3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during the academic year 2019-20.

Sl. No.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Calendar Year of publication	ISSN number	Link to the recognition in UGC enlistment of the Journal /Digital Object Identifier (doi) number		
							Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list
1	Inhibition Effects of Ethyl-2-Amino-4-Methyl-1,3-Thiazole-5-Carboxylate on the Corrosion of AA6061 Alloy in Hydrochloric Acid Media	Raviprabha.K	Chemistry	Journal of Failure Analysis and Prevention	2019	ISSN 1464–1474	https://link.springer.com/journal/11668	https://link.springer.com/article/10.1007/s11668-019-00744-5	Yes
2	5-(3-Pryridyl)-4H-1,2,4-triazole-3-thiol as Potential Corrosion Inhibitor for AA6061 Aluminium Alloy in 0.1 M Hydrochloric Acid Solution	Raviprabha.K	Chemistry	Surface Engineering and Applied Electrochemistry	2019	ISSN 1068-3755	https://link.springer.com/journal/11987	https://link.springer.com/article/10.3103/S1068375519060103	Yes
3	Electrochemical and Quantum Chemical Studies of 5-[(4-Chlorophenoxy) Methyl]-4H-1,2,4-Triazole-3-Thiol on the Corrosion Inhibition of 6061 Al Alloy in Hydrochloric Acid	Raviprabha.K	Chemistry	Journal of Failure Analysis and Prevention	2020	ISSN 1598–1608	https://link.springer.com/journal/11668	https://link.springer.com/article/10.1007/s11668-020-00954-2	Yes

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4	"Corrosion Inhibition Effect of Ethyl 1-(4-Chlorophenyl)-5-Methyl 1H-1,2,3-Triazole-4 Carboxylate on Aluminium Alloy in Hydrochloric Acid"	Raviprabha.K	Chemistry	Protection of Metals and Physical Chemistry of Surfaces	2020	ISSN 2070-2051	https://link.springer.com/journal/11124	https://link.springer.com/article/10.1134/S2070205120060209	Yes
5	Crystal structure, Hirshfeld surfaces and biological studies of 4, 5-dihydro-1,3,4-oxadiazole-2-thiones	Subbulakshmi N Karanth	Chemistry	Chemical Data Collections	2019	ISSN: 2405-8300	https://www.sciencedirect.com/journal/chemical-data-collections	https://www.sciencedirect.com/science/article/abs/pii/S2405830018302453	Yes
6	A highly selective chemosensor derived from benzamide hydrazones for the detection of cyanide ion in organic and organic-aqueous media: design, synthesis, sensing and computational studies	Subbulakshmi N Karanth	Chemistry	supramolecular chemistry	2020	ISSN: 1029 - 0478	https://www.tandfonline.com/journals/gsch20	https://www.tandfonline.com/doi/full/10.1080/10610278.2020.1770248	Yes
7	Corrosion inhibition of mild steel by 6-bromo-(4,5-dimethoxy-2-nitrophenyl)methylidine]imidazo[1,2-a]pyridine-2-carboxyhydrazide	Dr. Reena Kumari PD	Chemistry	AIP, conference proceedings	2020	ISSN: 1551-7616	https://pubs.aip.org/aip/acp	https://pubs.aip.org/aip/acp/article-abstract/2244/1/040006/723768/Corrosion-inhibition-of-mild-steel-by-6-bromo-4-5?redirectedFrom=PDF	Yes

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8	Some results on set colorings of directed trees	Nisha Reena Nazareth, Lolita Priya Castelino	Mathematics	Journal of Mathematical and Computational science	2020	ISSN: 1927-5307	J. Math. Comput. Sci. (scik.org)	https://scik.org/index.php/jmcs/article/view/4425	Yes
9	An Effect Of Sweep Angle On Roll Damping Derivative For A Delta Wing With Curved Leading Edges In Unsteady Flow	Renita Sharon Monis	Mathematics	International Journal of Mechanical and Production Engineering Research and Development	2019	ISSN: 2249-6890	https://journals.indexcopernicus.com/search/details?id=45150	[PDF] An Effect of Sweep Angle on Roll Damping Derivative for a Delta Wing with Curved Leading Edges in Unsteady Flow | Semantic Scholar	Yes
10	Effect of sweep angle and a half sine wave on roll damping derivative of a delta wing	Renita Sharon Monis	Mathematics	international Journal of recent Technology and Engineering	2019	ISSN: 2277-3878	https://www.tjprc.org/	https://issuu.com/tjprc/docs/35ijmperdapr201935	Yes
11	Evaluation of stiffness derivative for a delta wing with straight leading edges in unsteady flow	Renita Sharon Monis	Mathematics	International Journal of Engineering and Advanced Technology	2019	ISSN: 2249-8958	https://www.ijeat.org/	https://www.ijeat.org/wp-content/uploads/papers/v8i3S/C11610283S19.pdf	Yes

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12	Estimation Of Damping Derivatives For Delta Wings In Hypersonicflow For Straight Leading Edge	Renita Sharon Monis	Mathematics	International Journal of Mechanical and Production Engineering Research and Development	2019	ISSN: 2249-6890	https://www.tjprc.org/journals/journal-of-mechanical-engineering	https://issuu.com/tjprc/docs/22ijmperdoct201922	Yes
13	Analysis of Damping Derivatives for Delta Wings in Hypersonic Flow for Curved Leading Edges with Full Sine Wave	Renita Sharon Monis	Mathematics	International Journal of Engineering and Advanced Technology	2019	ISSN: 2249 – 8958	https://www.ijeat.org/	https://www.ijeat.org/wp-content/uploads/papers/v9i1/A3086109119.pdf	Yes
14	Analytical Estimation of Stability Derivatives of Wing with curved Leading Edges at Hypersonic Mach number	Renita Sharon Monis	Mathematics	Test Engineering And Management	2019	ISSN: 0193-4120	http://www.testmagzine.biz/index.php/testmagzine	http://testmagzine.biz/index.php/testmagzine/article/view/6133/4834	Yes
15	Estimation of Hypersonic Unsteady and Quasisteady damping derivatives for delta wings at large incidence Drives	Renita Sharon Monis	Mathematics	International Journal of Advanced Science and Technology	2020	ISSN: 2005-4238	International Journal of Advanced Science and Technology (sersc.org)	http://irep.iium.edu.my/81244/1/81244_Est%C4%B1mat%C4%B1on%20of%20Hypersonn%C4%B1c%20Unsteady.pdf	Yes

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16	Image Enhancement based on Fusion using 2D LPDCT and Modified PCA	Vasudeva	Computer Science & Engineering	International Journal of Engineering and Advanced Technology	2019	ISSN: 2249-8958	https://www.ijeat.org/	https://www.ijeat.org/wp-content/uploads/papers/v8i6S3/F12640986S319.pdf	Yes
17	Advanced Multispectral Image Fusion based on Frequency Partition and Normalization	Vasudeva	Computer Science & Engineering	Journal of Advanced Research in Dynamical & Control Systems	2019	ISSN: 1943-023X	https://www.jardcs.org/	https://www.jardcs.org/abstract.php?id=3939	Yes
18	Adaptive Receiver-Window Adjustment for Delay Reduction in LTE Networks	Adesh N D	Computer Science & Engineering	Journal of Computer Networks and Communications - Hindawi	2019	ISSN: 2090-7141	https://www.hindawi.com/journals/jcnc/	https://www.hindawi.com/journals/jcnc/2019/3645717/	Yes
19	Avoiding queue overflow and reducing queuing delay at eNodeB in LTE networks using congestion feedback mechanism	Adesh N D	Computer Science & Engineering	Computer Communications - Elsevier	2019	ISSN: 0140-3664	https://www.sciencedirect.com/journal/computer-communications	https://www.sciencedirect.com/science/article/abs/pii/S0140366419300131	Yes

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20	Sentimental Analysis of Student Feedback using Machine Learning Techniques	Adesh N D	Computer Science & Engineering	International Journal of Recent Technology and Engineering	2019	ISSN: 2277-3878	https://www.ijrte.org/	https://www.ijrte.org/wp-content/uploads/papers/v8i1s4/A11810681S419.pdf	Yes
21	Ambient Assisted Living: A review on Human Activity Recognition and Vital Health Sign Monitoring Using Deep Learning Approaches	Manoj T	Computer Science & Engineering	International Journal of Innovative Technology and Exploring Engineering	2019	ISSN: 2278-3075,	https://www.ijitee.org/	https://www.ijitee.org/wp-content/uploads/papers/v8i6s4/F11110486S419.pdf	Yes
22	Air Pollution Monitoring and Prediction System	Ramya D Shetty	Computer Science & Engineering	International Journal of Recent Technology and Engineering	2019	ISSN: 2277-3878	https://www.ijrte.org/	https://www.ijrte.org/wp-content/uploads/papers/v8i2S3/B11190782S319.pdf	Yes
23	Review on Women Security System	Dhanya Shenoy	Computer Science & Engineering	International Journal of Innovative Science and Research Technology	2019	ISSN: 2456-2165	https://www.ijisrt.com/	https://ijisrt.com/wp-content/uploads/2019/05/IJISRT19AP731.pdf	Yes

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24	An Efficient Multifocus Image Fusion Method using Curvelet Transformation and Normalization	Vasudeva	Computer Science & Engineering	International Journal of Future Generation Communication and Networking	2020	ISSN: 2233-7857	http://sersc.org/journals/index.php/ijfgcn	http://sersc.org/journals/index.php/IJFGCN/article/view/30151/16701	Yes
25	Review on Security in Wireless Sensor Networks	Manjunatha A S	Computer Science & Engineering	Journal of Critical Reviews	2020	ISSN-2394-5125	https://www.jcreview.com/	https://www.jcreview.com/admin/Uploads/Files/63149f90ad8c98.48446846.pdf	Yes
26	A survey on Efficient and Secure Techhiques for Storing Sensitive Data on Cloud	Dr. Raghavendra S	Computer Science & Engineering	International Journal of Computer Sciences and Engineering	2019	ISSN: 2347-2693	https://www.ijcseonline.org/	https://www.researchgate.net/publication/335807825_A_Survey_on_Efand64257cient_and_Secure_Techniques_for_Storing_Sensitive_Data_on_Cloud	Yes
27	Survey on Artificial Intelligence	Dr. Raghavendra S	Computer Science & Engineering	International Journal of Computer Sciences and Engineering	2019	ISSN: 2347-2693	https://www.ijcseonline.org/	https://www.ijcseonline.org/pdf_paper_view.php?paper_id=4488&300-IJCSE-07322-29.pdf	Yes

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28	A Survey on Challenges, Trends and Technologies of Internet of Things	Dr. Raghavendra S	Computer Science & Engineering	International Journal of Computer Sciences and Engineering	2019	ISSN: 2347-2693	https://www.ijcseonline.org/	https://www.ijcseonline.org/pdf_paper_view.php?paper_id=4653&154-IJCSE-07322-23.pdf	Yes
29	Hybrid Energy Efficient and QoS Aware Algorithm for Intelligent Transportation system in IoT	Dr. Raghavendra S	Computer Science & Engineering	International Journal of Grid and Utility Computing	2020	ISSN: 1741-8488	https://www.inderscience.com/jhome.php?jcode=ijguc	https://www.inderscience.com/info/inarticle.php?artid=110897	Yes
30	VASD 2 OM: Virtual Auditing and Secure De-duplication with Dynamic Ownership Management in Cloud	Dr. Raghavendra S	Computer Science & Engineering	InternationalJournal of Recent Technology and Engineering	2020	ISSN: 2277-3878	https://www.ijrte.org/	https://www.ijrte.org/wp-content/uploads/papers/v8i6/F7825038620.pdf	Yes
31	CRUPA: Collusion Resistant User Revocable Public Auditing of Shared Data in Cloud	Dr. Raghavendra S	Computer Science & Engineering	Journal of Cloud Computing, Advances, Systems and Applications	2020	ISSN: 2192-113X	https://journalofcloudcomputing.springeropen.com/	https://journalofcloudcomputing.springeropen.com/counter/pdf/10.1186/s13677-020-00188-5.pdf	Yes

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32	Multifocus Image Fusion Based On Multiresolution And Modified Principal Component Analysis	Vasudeva	Computer Science & Engineering	ICTACT Journal on Image and Video Processing	2020	ISSN: 0976-9102	https://ictactjournals.in/IJIVP/AboutIjivp.aspx	https://ictactjournals.in/paper/IJIVP_Vol_11_Iss_2_Paper_10_2345_2353.pdf	Yes
33	Character Recognition of Tulu Script Using Convolutional Neural Network	Sachin Bhat	Electronics & Communication Engineering	Advances in Artificial Intelligence and Data Engineering. Springer	2020	978-981-15-3513-0	https://link.springer.com/book/10.1007/978-981-15-3514-7	https://link.springer.com/chapter/10.1007/978-981-15-3514-7_11	Yes
34	Anthropometric Measurement Extraction Using Perspective Transform	Sachin Bhat	Electronics & Communication Engineering	Journal of Critical Reviews	2020	ISSN: 2394-5126	https://www.jcreview.com/	Journal of Critical Reviews (jcreview.com)	Yes
35	Stress State Detection of Social Media user using Neural Network based Factor Graph Model	Sachin Bhat	Electronics & Communication Engineering	Test Engineering and Management	2020	ISSN: 0193-4120	http://www.testmagzine.biz/index.php/testmagzine	http://testmagzine.biz/index.php/testmagzine/article/view/6921	Yes
36	Comparative Physical Study Of Evans Blue By Fe3o4@Cf-R Coated Combination Of Decorated Go And Tio2 Magnetic Nanocomposite	Sachin Bhat	Electronics & Communication Engineering	Rasayan: Journal of Chemistry	2020	ISSN: 0974-1496	https://rasayanjournal.co.in/	https://rasayanjournal.co.in/archiveissue.php?issueid=20	Yes

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37	Preprocessing of historical manuscripts using phase congruency and gaussian mixture model	Sachin Bhat	Electronics & Communication Engineering	Far East Journal of Electronics and Communication	2019	ISSN: 0973-7006	https://www.pphmj.com/journals/fjec.htm	http://www.pphmj.com/abstract/12357.htm	Yes
38	Restoration of Characters in Degraded Inscriptions using Phase Based Binarization and Geodesic Morphology	Sachin Bhat	Electronics & Communication Engineering	International Journal of Recent Technology	2019	ISSN: 2277-3878	https://www.ijrte.org/	https://www.ijrte.org/portfolio-item/F2669037619/	Yes
39	Text extraction and a deep CNN based model for character classification in Kannada documents	Sachin Bhat	Electronics & Communication Engineering	Journal of Innovative Technology and Exploring Engineering, Elsevier	2019	ISSN: 2278-3075	https://www.ijitee.org/	https://www.ijitee.org/wp-content/uploads/papers/v8i8/H7418068819.pdf	Yes
40	Design and Analysis of 8-T and 5-T based XOR and XNOR gates using Soft Computing Tools	Sowmya Bhat	Electronics & Communication Engineering	International Journal of Engineering Research & Technology	2019	ISSN: 2278-0181	https://www.ijert.org/	https://www.ijert.org/design-and-analysis-of-8-t-and-5-t-based-xor-and-xnor-gates-using-soft-computing-tools	Yes
41	Face Recognition student attendance system using Deep Learning	Chetan R	Electronics & Communication Engineering	IJCESR	2020	ISSN: 2393-8374	https://troindia.in/journal/ijcesr/	https://troindia.in/journal/ijcesr/vol7iss8/24-28.pdf	Yes

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42	A combination of Wireless and Optical Mode Communication in Sensor Networks for Efficient Data Transmission	Balachandra Achar	Electronics & Communication Engineering	Journal of critical reviews	2020	ISSN-2394-5125	https://www.jcreview.com/	https://www.jcreview.com/admin/Uploads/Files/632d53d56da6b9.39545757.pdf	Yes
43	Random Forest Algorithm based Strain Analysis on Composite Materials using Digital Image Processing	Balachandra Achar	Electronics & Communication Engineering	IJAST	2020	ISSN: 2207-6360	http://sersc.org/journals/index.php/IJAST	http://sersc.org/journals/index.php/IJAST/article/view/23271	Yes
44	Dual Parametric Stabilization of Interference and Throughput in Wireless Sensor Network- Optical Communication	Balachandra Achar H V	Electronics & Communication Engineering	International Journal of Advanced Trends in Computer Science and Engineering	2019	ISSN 2278-3091	https://www.warse.org/IJATCSE/	https://www.warse.org/IJATCSE/static/pdf/file/ijatcse18852019.pdf	Yes
45	Experimental and Numerical Investigations on Heat Transfer Characteristics of Open Cell Al6061 Alloy Foam	Raja Yateesh Yadav	Mechanical Engineering	International Journal of Research	2019	ISSN: 2236-6124	https://ijrpublisher.com/	https://app.box.com/s/f0bk0ho9i1rsuxdwnltt4d8ri8rk1lk2	Yes
46	Development of Eco-Friendly Silencer	Raja Yateesh Yadav	Mechanical Engineering	Studies in Indian Place Names	2020	ISSN: 2347-3150	https://www.tpnsindia.org/index.php/sipn	https://www.academia.edu/65833223/Development_of_Eco_Friendly_Silencer	Yes

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47	Improvement of Mechanical Properties of Aluminium 6061 based Metal Matrix Composite with Addition of Granite Particulate	Raja Yateesh Yadav	Mechanical Engineering	International Journal of Innovative Technology and Exploring Engineering	2020	ISSN: 2278-3075	https://www.ijitee.org/	https://www.ijitee.org/wp-content/uploads/papers/v9i7/G5011059720.pdf	Yes
48	Optimization of ball-burnishing process parameters on surface roughness, micro hardness of Mg–Zn–Ca alloy and investigation of corrosion behavior	Aditya Kudva S	Mechanical Engineering	Materials Research Express	2019	ISSN 2053-1591	https://iopscience.iop.org/journal/2053-1591	https://iopscience.iop.org/article/10.1088/2053-1591/ab40f2	Yes
49	Influence of Ball Burnishing Process on Equal Channel Angular Pressed Mg-Zn-Si Alloy on the Evolution of Microstructure and Corrosion Properties	Gajanan Anne	Mechanical Engineering	Silicon, Springer	2020	ISSN: 1549–1560	https://link.springer.com/journal/12633	https://link.springer.com/article/10.1007/s12633-020-00541-y	Yes
50	Investigation of Dry Sliding Wear Properties of Multi-directional Forged Mg-Zn Alloys	Gajanan Anne	Mechanical Engineering	Journal of Magnesium and Alloys, Elsevier	2019	ISSN: 2213-9567	https://www.sciencedirect.com/journal/journal-of-magnesium-and-alloys	https://www.sciencedirect.com/science/article/pii/S2213956719300623	Yes

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51	Effects of combined multiaxial forging and rolling process on microstructure, mechanical properties and corrosion behavior of a Cu-Ti alloys	Gajanan Anne	Mechanical Engineering	Materials Research Express, IOP science	2019	ISSN 2053-1591	https://iopscience.iop.org/journal/2053-1591	https://iopscience.iop.org/article/10.1088/2053-1591/ab0764/meta	Yes
52	Influence of Multi-Direction Forging on Microstructural, Mechanical and Corrosion Behaviour of Mg-Zn Alloy	Gajanan Anne	Mechanical Engineering	Journal of Materials Engineering and Performance, Springer	2019	ISSN: 1059-9495	https://link.springer.com/journal/11665	https://link.springer.com/article/10.1007/s11665-019-04007-0	Yes
53	Development, Characterization, Mechanical and Corrosion Behaviour Investigation of Multi-direction Forged Mg–Zn Alloy	Gajanan Anne	Mechanical Engineering	Magnesium Technology 2019, Springer	2019	ISSN: 1545-4150	https://link.springer.com/book/10.1007/978-3-030-05789-3	https://link.springer.com/chapter/10.1007/978-3-030-05789-3_50	Yes
54	Effect of rolling reduction on microstructure and mechanical properties Cu-3%Ti alloy	Gajanan Anne	Mechanical Engineering	Advances in Manufacturing Technology, Springer	2019	ISSN: 2195-4356	https://link.springer.com/book/10.1007/978-981-13-6374-0	https://link.springer.com/chapter/10.1007/978-981-13-6374-0_20	Yes

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55	Enhancing streamflow forecasting using the augmenting ensemble procedure coupled machine learning models: Case study of Aswan High Dam	Sujay Raghavendra Naganna	Civil Engineering	Hydrological Sciences Journal	2019	ISSN: 0262-6667	https://www.tandfonline.com/	https://www.tandfonline.com/doi/full/10.1080/02626667.2019.1661417	Yes
56	Multiple AI model integration strategy—Application to saturated hydraulic conductivity prediction from easily available soil properties	Sujay Raghavendra Naganna	Civil Engineering	Water Resources Management	2020	ISSN: 0920-4741	https://www.sciencedirect.com/journal/soil-and-tillage-research/vol/196/suppl/C	https://www.sciencedirect.com/science/article/abs/pii/S0167198719301795	Yes

Total count as per the SOP of the metric given by NAAC i.e paper per teacher = 56+1 = 57

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TECHNICAL ARTICLE—PEER-REVIEWED

Inhibition Effects of Ethyl-2-Amino-4-Methyl-1,3-Thiazole-5-Carboxylate on the Corrosion of AA6061 Alloy in Hydrochloric Acid Media

K. Raviprabha · Ramesh S. Bhat

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Abstract The corrosion inhibition efficiency of ethyl-2-amino-4-methyl-1,3-thiazole-5-carboxylate (EMTC) has been studied to prevent the corrosion of AA6061 alloy in 0.05 M HCl solution by weight loss, electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization (Tafel) methods at temperatures 303–323 K. Ethyl-2-amino-4-methyl-1,3-thiazole-5-carboxylate acted as a mixed-type inhibitor, and its efficiency increased with the increase in inhibitor concentration and temperature. Chemisorptions on the metal surface are revealed by kinetic and thermodynamic parameters. A surface morphology study of polished, corroded and inhibited metal surfaces verified the formation of a protective film.

Keywords AA6061 · EIS · Polarization · SEM · Adsorption · Inhibitor · Chemisorptions · Corrosion rate

Introduction

Due to the recyclability, outstanding physical and mechanical characteristics such as low density, high heat conductivity, good weldability and very elevated strength-to-weight ratio, aluminum and its alloys found applications in industry [1–4]. AA6061 aluminum alloys possess relatively excellent corrosion resistance, formability and low cost, so they are commonly used in aerospace, automotive, aviation and construction sectors [5]. The most important feature of aluminum is its corrosion resistance due to the presence of a thin, adherent and protective surface oxide film. Aluminum and its alloy, however, are reactive materials and are prone to corrosion [6, 7]. In the face of the hostile setting, the enhanced particulate depletes the aluminum protective oxide adherent oxide film and accelerates the corrosion [8, 9].

These materials will be significantly dissolved during industrial acid cleaning and acid pickling. Electrochemical, chemical etching and material losses will occur [10, 11]. Hydrochloric acid is used extensively because it is cheaper than other mineral acids and has no problems for industrial applications [12]. Although multiple methods, material selection, appropriate design, anodic and cathodic protection are available and different kinds of technologies are accessible for corrosion control, the use of organic heterocyclic compounds as timely and industrially suggested [13, 14]. The acid attack can be protected by the usage of corrosion inhibitors.

Number of the literature revealed that most corrosion inhibitors are organic compounds consisting of electronegative oxygen, sulfur, nitrogen and phosphorous atoms, unsaturated bonds and aromatic rings [15–21]. Compounds with the groups –C=N–, electron-donating and electrons have been noted to have a tendency to inhibit the effect of corrosion on Al alloy in acidic medium [22]. Compounds like triazole contain heterocyclic structures, which in aggressive media are deemed to have excellent inhibition properties [23]. Lagrenée et al. synthesized a series of 3,5-disubstituted 1,2,4-triazole compounds which shows outstanding effectiveness for corrosion inhibition [24–29]. It was observed that, in addition, 3 and/or 4-substituted triazole derivatives by thiol or amino group

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Russian Text © The Author(s), 2019, published in Elektronnaya Obrabotka Materialov, 2019, No. 6, pp. 108–118.

5-(3-Pryridyl)-4H-1,2,4-triazole-3-thiol as Potential Corrosion Inhibitor for AA6061 Aluminium Alloy in 0.1 M Hydrochloric Acid Solution

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Abstract—Corrosion inhibition performance of 5-(3-Pryridyl)-4H-1,2,4-triazole-3-thiol on aluminium alloy AA6061 in 0.1 M HCl solution was tested by the weight loss method, potentiodynamic polarization and electrochemical impedance spectroscopy. The effect of an increase in temperature and a change in the concentration of the inhibitor were studied. The results indicated that with an increase in the concentration of the inhibitor and temperature the inhibition efficiency also increased. The inhibition efficiency as high as 94.1% was found at 60°C for 40 ppm of the inhibitor. By the perusal of thermodynamic and activation parameters, it is found that adsorption of the studied inhibitor takes place through chemisorption. The inhibitor agrees the Langmuir adsorption isotherm and acts as a mixed type inhibitor. Thermodynamic parameters also unveiled that the process of adsorption on the metal surface takes place through chemisorption. The formation of a protective film on the metal surface was confirmed by scanning electron microscopy. From the mechanism of corrosion inhibition, it is possible to deduce the formation of a coordination bond between the inhibitor and the metal surface. The inhibition nature of the molecule was explained by theoretical studies.

Keywords: aluminium alloy AA6061, corrosion inhibitor, electrochemical impedance spectroscopy, scanning electron spectroscopy

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INTRODUCTION

Corrosion is a destructive (or deterioration) attack on metals and alloys by chemical or electrochemical reactions whenever it is exposed to a corrosive atmosphere. Aluminium is widely used in manufacturing automobiles, aircrafts, household appliances, containers, and electronic devices [1]. The structural components of aircrafts or submarines are largely fabricated from high strength Al alloys that contain alloying elements like Cu, Mg, Fe, Si and Mn [2, 3]. Such alloys have acceptable mechanical properties and higher strength to weight ratios. Aluminium and its alloys finds potential applications in the field of industries, building constructions, kitchen, defence, automobile and electronics etc., even with its higher susceptibly to corrosion due to its low reduction potential of −1.66 V and higher oxidation tendency [4, 5].

Aluminium shows resistance to corrosion due to the formation of a stable metal oxide film [6]. But in the presence of an acidic medium like hydrochloric acid, the amphoteric oxide film gets ruptured when the pH falls below 4. Acidic solutions are widely used in industries for surface cleaning techniques. These are obligatory for almost all metal specimens, even for the most expensive coatings. Surface cleaning techniques include pre-finishing operations such as stripping, pickling, and chemical cleaning process [7, 8]. A corrosion problem takes place as a result of the interface between aqueous acidic solutions and the metals, especially during the pickling process in which an alloy is brought in contact with concentrated acids. This process if not combated can lead to economic losses due to the corrosion of the alloy [9].

The use of a corrosion inhibitor is one of the best methods for the protection of metals from corrosion. Most of the inhibitors used are organic compounds having heteroatoms, unsaturated bonds/aromatic rings which can donate lone pairs of electrons such as phosphorus, sulphur, nitrogen, and π electrons, through which inhibitor molecules interact with the metal surface by which adsorption takes place [10–12]. Most of the inhibitors are toxic, even though they exhibit superior inhibition properties. The anticorrosion properties of a novel compound 2-(4-(diethylamino)-2-hydroxybenzyledene) hydrazinecarboamideon the aluminium alloy AA2024-T3 in 0.5 M HCl

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TECHNICAL ARTICLE—PEER-REVIEWED

Electrochemical and Quantum Chemical Studies of 5-[(4-Chlorophenoxy) Methyl]-4*H*-1,2,4-Triazole-3-Thiol on the Corrosion Inhibition of 6061 Al Alloy in Hydrochloric Acid

K. Raviprabha · Ramesh S. Bhat

Submitted: 15 February 2020 / Accepted: 13 July 2020 / Published online: 10 August 2020

Abstract Corrosion inhibition studies of 5-[(4-chlorophenoxy) methyl]-4*H*-1, 2, 4-triazole-3-thiol (CMTT) on 6061 Al alloy in 0.05 M HCl were carried out at different concentrations and temperatures. Weight loss method, potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) were employed in the study. Higher concentration and temperature were found to improve the efficiency of inhibitor. Highest corrosion resistance of 95.29% was recorded with 100 ppm CMTT at 333 K. Adsorption of the inhibitor was spontaneous as indicated by Langmuir adsorption isotherm. Thermodynamic parameters, SEM, AFM results indicated that inhibitor used protects the alloy from corrosion. Quantum chemical parameters such as highest occupied molecular orbital energy (E_{HOMO}), lowest unoccupied molecular orbital energy (E_{LUMO}), energy gap (ΔE), dipole moment (l) and Mulliken charges are calculated. Quantum chemical calculations also endorsed experimental information and the adsorption of inhibitor molecules onto the metal surface.

Keywords Corrosion · Inhibitor · 6061Al alloy · HCl · SEM · AFM

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Introduction

Aluminum has a special advantage of being lighter in its multifarious industrial applications coupled with a fairly strong negative standard reduction potential [1]. Aluminum and its alloys are used in industries due to economic recyclability and outstanding mechanical and physical characteristics such as low density, string heat conductive characteristics and good solderability [2]. Due to relative excellent resilience to corrosion, formability and low price, 6061 Al alloys are widely used in the aerospace, household, electric, automotive, marine and other construction sectors [3]. The most important feature of aluminum is its corrosion resistance due to the existence of a thin adherent and protective surface oxide film. Notwithstanding this favorable factor, the alloy is susceptible to corrosion [4, 5], especially under industrial acid cleaning, acid pickling, electrochemical and chemical grafting [6, 7].Though proper design and use of anodic and cathodic protection can go a long way in controlling corrosion, the use of organic heterocyclic compounds as inhibitors is a much desired alternative.

Many numbers of literatures abound in the use of various organic compounds with a primary elemental composition of oxygen, sulfur and phosphorous in their structure along with unsaturated bonds or aromatic rings [8, 9]. Several studies have been conducted earlier with triazole as central moiety deemed to have outstanding inhibition properties in different aggressive media [10–13]. For example, Lagrenée et al. tried 3,5-disubstituted 1,2,4-triazole series of compounds achieving remarkable corrosive inhibition [14–19]. Especially thiol- or amino-group substitution in triazole was found to effect much better inhibition [20–27].

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PHYSICOCHEMICAL PROBLEMS OF MATERIALS PROTECTION

Corrosion Inhibition Effect of Ethyl 1-(4-chlorophenyl)-5-methyl-1*H*-1,2,3-triazole-4-carboxylate on Aluminium Alloy in Hydrochloric Acid

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Abstract—The inhibition efficiency of Ethyl 1-(4-chlorophenyl)-5-methyl-1*H*-1,2,3-triazole-4-carboxylate (ETC) on AA6061 Aluminium (Al) alloy in 0.1M HCl solution was tested through weight loss, potentiodynamic polarisation and electrochemical impedance spectroscopy methods. The experimental results show that the inhibition efficiency of ETC increased with an increase in inhibitors concentration and temperature. Potentiodynamic polarisation indicated that the inhibitor is mixed type. From Langmuir isotherm, it was hypothesized the adsorption of inhibitors on AA6061 alloy surface might occur by physical and chemical interaction; however, the activation energy raised suggests a chemisorption process for the interaction of the inhibitor on AA6061 alloy surface. Scanning electron microscopy was used to characterise the surface morphology of the alloy in presence and in the absence of the inhibitor.

Keywords: AA6061, corrosion, ETC, polarisation, EIS, SEM
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1. INTRODUCTION

The corrosion of aluminium and its alloys has drawn considerable attention from many scientists because of their elevated mechanical strength, low price, low density and excellent machinability, and they have been commonly used in industrial applications, particularly in construction, electronics, packaging, storage and transportation facilities and machinery [1, 2]. Aluminium is mainly resistant to corrosion owing to its thin, adherent surface oxide film. However, aluminium and its alloy are reactive materials and are susceptible to corrosion [3]. Upon exposure to aqueous solution, a powerful adherent and constant passive oxide film is created on Al. This surface film dissolves when the metal is subjected to elevated acid or base concentrations [4]. Hydrochloric acid is generally used in industrial applications such as cleaning, etching, de-scaling etc. These processes lead to metal loss through corrosion [5]. One of the most significant techniques is to use sulfur, oxygen or nitrogen containing organic compounds as corrosion inhibitors to prevent the corrosion response and thereby decrease the rate of corrosion. Compounds with π-bonds also usually have excellent inhibitive characteristics owing to an orbital interaction with the metal surface [6]. The inhibition of such compounds is based on its molecular adsorption capacity, which isolates the metal from corrosion. By chemisorption, physical adsorption or complexation, the inhibitors are attached to metal surfaces with polar groups functioning as reactive centres in the molecules [7–10].

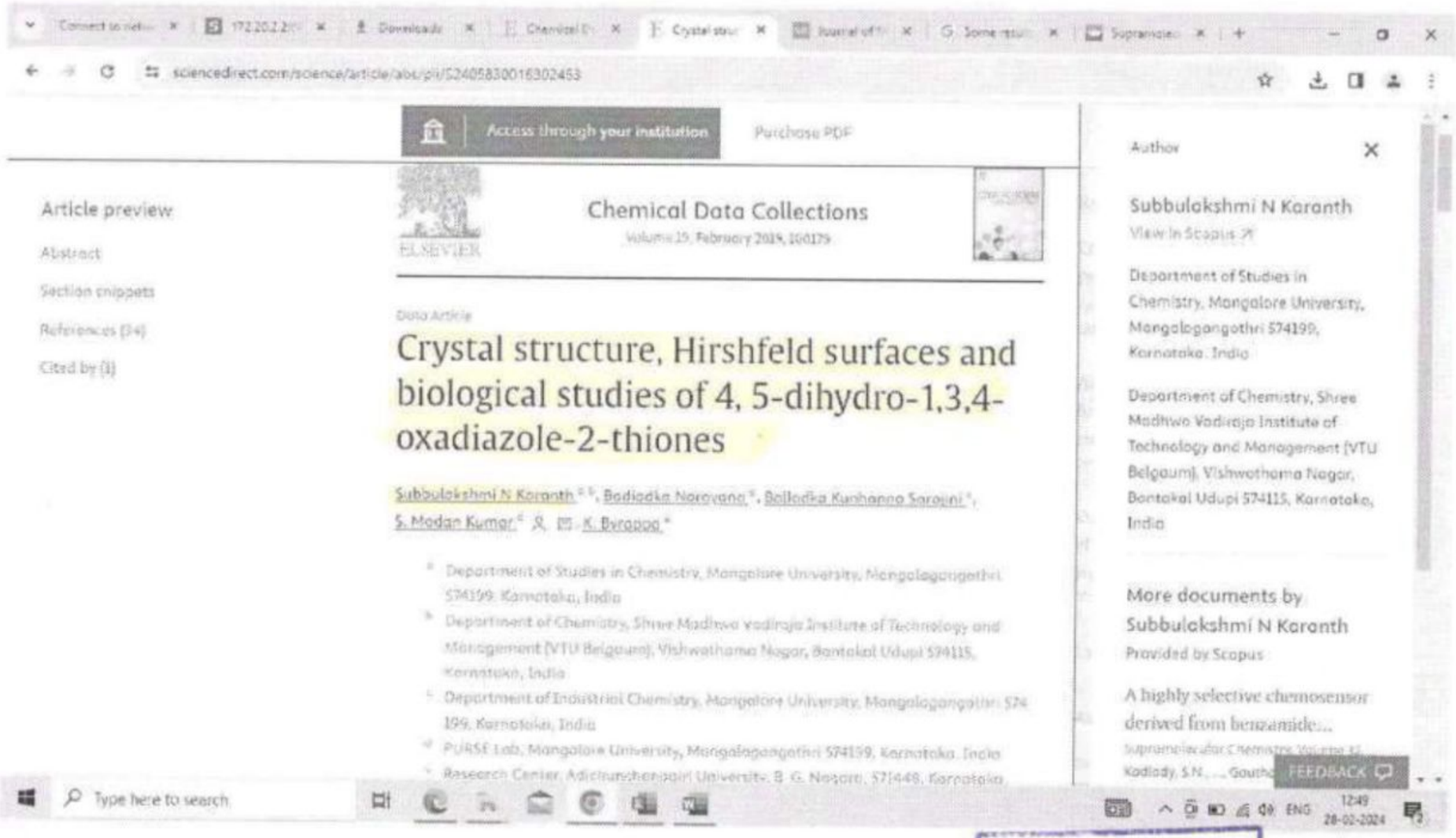
Gabriel O. Resende, et al., [11] synthesised and studied the anticorrosion properties of Ethyl 1-(4-nitrophenyl)-5-methyl-1*H*-1,2,3-triazole-4-carboxylate on carbon steel alloy in 1 mol/L HCl solution by electrochemical and weight loss method. They showed that inhibition effectiveness was found to improve with a rise in inhibitor concentration.

In the present research, the impact of Ethyl 1-(4-chlorophenyl)-5-methyl-1*H*-1,2,3-triazole-4-carboxylate (ETC) in 0.1M HCl solution as a corrosion inhibitor for AA6061 Al alloy is explained. Weight loss technique, potentiodynamic polarization and EIS techniques were used to test alloy coupons. Taking into account the impact of temperature as well as activation and thermodynamic parameters, the mechanism of adsorption by the inhibitor was explored.

2. EXPERIMENTAL PROCEDURE

2.1. Preparation of Specimen

Corrosion studies were carried out on AA6061 alloy specimen. The composition of AA6061 Al alloy is given in Table 1. The aluminium sample was drawn



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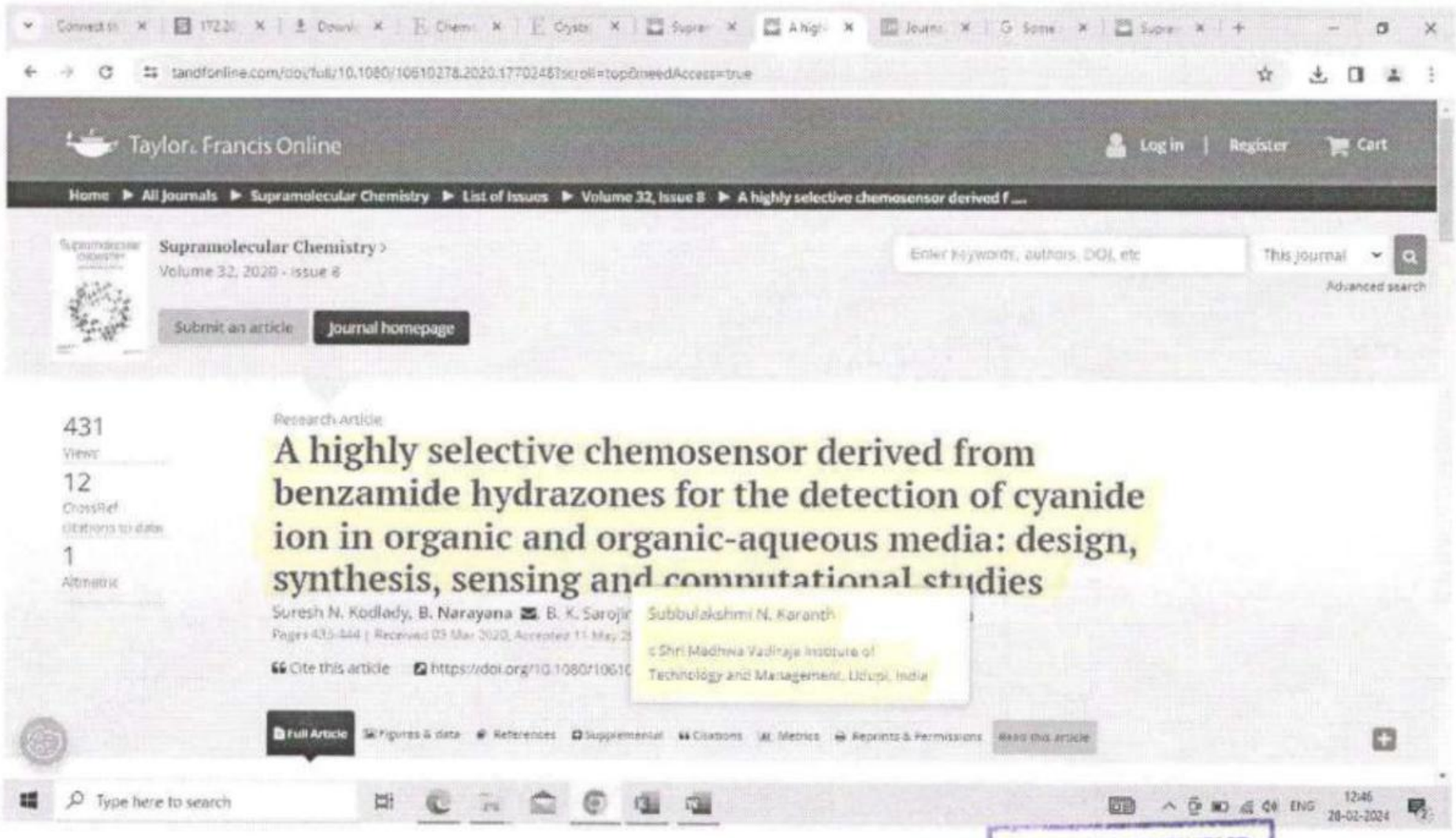

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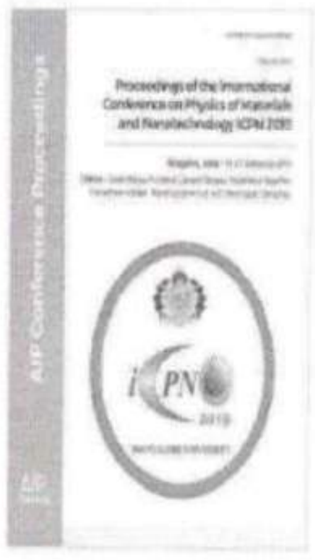

RESEARCH ARTICLE | JUNE 26 2020

Corrosion inhibition of mild steel by 6-bromo-(4,5-dimethoxy-2-nitrophenyl)methylidene]imidazo[1,2-a]pyridine-2-carbohydrazide in 0.5M hydrochloric acid solution

Karkala Shenoy Vranda; Pattacheravanda Devaiah Reena Kumari

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SOME RESULTS ON SET COLORINGS OF DIRECTED TREES

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Abstract. A set coloring of the digraph D is an assignment (function) of distinct subsets of a finite set X of colors to the vertices of the digraph, where the color of an arc, say (u,v) is obtained by applying the set difference from the set assigned to the vertex v to the set assigned to the vertex u which arc also distinct. A set coloring is called a strong set coloring if sets on the vertices and arcs are distinct and together form the set of all non empty subsets of X. A set coloring is called a proper set coloring if all the non empty subsets of X are obtained on the arcs of D. A digraph is called a strongly set colorable (properly set colorable) if it admits a strong set coloring (proper set coloring).

In this paper we find some classes of directed trees which admit a strong set coloring and construction of strongly set colorable directed tree $\overrightarrow{T'_n}$.

Keywords: set coloring; strong (proper)set coloring; digraphs.

2010 AMS Subject Classification: 05C20, 05C78.

1. INTRODUCTION

In this paper, we consider only finite simple digraphs. For all notations we follow Harary [1]. The notion of set coloring of a graph has been introduced by Hegde [2] in 2009. Further Hegde and Sumana [4] determined the set coloring number of certain graphs.

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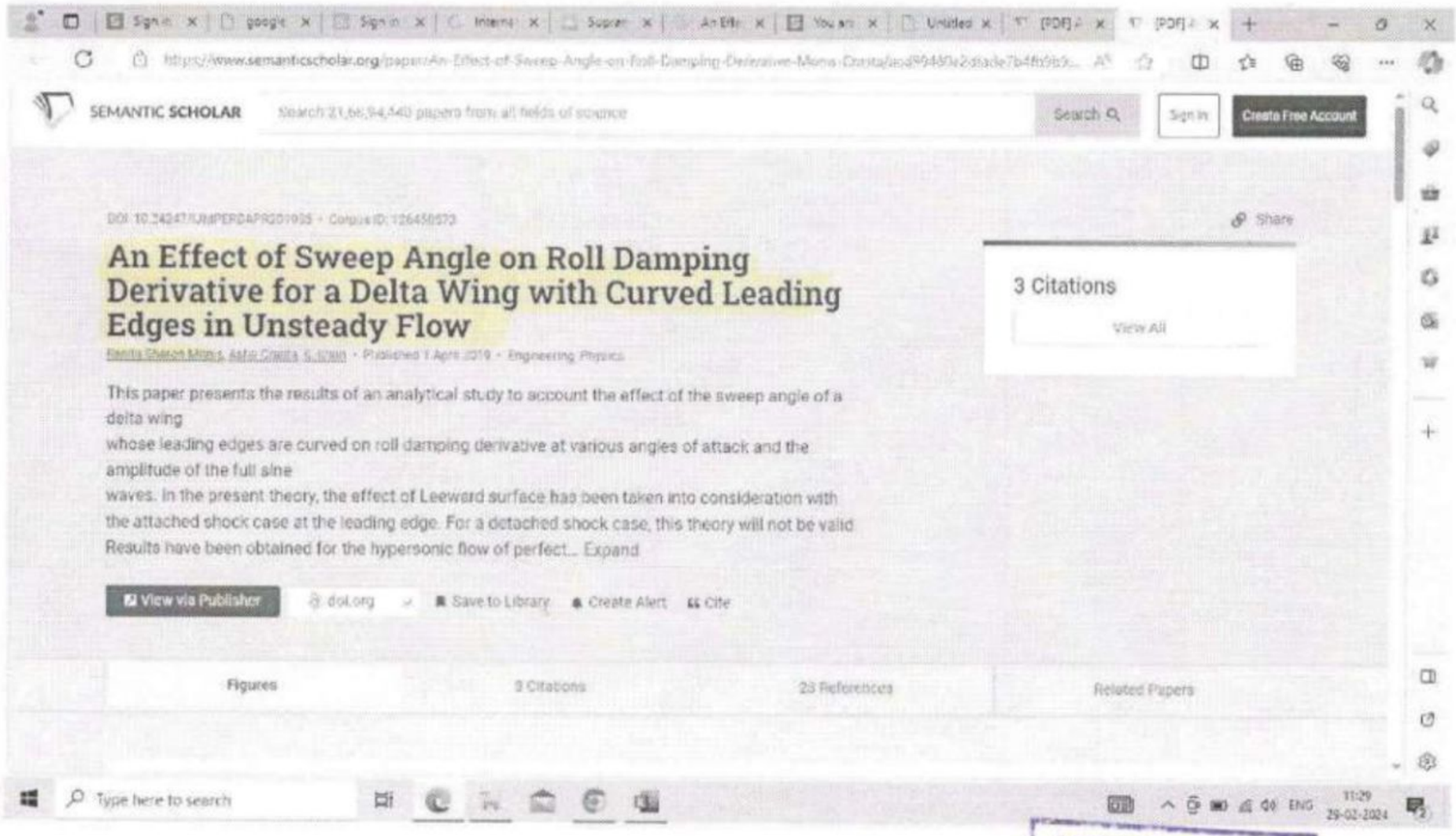

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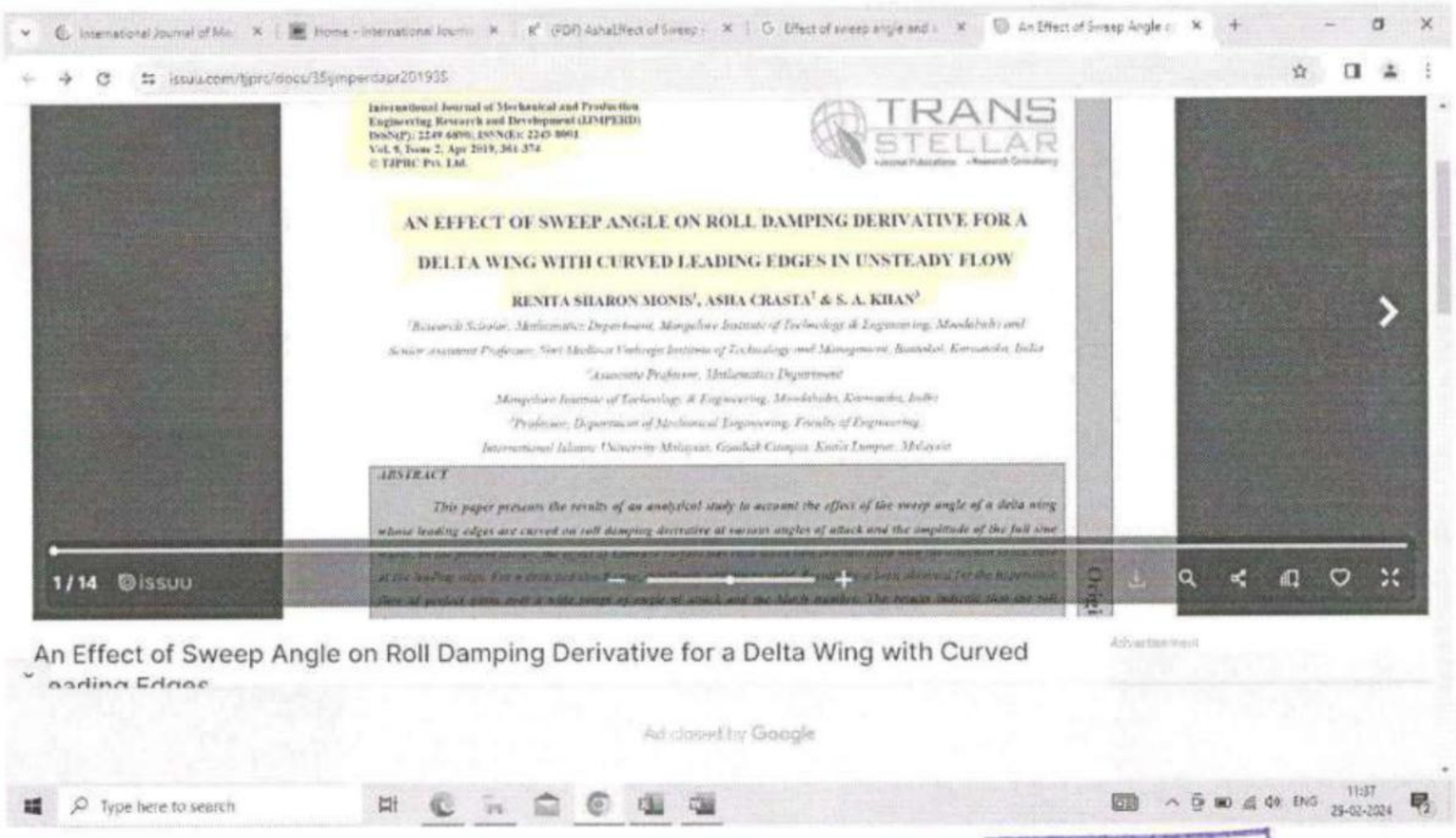

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Evaluation of Stiffness Derivative for a Delta Wing with Straight Leading Edges in Unsteady Flow

Renita Sharon Monis, Asha Crasta, S.A. Khan.

Abstract: ***The emphasis of this paper is to examine the Stiffness derivative variation with the pivot position by varying Mach number in unsteady flow and its comparison with quasi-steady flow of Crasta& Khan for varying angle of attack with different Mach number. From the results, it is evident that Stiffness derivative decreases as the Mach number increases. Comparison with Liu as well as Crasta& Khan theory it is evident that there is an improvement in the present theory being unsteady over quasi-steady theory, in addition to the fact that in the present work the pressure on the leeward surface is taken into account which results in increased value of the stability derivative and the same is clearly visible in results.***

Index Terms -Delta wing, Hypersonic, Straight leading edge, Unsteady.

I. INTRODUCTION

Ghosh [1] has developed a 2D large deflection hypersonic similitude. The resulting piston theory is not restricted to slender shapes as in the cases of Lighthill's [2] and Miles [3] piston theories. Ghosh's piston theory has been applied (Ghoshet al. [4]) to oscillating plane ogives to predict C_{m_q} .The similitude was extended to non-slender cones/quasi cones,and a new kind of piston motion, called conico-annular piston motion was given by Ghosh[5]. Oscillating delta wings at large incidence was treated by Ghosh[6].

According to Liu &Hui [7] depending on the combination of flight Machnumber,the angle of attack, the ratio of specific heats of the gas and the swept back angle of the wing for an oscillating triangular wing in supersonic/hypersonic flow the shock wave may be attached or detached from the leading edges.

Etkin [8] and Levin [9] have shown the separate effects of the pitch rate and incidence rate on the pitching moment. Hui et al. [10] have studied the problem of stability of an oscillating flat plate wing of arbitrary plan form placed at a specified mean angle of attack in supersonic/hypersonic flow by applying strip theory. The plane piston theory of Ghosh was applied with the inclusion of wave reflection effect to obtain in closed form $C_{m_{\dot{\alpha}}}$ for non-slender wedges/plane ogives in Hypersonic flow (Ghoshet al. [11]).

Ghosh [12] has given a unified hypersonic similitude,and a consequent piston theory which is valid for wedges/quasi-wedges for any Mach number greater than 1 and $E \le 0.3$ provided bow shock is attached. It is assumed that at each spanwise station, the flow is 2-D with the shock attached.

To assess the overall stability the moment derivatives due to the pitch rate as well as incident rate should be evaluated. In the present work, the unified similitude of Ghosh [14] along with the extended theory of Crasta& Khan is combined with strip theory to obtain the unsteady moment derivative for the delta wing with the straight leading edge.
In this paper, an attempt has been made to study the Stiffness derivative with different pivot position which gives the better comparison with the theory developed by Liu as well as Crasta& Khan.

Implemented two-dimensional slender body theory in supersonic/hypersonic flow at the high angle of attack for various Mach number by utilizing the concept of piston theory, relations for stability derivatives were obtained for a wedge, which depends on the flight Mach number and semi vertex angle of the wedge [16]–[23].

The theory developed by Crasta and Khan [24]-[25] which is a quasi-steady can now be extended to unsteady theory to predict the formulae for Stiffness derivative.

Khan et al., [26] analytical and numerical methods are used to evaluate flow over a wedge at supersonic Mach numbers. Closed form solutions are obtained for the various semi-vertex angle of the wedge and the Mach numbers

Renita et al., [27] an analytical study to account the effect of the sweep angle of a delta wing whose leading edges are curved on roll damping derivative at various angles of attack and the amplitude of the full sine waves?

Musavir et al., [28] simulated the trajectory of the unguided rolling projectiles at varying Mach numbers using aerodynamic coefficients. The aerodynamic coefficients are estimated using an aerodynamic prediction code, Missile DATCOM. The predicted stability derivatives will determine the design criteria, and also their effect on the design aspects (stability and accuracy) of the projectile. To satisfy the condition of stability for the trajectory of the projectile, a model of 6 DOF equations has been used.

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TRANS STELLAR

ESTIMATION OF DAMPING DERIVATIVES FOR DELTA WINGS IN HYPERSONIC FLOW FOR STRAIGHT LEADING EDGE

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ABSTRACT

Accurate estimation of the aerodynamic stability derivatives of airplanes is essential to evaluate the performance of the aircraft, whether civilian or military. Theoretical prediction methods for the dynamic stability derivatives at high angles of attack have not advanced, and in the present paper, an attempt has been made to study the effect of damping derivatives for delta wings for different angles of incidence, and the Mach number for a wing whose leading edge is straight. In this paper, the flow is considered to be unsteady flow and also considering the effect of the Leeward surface along with the

Analysis of Damping Derivatives for Delta Wings in Hypersonic Flow for Curved Leading Edges with Full Sine Wave

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TEST Engineering & Management

March - April 2020
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Analytical Estimation of Stability Derivatives of Wing with curved Leading Edges at Hypersonic Mach number

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Abstract

This paper focusses attention on theinfluence of prominent curvedends torestrainingderivedowing to the transversefrequency for the numerous amplitude, flow reboundperspective δ, hingelocation, and the inertia. In the currentlearning by the consequence of expansion fan on the expansion side (i.e., Leeward surface) are neglected.Outcomesof the demonstrationare that with the increase of the amplitude of the half-sine wave, there is a progressive increase in thehamperingspinoffs from k = 0, advancedto the TE, it declines up to the whereabouts of the normal force location and just opposite trend. At the place of k = 0.4,while we deliberate the permanencespinoffs in curbing for the lev pitch q, there is a reduction in the mathematicaltenets of the derivatives, and this trend continues till k = 1 towards the trailing edge. This upsurge is not linear and not like for position near the foremost edges.The change in the enormousness of the inhibitingresults because of the deviations in the Mach (M), flow deflection angle δ, and the amplitude of the sine wave persisted in the identicalkind.

Keywords; *Trailing Edge, wing, Angle of attack, Curved leading edge.*

I. INTRODUCTION

In the study of aerodynamics, the role of the delta wing plays an important role. Many people have tried may shape of the wings. Right from the rectangular wing, tapered wing, and finally the delta wing. The delta wing has a distinct behavior due to the delay in the drag divergence Mach number. This implies that not only will it delay the hindrance disagreement Mach (M) but also will result in a decrease in the drag of the wing. This is a distinct advantage over the other shapes of the wings. This paper focuses attention on theanalysis of damping derivative for various Mach numbers, and the deflection angle is studied for a half-sine leading edge. In the present study, the effect on the expansion side (i.e., the lee side) is neglected as the contribution from the lee side will negligible at hypersonic Mach numbers. Due to the high demand for high performance efficient military vehicles, the scrutiny of hypersonic flow above delta wings done varied range of deflection direction δ is of utmost importance. In the design process, there is a need for developing reasonable but straightforward and very accurate methods to predict the stability derivatives. The current discussion transactions with the variables of flow equalities & investigation of flow at high-speed with aforemostdomedverge for a wing. For a conventionalforemostverge has a rectilinear dissemination of the sideapparent area.In this case, we are substituting a conventionalforemostverge by a half-sine wave.

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Estımatıon Of Hypersonıc Unsteady And Qausı-Steady Dampıng Derıvatıves For A Delta Wıngs At Large IncıdenceDrives

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Abstract

This paper presents results of quasi-steady and unsteady damping derivatives of a delta wing whose leading edge is straight. Results are computed for a wide range of Mach numbers and angles of attack. Here the contribution to the damping derivatives due to the rate of change of angle of attack is estimated separately. The results show that with the increase in Mach number, there is a progressive decrease in the damping derivatives for both the cases (i.e., unsteady and quasi-steady). With the further rise in the Mach values, the magnitude of decline has diminished for Mach number M = 10 and above the state of steady-state is achieved. For the entire range of the Mach number, the location of the center of pressure remained unchanged for a fixed value of the flow deflection angle δ. For the lower flow deflection angle of the wing, the magnitude of the damping derivatives is smaller as compared to the higher values of δ. The contribution to the damping derivatives from the rate of change of angle of attack is around 20 percent of the quasi-steady one. The results for flow deflection angles of ten degrees and twenty degrees show a different trend. When we compare the results of the damping derivatives for a fixed pivot position, it is seen that the damping derivatives show different behavior for two different values of the flow deflection angle δ. The steady-state varies for two values of δ. When we look at the damping derivatives at hinge point k = 0.6, the magnitude is small. The steady-state is attained early for quasi-steady in comparison to the unsteady damping derivatives.

Keywords–*Damping derivative, Delta wing, Hypersonic, Straight leading-edge, Pivot position*

1. Introduction

The simulation of the static, as well as the dynamic stability of the aerospace vehicles, is critical before we decide to go for the fabrication of the prototype. At the initial design stage of the aerospace vehicles, knowledge of the stability derivative is of prime importance. Theoretical computation of the stability derivatives gives a fair idea about the performance of aerospace vehicles. Since wind tunnel tests require an enormous amount of cost in model making and wind tunnel tests, therefore designers prefer to do the simulations. Then once a design is almost frozen, only they plan to fabricate the model and conduct the wind tunnel tests. Before the wind tunnel tests, the designer is required to satisfy the geometrical similarity, kinematical similarity, and dynamic similarity. The literature review shows that it is straightforward to achieve geometrical and kinematical similarity. However, the matching of the dynamic similarity parameter is challenging. For instance, when we conduct the wind tunnel tests, the Reynolds number of the wind tunnel section while doing the tests is different when the aerospace vehicle is flying at higher altitude where the air density is low. The Reynolds number is low as compared to the wind tunnel

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Image Enhancement based on Fusion using 2D LPDCT and Modified PCA

C. Rama Mohan, S. Kiran, Vasudeva, A. Ashok Kumar

Abstract:- The images play a vital role in various fields of applications; medical field is the one, where images more widely used in diagnosis. Best image data analysis results if the quality of the image is high. To attain best image quality some popular techniques are available, among that image fusion is one of the technique, it enhances the information of the image by selecting and merging the significant information from two or more similar multi-focus images. Using the features of image fusion a new technique is proposed in this paper. In proposed technique, fusion of sources images with 2D Laplacian Pyramid Discrete Cosine Transformation (2D LP - DCT) and Modified Principal Component Analysis (MPCA). In this, two similar multi-focus images are considered, first, they undergone to 2D LP-DCT and then MPCA technique. The 2D LP-DCT enhances important image features, which are best utilized in image fusion and results good image quality. In Modified PCA, the concept of dimensionality reduction is used. The experimental results indicate that the suggested strategy can produce fused images with good visual quality and computational effectiveness than other state-of-the-art works.

Keywords: Laplacian Pyramid, Image Fusion, Multi-focus Images, DCT, Quality Evaluation Metrics, Image Quality, Modified Principal Component Analysis

I. INTRODUCTION

Fusion of images is a procedure in which fusion rules are used to combine two or more images from the same scene with different focus values. The fusion results in an informative and composite image that is more suitable for visual perception, object detection, and target recognition [1-5]. The goal of image fusion is to integrate additional and redundant information from multiple images to create more composite images than any source image. Image fusion is widely used to apply distinct types of information in their entirety. Due to the combination of information with different features, mixed pictures can provide a better understanding and a more reliable outcome. The fusion method can increase the efficiency of subsequent processing operations such as extraction and identification of objects and segmentation.

An algorithm for image fusion seeks primarily to reduce the number of data errors, but also to combine significant visual details from various images so that the image results in exact and detailed information without introducing objects. A wider view of the objects observed may be provided by spectral, spatial and temporal image resolution [6]. Multi-source image information may be gathered by fast technological progress to create a mixture between space and spectra information of high quality images [7–8]. Fusion involves a wide variety of medical, surveillance, military, microscopic, remote sensing systems, computer vision, robotic vision, robotic vision, and navigation.

The processing level, such as the pixel level, the signal level and the function level–based on the image fusion–can generally be used. The traditional image fusion schemes performed fusion on source images, often with serious side effects such as contraster reduction. Additional scientists have recognized the need for fusion as mathematical change in the field of transformation [9]. In many applications, wavelets transformation was used like restoring, removing noise in a image, improving images on the edge and extracting the features; the two-dimensional data found in the pictures were not easily captured with wavelets [10]. Different techniques for transformation were suggested for the image signals that incorporate direction and multi-resolution so that borders could not be captured efficiently in natural images. Several transformation techniques were proposed for image signals with directional and multi-resolution signals that could therefore not capture natural photographs efficiently. Good image performance such as $Q^{AB/F}$, QW, QS, QE, QC, QCB, CQM, QG, QM, QP, H, SD, SF, RMSE, PFE, MAE, SNR, PSNR, MSE, and PSNR_HVSM cannot be retrieved using the simplistic primitive technique. Several investigators have suggested a range of image fusion algorithms based on the combination between the DWT and PCA, morphologies and morphological techniques [11-14]. These methods are significantly better than the average simple, maximum, and minimum [15]. A number of papers have been published late on the development of various pixel image fusion algorithms. Many algorithms are based on transform wavelets [16-17], pyramids transform [18], statistic signal processing [19], principal component analysis [16, 19, 29], fuzzy logic [20, 25], DCT [15, 21-22] portioning [23, 28], etc. DCT has been shown to be well for image compression and is well received in several applications of image preprocessing.

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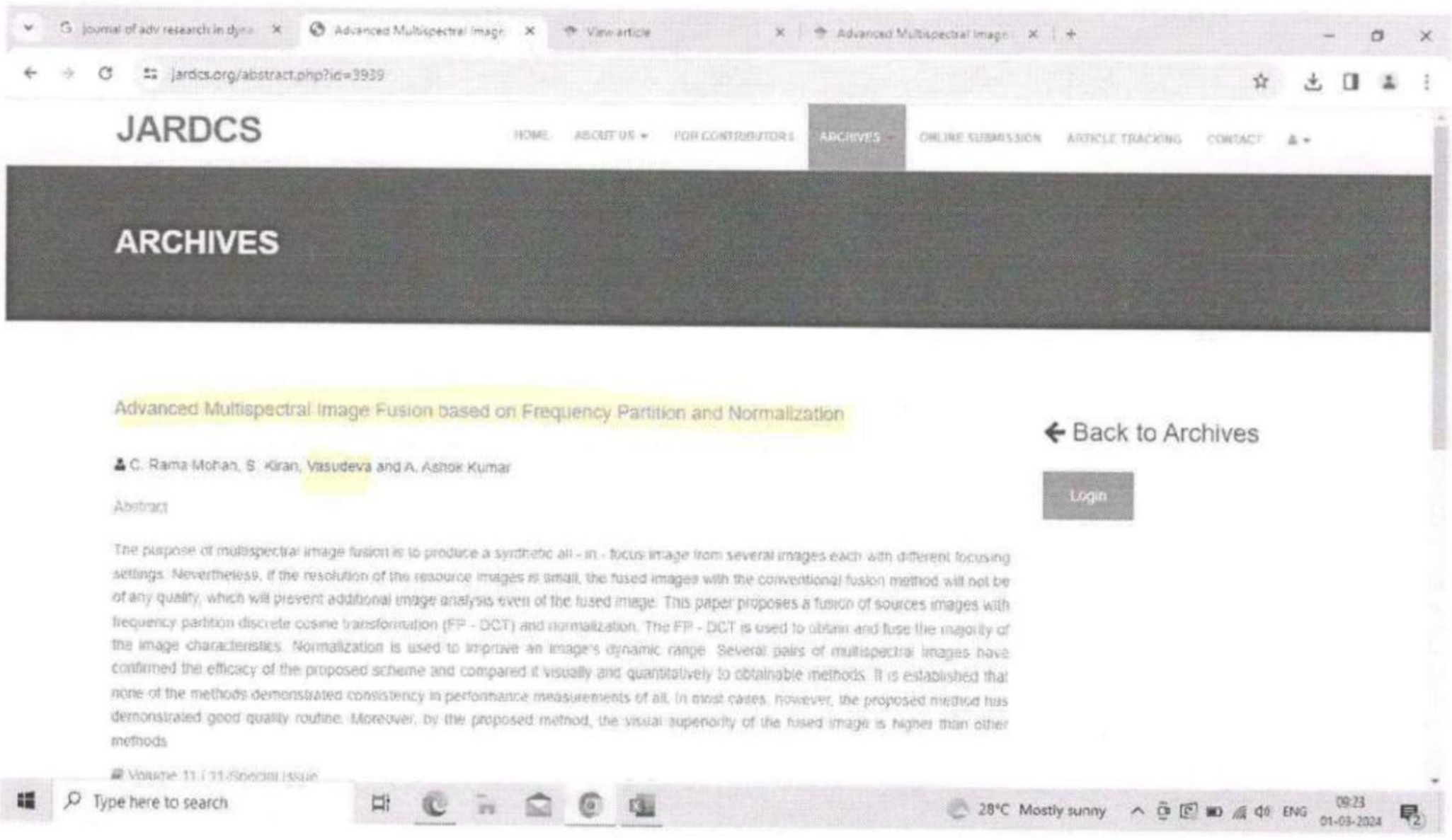

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Research Article

Adaptive Receiver-Window Adjustment for Delay Reduction in LTE Networks

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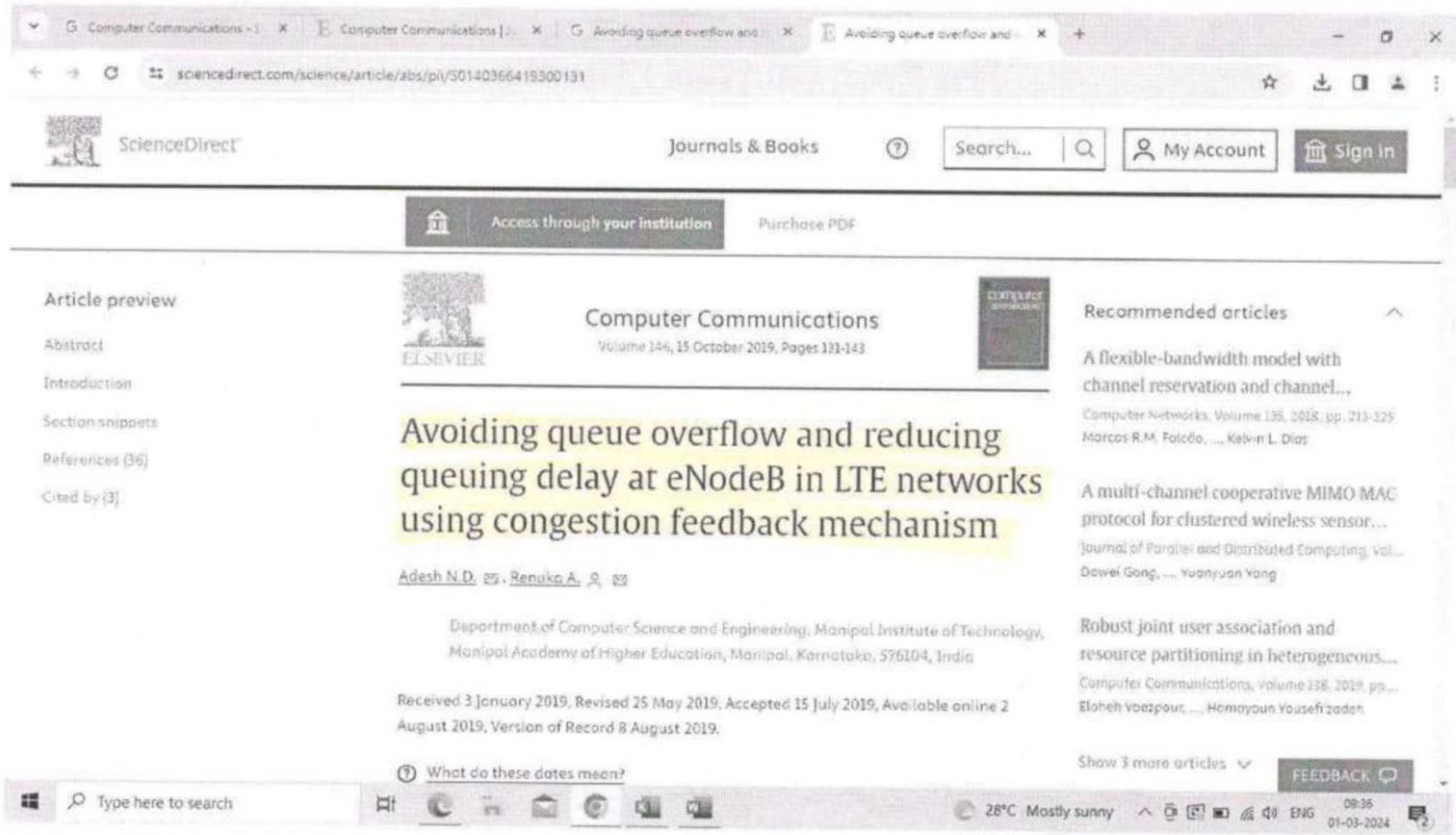
The cellular network keeps the vast capacity of queue space at eNodeBs (base stations) to reduce the queue overflow during the burst in data traffic. However, this adversely affects the delay sensitive applications and user quality of experience. Recently, few researchers have focused on reducing the packet delay, but it has a negative impact on the utilization of network resource by the users. Further, it fails to maintain fairness among the users, when competing for a shared resource in coexistence with conventional TCP or UDP users. Therefore, in this paper, the adaptive receiver-window adjustment (ARWA) algorithm is proposed to efficiently utilize the network resources and ensure fairness among the users in resource competitive environment, which requires slight modification of TCP at both the sender and receiver. The proposed mechanism dynamically varies the receiver window size based on the data rate and delay information of the packets, to enhance the performance of the system. Based on extensive experiments, the results illustrate that the ARWA algorithm reduces the delay of TCP packet and increases fairness among the users. In addition to that, it enhances the packet delivery fraction (PDF) and maintains the throughput of the system. Moreover, it competes with other conventional TCP users for the shared network resources in a fair manner.

1. Introduction

In recent years, with the advent of smart phones, there is an increasing demand for good quality of service at low operational cost [1]. This essentiates the system resources to be utilized efficiently. Based on Ericsson 2017 survey statistics [2], the 4G subscribers have grown more than 2.6 billion, and in the next five years, around 5.5 billion additional 4G users are expected. The Cisco report [3] indicates that downloading of data and video streaming have contributed tremendously to the increase in network traffic in 2017, and mobile data traffic will increase by more than 47% by 2021 compared to that of 2017. The rapid increase in wireless data demand and usage has created a significant burden on the existing network resources. Supporting this large increase in data and connectivity is a challenge. This has motivated the industrial personnel and researchers to examine the 4G systems to provide the better solutions to improve the performance of the 4G network.

The LTE radio protocol stack consists of four layers such as Radio Link Control (RLC), Medium Access Control (MAC), Physical layer (PHY), and Packet Data Convergence Protocol (PDCP) [4] to transfer the data securely and reliably between eNodeB and user. Real-time applications have strict requirements on end-to-end packet delay to achieve acceptable quality of experience by the user. Congestion may take place on radio interface due to various reasons, which may result in accumulation of packets in queues of RLC entities and waiting for the instruction from the MAC layer. Thus, there is overflow of RLC queues due to the large volume of traffic in a short period of time leading to high delay resulting in poor performance. To guarantee high throughput and low delay during congestion, the researchers have proposed various methods such as buffer-aware



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Sentimental Analysis of Student Feedback using Machine Learning Techniques

Daneena Deeksha Dsouza, Deepika, Divya P Nayak, Elveera Jenisha Machado, Adesh N. D.

ABSTRACT—Educational institutions attempt to collect feedback from students to study their sentiment towards courses and facilitates provided by the institution to improve the college environment. In present scenario, grading technique is used for feedback. This grading technique does not reveal the true sentiment of students, but the textual feedback provides a chance to the students to highlight certain aspects. In this paper, a method has been proposed for sentimental analysis of student feedback using machine learning algorithms such as Support Vector Machine, Multinomial Naïve Bayes Classifier, and Random Forest. A comparative analysis is also conducted between these machine learning techniques. The experimental results suggest that Multinomial Naïve Bayes Classifier is more accurate than other methods.

Index Terms: Sentimental analysis, Multinomial naïve Bayes, Machine Learning

I. INTRODUCTION

Feedback is the statement sent to an entity about its past behavior from which the entity can analyze the future and current behavior to achieve the expected result. Feedback plays animportant role in education and learning by helping to adopt new knowledge and prevent repetitive mistakes. In matters concerning quality in higher education, a lot of peoplewonderabout whose opinion should really be taken seriously or has greatest importance in the decision-making processes.Feedback is aprocess which helps the organization to monitor, evaluate, and regulate the overall working environment. Good feedback practice provides usefulinformation to the organization in improving the teaching and learning experience.

Depending on the feedback given by students it can be classified as textual or grading (Likert-scale based score) form.In Likert-scale based score questions are provided to the students and are asked to answerthose questions using a rating based scale. This technique mainly focuses on a question that is related to same topic and it does not express the exact sentiment of the students.

In order to know the exact sentiment of the students textual feedback technique is used. In this textual form student are given with set of questions and they need to answer it in sentences.It is helpful to both theacademic administration and the instructor to overcome the issues related to their organization.In this paper, the student feedback with varied opinion is collected using google forms. The aim is to extract expressions of opinion and classify it asnegative, positive or neutral using machine learning techniques.

Sentimental analysis is a method for identifying the sentiment expressed in texts. The need ofSentiment Analysis oftext has gained more importance in today's situations faced by the people of the world. Generally, there are three approaches in sentimental analysis. They arelexicon based,machine learning and hybrid approach. In machine learning technique, it uses unsupervised learning or supervised learning. Classification problem can be carried out using several algorithms like support vector machine, naïve bayes, randomforest. Inlexicon based method sentiment polarity of the textual content is detected using sentiment lexicon. A lexicon is a list of words with associated sentiment polarity. Hybrid approach is a combination of lexicon-based and machine learning methods. The training data set is labelled using sentiment lexicon and this is used to for the machine learning model. Then testing data is evaluated using this model.

The remaining of this paper is organised as follows: In section 'Literature Review' we provide a brief description about some work related to sentiment analysis and machine learning techniques. The process of classifying the text into different classes using feedback obtained from students is presented in section 'Methodology'. Comparative analysis of different machine learning algorithms based on accuracy and F-score are presented in section 'Performance Analysis'. Section 'Conclusion' concludes the research work.

II. LITERATURE REVIEW

Lot of research has been done in the area of sentiment analysis. However, there was not much research done in area of text classification which classifies the sentence into three classes i.e. negative, positive and neutral.

Sentiment analysis aims at identifying, analyzing and extracting opinions from texts. This paper describes hybrid approach for performing sentiment analysis and it is done using TF-IDF(term frequency-inverse document frequency)

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Ambient Assisted Living: A Research on Human Activity Recognition and Vital Health Sign Monitoring using Deep Learning Approaches

Manoj T, Thyagaraju G S

Abstract*— The rise in life expectancy rate and dwindled birth rate in new age society has led to the phenomenon of population ageing which is being witnessed across the world from past few decades. India is also a part of this demographic transition which will have the direct impact on the societal and economic conditions of the country. In order to effectively deal with the prevailing phenomenon, stakeholders involved are coming up with the Information and Communication Technology (ICT) based ecosystem to address the needs of elderly people such as independent living, activity recognition, vital health sign monitoring, prevention from social isolation etc. Ambient Assisted Living (AAL) is one such ecosystem which is capable of providing safe and secured living environment for the elderly and disabled people. In this paper we will focus on reviewing the sensor based Human Activity Recognition (HAR) and Vital Health Sign Monitoring (VHSM) which is applicable for AAL environments. At first we generally describe the AAL environment. Next we present brief insights into sensor modalities and different deep learning architectures. Later, we survey the existing literature for HAR and VHSM based on sensor modality and deep learning approach used.

***Keywords*— Ambient Assisted Living; Deep Learning; Human Activity Recognition; Vital Health Sign Monitoring**

I. INTRODUCTION

The global phenomenon of population ageing among human population is seen more often in most of the countries across the world due to gradual decline in the birth and mortality rate. In years to come this demographic change will have serious implications on our society. The pace of population ageing has increased dramatically in most of the developed countries and some of them even attained the older population age structure than ever seen and heard in the past[1]. According to Department of Economic and Social Affairs, United Nations there about around 13% of the global population comprising an estimated 962 million in the world are aged 60 or over in the world. The population aged 60 or above is increasing at a rate of about 3% per year [2].

In India, there are around 104 million people aged 60 or above which comprises the 8.6% of total population as per demographic reports. The ageing rate has increased over time from 5.6% in 1961 and it is projected to grow around 20% of population by 2050 (i.e., around 34 million)[3]. This stark reality of spike in elderly population will be accompanied by surge in age-related chronic disorders such as dementia and other mental health issues, diabetes, cancer, cardio-vascular diseases, respiratory related issues etc., as well as with physical or cognitive impairments such as sensory loss, motor handicap, hyperactivity disorder etc. In order to alleviate the predicament of such aged or disabled population to be dependent on their family members or caregivers; a technological ecosystem which provides independent and healthy lifestyle is the need of the hour. Ambient Assisted Living (AAL) tries to fill this gap by making targeted interventions at various stages of assisting the elderly population. In recent years, various research communities, focus groups, businesses and policy makers have shown keen interest to develop a low-cost, reliable, secure, robust, eco-friendly assistive healthcare solutions to effectively counter the repercussions of aging population. However, gathering the ambient intelligence from the operational surroundings demands the confluence of multiple assistive techniques. It involves the scenarios such as human activity recognition, vital health sign monitoring, mobility assistance, gait analysis, sensor data analysis etc. The state of art deep learning approaches will leverage the experience of assisted living which facilitates in acquiring the ambient intelligence from the devices deployed in the AAL ecosystem.

This paper is organized into sections as follows: Section II provides the introduction to Ambient Assisted Living environment. Section III briefly summarizes sensor modality most commonly seen in sensor based monitoring Section IV describes the classification of deep learning architectures which is extensively used in the research work and many applications. Section V and VI respectively focuses on the critical review of HAR and VHS based on sensor modality and deep learning approach used. Section VII concludes the paper by discussing some of recent happenings related to research of HAR and VHSM using deep learning in AAL environment.

II. AMBIENT ASSISTED LIVING

The term of AAL has opened up new avenue to innovate cutting edge technologies to provide assistance as well as healthcare and rehabilitation to elderly people with physical or mental impairment [4].

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Air Pollution Monitoring and Prediction System

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ABSTRACT— Environmental Air Pollution Monitoring System is used for monitoring the concentrations of major air pollutants using gas sensors. The main target of this project is to monitor the air quality using sensors and analyze the existing trends in air pollution and make prediction about future. The major objective is to inform the public about the quality of air, raise the awareness and also to develop warning systems for the prevention of undesired air pollution episodes and to create awareness in order to reduce the amount of air pollution caused due to various sources. The system is also used to get the approximate quantity of pollutants present in air thereby giving awareness to the people of that specific region. Thus, the amount of pollution caused due to various sources can be reduced, leading a healthier and safer environment.

Index Terms: Air pollutants, Gas sensors, Warning System

I. INTRODUCTION

Air pollution is one of the major environmental problem in our country. Mostly, it is caused by human activities such as construction, mining, transportation, etc. However, natural disasters such as volcanic eruptions and forest fires may also pollute the air, but their occurrence is rare and they usually have less effect, unlike human activities that are important causes of air pollution.

Poor air quality has harmful effects on human health.

Therefore, reducing pollutants in the air is important for human health and the environment. Pollutants can also damage plants and buildings.

Major Pollutants taken into consideration:

Carbon monoxide (CO) is a colorless, odorless gas that is produced by the incomplete burning of carbon based fuels including petrol, diesel, and wood. Combustion of natural and synthetic products also causes the production of CO. It also lowers the amount of oxygen that enters our blood.

Nitrogen dioxide (NO_2) causes smog and acid rain Burning the fuels such as petrol, diesel, kerosene and coal leads to the production of NO_2.

Sulphur dioxide (SO_2) is produced from burning coal. Some industrial processes can also produce Sulphur dioxide.

In past decades, due to civilization and urbanization, there is a major growth in Polluting industries, large quantities of construction waste, drastic loss of forests and vehicles on roads which has increased the level of pollution. Therefore, it is necessary to constantly monitor and report the harmful impacts from air pollution.

II. LITERATURE REVIEW

In order to monitor the air quality, a new framework has been put forth that monitors the concentration of gases and analyze the current trends in air pollution and make prediction about future.

In [1], Internet of Things has been introduced and a kind of real time Air Pollution Monitoring and Forecasting System is being designed. In monitoring points, environmental sensors including nitrogen dioxide, smog, inhalable particles, carbon monoxide, chlorine, hydrogen chloride and hydrogen fluoride sensors are installed.

In [2], Two low cost gas sensors namely MQ7 (to detect CO) and MQ135 (to detect NH3CO2 etc.) with Wi-Fi module have being used. Raspberry Pi 3 B model is used. Their sensor will gather the data of various environmental parameters and provide it to Raspberry Pi which acts as a base station.

In [3], Auto regression algorithm is used to predict future value of PM2.5 based on the previous PM2.5 reading. Here they are only predicting the level of PM2.5.Logistic regression algorithm is employed to detect whether a data sample is polluted or not.

In [4], Two gas sensors namely CO and NO2 are used. They have used Arduino platform to communicate the data quickly. WSN (Wireless sensor network) acts as the transceiver. Output is in terms of concentration of gases i.e. in ppm. The values of sensors are sent to the mobile using IOT central server and then displayed on the screen.

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Review on Women Security System

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Abstract:- In global scenario, women have gained freedom to work outside. Despite the freedoms that women have been given, they still need to be worried about the problems they are going to face when they are alone. While the harassment against women is serious problem in current scenario, Women do not have to become victims for that, by using security systems and applications, women may be able to protect themselves from critical condition. This paper addresses the different models proposed for women security and does a comparative analysis of the same.

Keywords:- *AVRatmega328P, Global System for Mobile communication (GSM), Global Positioning System (GPS), Shock Generator, Switch Button, Spy Camera, Intrusion Detection, Area Zone Module, Fake Call, Alarm, LED, Buzzer, RS232.*

I. INTRODUCTION

Though our country is independent still many women are enclosed in boundaries because of increasing crime rate in India. The IT and corporate sectors are evolving rapidly. And sometimes the company requires them to work even at night shifts. At night shifts most of the women feel insecure to work due to the increasing physical harassment on women. It is observed that most of these cases happen when women are alone. Hence it becomes important to develop systems which help the women to fight even if she is alone. If a system could inform victim's family about her current location, the chances of victim being helped are greatly improved. Today there is many cases which are happening to women. No one can predict such situations, so it is necessary to keep all the safety devices ready, to escape from critical condition. This paper presents review on different systems developed to help women and provides the critical analysis of different approaches used for women security.

II. DIFFERENT MODELS FOR WOMEN SECURITY

A. Portable Device for Women Security

The paper [1] proposes portable hardware device which consist of AVR Atmega328P microcontroller, GSM Module, GPS Module, Shock Generator Circuit and RS232.

➢ *AVR ATmega328P:*

It is single chip microcontroller created by Atmel. It has low power consumption and 32kb flash memory.

➢ *GPS Module:*

It is used to get position information. The location information consists of latitude, longitude, time stamp etc. Here SIM28m GPS is used.

➢ *GSM Module:*

GSM acts like a mobile device which is used to send message and make voice call to predefined mobile number.

➢ *Shock Generator Circuit:*

It produces voltage around 1200mv and current of 3microamp. Shock generator circuit is used to provide electric shock to the attacker.

➢ *RS232:*

It is used for transferring and receiving the serial data between two devices. Here it is used to have serial communication between GSM and GPS modules.

The shock generator is kept inside the sandal. All other circuit is placed inside the bag. In case of emergency women will press the button. After the button is pressed shock is generated at the tip of the sandal. The microcontroller will send signal to the GSM and GPS using RS232. GPS receives signal form the satellite and calculates the latitude and longitude values and sends it to the GSM. GSM continuously sends text message containing location of the victim to predefined numbers. The multiple number can be added while programming, if message is not viewed by first person the message will be sent to the next number and so on.

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An Efficient Multifocus Image Fusion method using Curvelet Transform and Normalization

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Abstract:

Multi-focus imaging fusion is a technique that puts together a fully focused object from the partly focused regions of several objects from the same scene. For producing a high quality fused image, negligible aliasing and ability to separate positive from negative frequencies characteristics are important. The ringed artifacts, however, were inserted into a fused image because of a lack of negligible aliasing and ability to separate positive from negative frequencies properties. A multifocus image fusion algorithm is proposed to resolve these issues, in conjunction with curvelet transform and normalization. First, the source images are translated to the curvelet transform. It helps in the obtaining of the curvelet frequency components. Then the frequency components are combined with a fusion rule to transform the origin frames. curvelet transform has demonstrated that it provides an effective transformation for multi-resolution imaging fusion with its negligible aliasing and ability to separate positive from negative frequencies characteristics. In order to enlarge the effectiveness of the curvelet transform based method, the normalization technique is used. The proposed fusion approach has been tested on a numeral of multifocus images and compared to various popular methods of imaging fusion. The experimental results indicate that in subjective performance and objective assessment, the proposed fusion approach could deliver better fusion results.

Keywords: *Image Fusion, Normalization, Curvelet Transform, Quality Evolution Metrics, Image Quality*

1. Introduction

Because of the restricted focus range of optical lenses in CCD systems, it was impossible to derive an image that includes all of the required focal objects[1]. The method is a multifocus image fusion that combines multiple artifacts from the same scene into a more perceptible and observable composite image[2]. Several methods of image fusion are spatial, and they transform domain methods[3]. Transform domain algorithms, in particular, multi-resolution algorithms are best because the human visual system handles multi-resolution information in accordance with the computational principle of the transform domain method[4-8].

This paper focuses on the fusion of multi-focus images using curvelet transformation, and to increase the dynamic range of an image, normalization is applied. The extraction feature of the fused image is calculated using specific parametric methods. The proposed method is also compared to already authorized methods of fusion, such as LP, RP, DWT, DTCWT, and CVT. The result of CVT with normalization system shows that there is a much improvement in the statistical parameters than compared to other fusion methods.

2. Proposed Method

The proposed system structure is shown in Figure 1, which involves three processes: the curvelet transform - based image fusion process, and restoration process. The two steps are below. The CVT and normalization based image fusion is defined in Algorithm. 1.

Algorithm 1 : CVT and Normalization based image fusion

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Abstract:

Multi-focus imaging fusion is a technique that puts together a fully focused object from the partly focused regions of several objects from the same scene. For producing a high quality fused image, negligible aliasing and ability to separate positive from negative frequencies characteristics are important. The ringed artifacts, however, were inserted into a fused image because of a lack of negligible aliasing and ability to separate positive from negative frequencies properties. A multifocus image fusion algorithm is proposed to resolve these issues, in conjunction with curvelet transform and normalization. First, the source images are translated to the curvelet transform. It helps in the obtaining of the curvelet frequency components. Then the frequency components are combined with a fusion rule to transform the origin frames. curvelet transform has demonstrated that it provides an effective transformation for multi-resolution imaging fusion with its negligible aliasing and ability to separate positive from negative frequencies characteristics. In order to enlarge the effectiveness of the curvelet transform based method, the normalization technique is used. The proposed fusion approach has been tested on a numeral of multifocus images and compared to various popular methods of imaging fusion. The experimental results indicate that in subjective performance and objective assessment, the proposed fusion approach could deliver better fusion results.

Keywords: *Image Fusion, Normalization, Curvelet Transform, Quality Evolution Metrics, Image Quality*

1. Introduction

Because of the restricted focus range of optical lenses in CCD systems, it was impossible to derive an image that includes all of the required focal objects[1]. The method is a multifocus image fusion that combines multiple artifacts from the same scene into a more perceptible and observable composite image[2]. Several methods of image fusion are spatial, and they transform domain methods[3]. Transform domain algorithms, in particular, multi-resolution algorithms are best because the human visual system handles multi-resolution *information in accordance with the computational principle of the transform domain method[4-6].*

This paper focuses on the fusion of multi-focus images using curvelet transformation, and to increase the dynamic range of an image, normalization is applied. The extraction feature of the fused image is calculated using specific parametric methods. The proposed method is also compared to already authorized methods of fusion, such as LP, RP, DWT, DTCWT, and CVT. The result of CVT with normalization system shows that there is a much improvement in the statistical parameters than compared to other fusion methods.

2. Proposed Method

The proposed system structure is shown in Figure 1, which involves three processes: the curvelet transform - based image fusion process, and restoration process. The two steps are below. The CVT and normalization based image fusion is defined in Algorithm. 1.

Algorithm 1 : CVT and Normalization based image fusion

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REVIEW ON SECURITY IN WIRELESS SENSOR NETWORK

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ABSTRACT : Security is a major issue in wireless sensor networks for secure communication between the sensor nodes. As the application of wireless sensor networks grows, there is a requirement for secure communication mechanisms. The sensor nodes can be influenced through many environmental factors and those security aspects need to be addressed at the start of the machine design. In this paper, we tried to provide a brief on numerous security issues and their countermeasures in wireless sensor networks.

KEYWORDS: Security, Sensor Nodes, Wireless Sensor Networks

I. INTRODUCTION

Wireless Sensor Networks (WSNs) are a sort of AdHoc community that contains a huge number of sensor nodes. There is not any constant infrastructure for Wireless sensor networks and may be deployed and managed in an AdHoc manner. There are many applications of wireless sensor networks including military applications, medical and home applications, etc. The WSNs may be used to detect and track the intrusion of enemies, to detect forest fires and floods to monitor environmental pollutions, and also to degree the traffic flows in the networks. The common sensor nodes are responsible for the transmission of real-time sensor data of a few precise software to the intermediate collection nodes called cluster head. The back-end data center will receive the sensed data from the cluster head for further process and analysis.

Security is one of the fundamental constraints in the WSNs. As the WSNs normally deployed in remote environments and work in an unattended manner, prevention of attack and protection of privacy of data collected at each node. We will discuss the security countermeasure schemes and their classification for the sensed data.

This paper aims to provide a survey on security in wireless sensor networks, which highlights and considers major security issues and implications of wireless sensor networks.

II. LITERATURE SURVEY

In recent years, there are several security issues have been identified. The security threats may be categorized into two categories [13]:

1. Active attacks: Active attacks are the attacks in which the attacker modifies the contents of the sensed data. Examples for active attacks are node replication attacks, wormhole attacks, compromised node attacks, etc.
2. Passive attacks: Passive attacks are the attacks in which the attacker monitors the network to check the data communication. An Example of the passive attack can be considered as eavesdropping.

The authors in [1] had mentioned various challenges in mobile wireless sensor networks. The network structure of wireless sensor networks is dynamic since nodes will join and leave the network frequently. Also, the authors have discussed the various kinds of attacks that are possible on sensor networks. They have discussed the low-level security in mobile sensor networks.

The authors in [2] have discussed the attacks against broadcast services in wireless sensor networks. These attacks will have the most catastrophic effects on power and other resource constraints. As the duplicate packets are propagated through the sensor nodes without being filtered out, the sensor nodes will simply waste their energy and memory on transmitting and buffering those false packets. They proposed a new secure broadcast authentication for sensor networks. According to their research, this authentication scheme may be used to detect invalid packets and to isolate links that are from the compromised nodes, which results in enhanced resistance to various security attacks including DoS attacks. Their research contains two components: Lightweight Neighbor Authentication Protocol (LNAP) and Predictive Hash-Based Broadcast Protocol (PHBBP). LNAP is used for authenticating the

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A Survey on Efficient and Secure Techniques for Storing Sensitive Data on Cloud

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Abstract— Cloud computing, being the most recent emerging paradigm, is a technological advancement that aims at turning the vision of computing utilities into a reality. Simply, it is an approach of making technology available to the users, by the usage of Internet servers for data storage and processing. More specifically, cloud computing offers users benefits such as scalability, availability, reliability and global accessibility. Being a radical mechanism, the major obstacles for massive adoption of cloud computing are security, trust and privacy issues. With some defensive procedures like using a combination of methods that include encryption, authentication, and authorization, users are still concerned about the risks associated with their stored data. In this survey, many efficient and secured claiming techniques are investigated for end users to access the data stored in the cloud. The focus is here much on securing the data residing in cloud and privacy in accessing them. The study will throw lights upon keyword search, indexing, file splitting, encryption, and multi-cloud. Further, various methodologies in the existing system and performance of algorithms together with their pros and cons are discussed. Also, cloud security challenges, privacy and communication issues are considered and addressed here.

Keywords— Keyword Search, Secure Data, Data Privacy, Cloud Computing, Splitting Techniques, Encryption.

I. INTRODUCTION

Cloud computing is one of the biggest utility resources that will make life even easier than it is in the present day concerning Information technology. It aims at facilitating IT as a service to the user's on-demand basis with greater availability, scalability, flexibility, and reliability in the cloud. It is now a challenging opportunity for big online businesses to implement cloud computing technologies in their corporate to raise the value of work and drop the production cost. Now people don't need a greater hard disk drive, memory card in their devices like mobile and computers. They can save data straightaway on the cloud with the service of the internet and later, can access and share data and information with greater speed and accuracy. A new world of openings for businesses has been opened up, but varied with these opportunities are the number of security challenges that have to be essentially considered and addressed before obligating to a cloud computing strategy. Hence, data security serves as one important aspect to look into as we see in [1], [2] and [3].

Data and computation integrity together with security are the key concerns for users of cloud computing services. Data Protection is effecting a cloud computing strategy by placing sensitive data in the hands of a third party, by this means ensuring that the data remains protected both at rest as well as when in transit which is of utmost importance [4]. Data requires to be encrypted at all times. Generally, for the client to own and manage the data encryption key is the only approach to truly certify confidentiality of encrypted data that exists on a cloud provider's storage servers. [5]. As soon as the encryption is complete, the next is about the access to data stored in the cloud. The data residing in the cloud should be made accessible only to those who are authorized, making it critical to both monitor and restrict who will be accessing the firm's data through the cloud. The companies should be able to view data access audit trails and logs to confirm that only authorized users are accessing the data, which intents ensuring the integrity of user authentication [6]. Counting some key security advantages, there are some if not more security challenges that prevent clients from committing to a cloud computing technique, even though there are some real benefits of using cloud computing. Restricting and monitoring access to that data through user authentication and access logging, and effectively planning for the true possibilities of inaccessible or compromised data due to the natural disasters or data breaches, are all the significant security challenges that a business needs to address when making an allowance for cloud computing providers.

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Survey on Artificial Intelligence

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Abstract— Artificial intelligence is a field of science which aims to automate the activities that require human intelligence. This has been used since last two decades as a development tool in various fields like forecasting, health care, security and also has significantly improved both manufacturing and service system performance. Since AI and its working lies on large amount of data, an algorithms and data science, users fail to understand and grasp the concepts and lacks the skills needed to work with this technology. It is difficult to identify the cause behind system software/hardware crashes because AI is controlled by machines and algorithms. It requires huge fund to implement the system. But there are some facts that support the adoption of AI such as flexible computing power available on the cloud, availability of ready to use software libraries and data. These changes made it possible for the users to build their own algorithms.

Keywords—Artificial Intelligence, Data mining, Algorithm, ANN

I. INTRODUCTION

Artificial Intelligence is the most in demand field in computer science which deals with the simulation of intelligent behavior in computer. AI techniques are recognizable as features in a product. These techniques reside in background which improves the overall performance of the system. AI can be used along with APIs for software and interfaces for users. It maps between model inputs and the parallel outputs for available data using machine learning by delivering the model inputs and outputs examples repeatedly. It selects the right model that achieves the desired outcomes by fitting within he available budget and available training data. AI monitors the system performance and helps the organization to build customer trust.

From cancer treatment, over food safety assurance for a growing population, to climate change analysis: AI provides major solutions to solve the challenges faced by the society. It plays an important role in strategic games such as poker, chess, etc., where based on heuristic knowledge, the system makes a decision among large number of possible positions. Interactions with the computer which understands natural languages spoken by humans are made possible by AI. Speech Recognition is also an important application of AI where it can understand various accents, background noise, change in user's voice due to cold, etc. One of the important applications of AI is fraud detection. For ex, master card uses intelligent decision technology to analyze different data points to identify fraud transactions, enhance real time accuracy and decrease false declines.

AI systems are able to analyze handwritten text, identify the letters shape and translate it into modifiable text. Visual models analyses, understands the visual input on the computer. Examples for such systems are, face recognition system, expert system to diagnose the patient. Robotics is an application of AI where robots are able to perform the tasks given by human. ANN is used as decision supporting system in clinics for the purpose of diagnosis process such as concept processing technology used in EMR software.

Three ways in which AI is used by HR persons and recruiting professionals are screening the rank candidates and their resumes, use of job matching platforms to predict candidate success in given roles and automation of repetitive communication tasks. Heuristic search is used by telecommunication companies in the management of their workforces. For automatic gearboxes in automobiles, fuzzy logic controllers have been developed. Home water quality monitoring applications are developed by artificial intelligence in combination with sensor technologies. Familiar applications of AI like Netflix, Amazon in which user activities are analyzed and compared with others to decide which shows or the products to suggest using ML algorithms. AEG (Automatic Exploit Generation) IA a bot

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A Survey on Challenges, Trends and Technologies of Internet of Things

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Abstract— This paper is a documentary survey on different areas in which Internet of Things (IoT) can be applied. Many concepts are also discussed on different IoT architectures along with several examples. This paper examines architecture of high level, conceptual levels for the IoT from a computational perspective. The paper also includes discussion about how the communication is established between IoT setup and the application. Different types of protocols to be implemented for the communication is also explained. By deploying these IoT systems the vision of smart city can be achieved. Many of the physical objects of the world are connected with sensors and actuators, which are linked by communication infrastructures and managed by computer algorithms. IoT sensor networks and integrated systems connect intelligent objects. These systems revolutionize the way we deal with our daily lives, medical care, energy and transport. These computational systems are addressed with a variety of different models and structures. In an effort to consolidate the use of these models, this document reviews research in IoT computing.

Keywords—Component, IOT applications, Energy efficiency, GPS, Biometric Systems, Routing Protocols

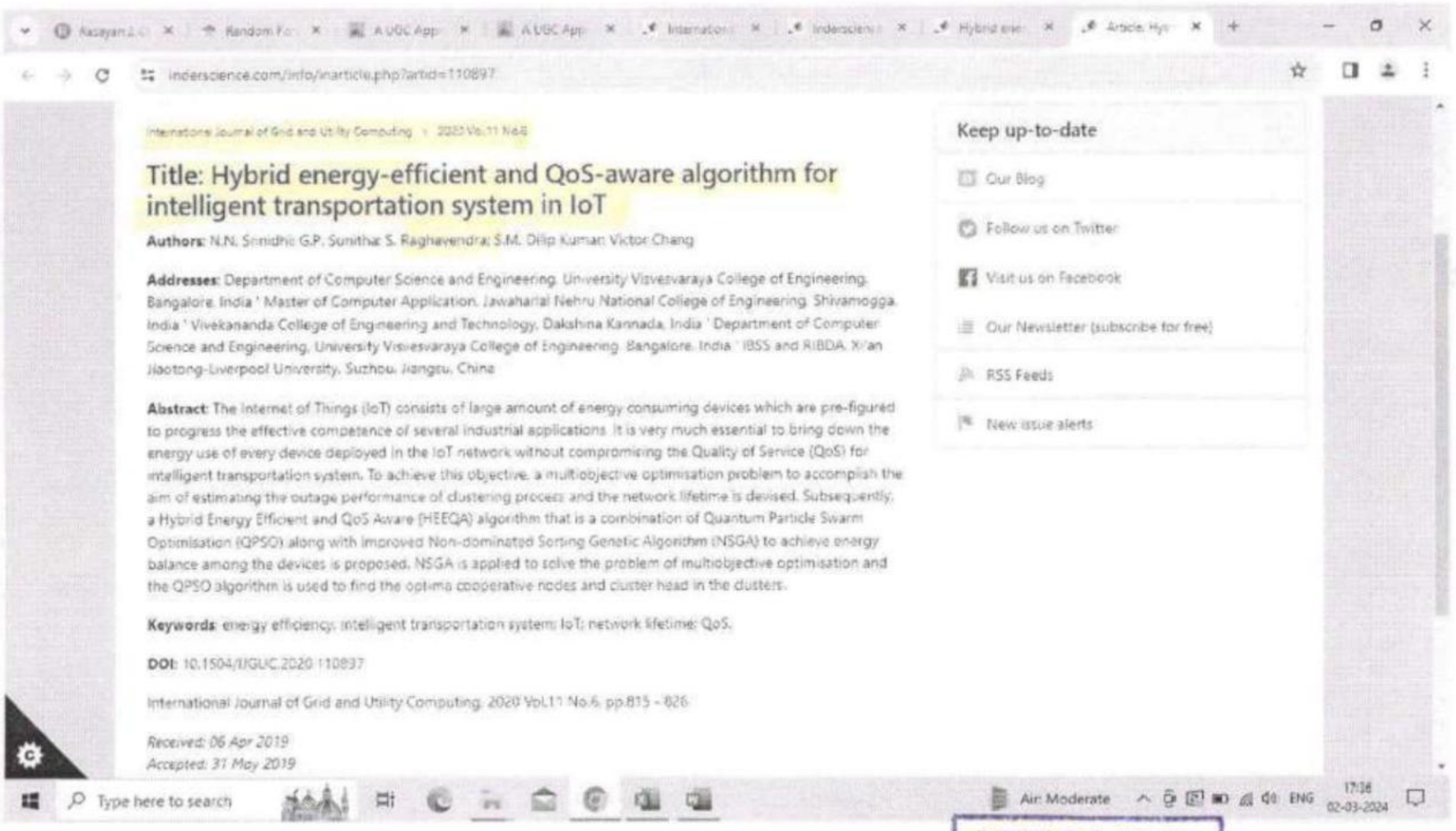
I. INTRODUCTION

Internet has drastically changed human life, starting from the social relationships to all aspects of day to day life. The IoT has the power of anytime, anywhere, any media, anything communications. Nowadays IoT is considered as a major part of the Internet of future. It is clear that Internet is the main medium for publishing and using the information.

Internet of Things (IoT) is the network of physical objects that contain electronic components which are integrated into architecture to communicate with one another or with the external environment. In the coming years, IoT-based technology will provide us advanced levels of applications and change the way people live their lives. Advances in medicine, energy, gene therapy, agriculture, smart cities and smart homes are just some of the examples in which the IoT is firmly rooted.

The components used in the IoT are described here. Lower battery feeding, high performance are the factors which plays a significant role when designing electronic systems which also leads to low power systems. Information collected via IoT devices is huge and this information must be stored on a reliable storage server. This is where cloud computing comes into play. Data is handled and used, giving more space for IoT setup to find out where things like electrical errors / errors are within the system. We know that IoT is dependent on sensors, especially in real time. As these electronic gadgets spread in every field, they use triggers to communicate with big data. To communicate, Internet connectivity is a must in which every existing object is represented by IP address. However, there is only a small number of addresses which are available based on the IP name. Due to the increasing number of devices, this naming system will no longer be feasible. Therefore, researchers are looking for another alternative naming system to represent each existing objects.

Today, the demand for Internet application development is very high. So IoT is an important technology with which we can produce various useful Internet applications. Basically, IoT is a network in which all physical objects are connected to the Internet via network devices or routers or gateways through which data can be exchanged. IoT allows objects to be remotely controlled through the existing network infrastructure. IoT is a very good and intelligent technique that reduces human effort and easy access to physical devices. This technique also has an autonomous control function which can control any devices without human interaction. "Things" in the IoT sense, it is the combination of hardware, software, data and services. "Things" can refer to a wide variety of devices such as DNA analysis devices for environmental monitoring, electrical terminals in coastal waters, Arduino chips in home automation and many others. These devices collect useful data with the help of various



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International Journal of Grid and Utility Computing : 2020 Vol.11 No.6

Title: Hybrid energy-efficient and QoS-aware algorithm for intelligent transportation system in IoT

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Abstract: The Internet of Things (IoT) consists of large amount of energy consuming devices which are pre-figured to progress the effective competence of several industrial applications. It is very much essential to bring down the energy use of every device deployed in the IoT network without compromising the Quality of Service (QoS) for intelligent transportation system. To achieve this objective, a multiobjective optimisation problem to accomplish the aim of estimating the outage performance of clustering process and the network lifetime is devised. Subsequently, a Hybrid Energy Efficient and QoS Aware (HEEQA) algorithm that is a combination of Quantum Particle Swarm Optimisation (QPSO) along with Improved Non-dominated Sorting Genetic Algorithm (NSGA) to achieve energy balance among the devices is proposed. NSGA is applied to solve the problem of multiobjective optimisation and the QPSO algorithm is used to find the optima cooperative nodes and cluster head in the clusters.

Keywords: energy efficiency; intelligent transportation system; IoT; network lifetime; QoS.

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VASD²OM: Virtual Auditing and Secure Deduplication with Dynamic Ownership Management in Cloud

Geeta C M, Nikhil R C, Raghavendra S, Rajkumar Buyya, Venugopal K R

Abstract: *In cloud repository amenities, deduplication technology is often utilized to minimize the volume and bandwidth by removing repetitious information and caching only a solitary duplicate of them. Deduplication is extremely productive when many customers deploy the identical information to the cloud repository, but it aggrevates problems pertaining to safety and proprietorship. Proof-of-ownership mechanism authorize any possessor of an identical information to approve to the cloud repository server that he possess the information in a dynamic way. In repository utilities with enormous information, the repository servers may want to minimize the capacity of cached information, and the customers desires to examine the integrity of their information with a reasonable cost. Aiming at realizing integrity auditing and deduplication with effective proprietorship administration of information in the cloud, we propose Virtual Auditing and Secure Deduplication with Dynamic Ownership Management in Cloud (VASD²OM) mechanism. It empowers the distributed server to limit access to the deployed information though the proprietorship transforms actively. Further, the mechanism supports safe and effective virtual auditing of the documents during the download process. In addition, the proposed mechanism lowers the burden of dataowner to audit documents by himself and there is no need to authorize auditing to a Third Party Auditor (TPA). Experimental results demonstrate that the virtual auditing has low auditing time cost relative to the existing public auditing schemes.*

Keywords: *Cloud storage, Deduplication, Encryption, Proof-of-Ownership, Revocation, Virtual auditing.*

I. INTRODUCTION

Cloud computing delivers extensible, inexpensive and location-independent online facilities extending from simple backup facilities to distributed repository frameworks. Now a days optical networks [1], [2] have been deployed all over the globe for efficient information communication. The rapid expansion of information capacity stockpiled in the distributed repository has compelled to a rising need for procedures for conserving disk capacity and network bandwidth.

To minimize resource utilization, various distributed repository utilities, such as Dropbox [3], Google Drive [4], make use of deduplication procedure, where the distributed repository saves one solitary duplicate of repetitious information and furnishes links to the copy rather than of saving other genuine copies of that information, irrespective of the number of customers request to save the information.

In order to secure their personal information from unapproved external attackers and from the Cloud Service Provider (CSP) [5], customers encode their documents before deploying to the distant server. While, traditional encryption cannot be used to carry out deduplication due to the following reasons; Deduplication method takes benefit of information equivalence to recognize the identical information and decrease the repository capacity. On the contrary, the cryptographic algorithms shuffle the encoded documents in order to make ciphertext equivalent from theoretically random information. Encryption of the identical documents by distinct customers with distinct encryption keys results in distinct ciphertexts makes it critical for the distributed server to determine if the plaintext are identical and deduplicate them.

Concurrent encryption [6] solves this issue successfully. The concurrent encryption algorithm encodes an input document with the hash value of the input document as an encode key. The ciphertext is transmitted to the server and the customer keeps the encode key. Since concurrent encryption is imperative, alike documents are encoded into equivalent ciphertext, despite of who encodes them. Thus, the distributed repository server can carry out deduplication over the encoded document. and all proprietors of the document can retrieve the encoded document (after executing the proof-of-proprietorship convention) and decode it subsequently since they possess the identical encode key for the document. In the case of ownership repudiation, assume numerous customers possess proprietorship of a ciphertext deployed in distributed repository.

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Research

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CRUPA: collusion resistant user revocable public auditing of shared data in cloud

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Abstract

Cloud repository is one of the most important services afforded by Cloud Computing where information is preserved, maintained, archived in distant servers and made available to the users over the Internet. Provided with the cloud repository facilities, customers can organize themselves as a cluster and distribute information with one another. In order to allow public integrity auditing on the information stored in semi-trusted cloud server, customers compute the signatures for every chunk of the shared information. When a malicious client is repudiated from the group, the chunks that were outsourced to the cloud server by this renounced customer need to be verified and re-signed by the customer present in the cluster (i.e., the straightforward approach) which results in huge transmission and reckoning cost for the customer. In order to minimize the burden of customers present in the cluster, in the existing scheme Panda, the semi-trusted Cloud Service Provider (CSP) is allowed to compute the *Re — sign* key. Further, the CSP audits and re-signs the revoked customer chunks by utilizing the *Re — sign* key. So, it is easy for the CSP by colluding with the revoked customer to find the secret keys of the existing customer. We introduce a novel Collusion Resistant User Revocable Public Auditing of Shared Data in Cloud (*CRUPA*) by making use of the concept of regression technique. In order to secure the secret keys of the existing customers from the CSP, we have allowed the information proprietor to compute the *Re — sign* key using the regression technique. Whenever the information proprietor revokes the customer from the cluster, the information proprietor computes the *Re — sign* key using the regression technique and sends to the CSP. Further, the CSP audits and re-signs the revoked customer chunks using the *Re — sign* key. The *Re — sign* key computed by the information proprietor using regression method is highly secure and the malicious CSP cannot find the private information of the customers in the cluster. Besides, our mechanism achieves significant improvement in the computation cost of the *Re — sign* key by information proprietor. Further, the proposed scheme is collusion resistant, supports effective and secure customer repudiation, multi-information proprietor batch auditing and is scalable.

Keywords: Cloud computing, User revocation, Public auditing, Proxy re-signatures, Multi-information proprietor batch auditing, Regression method

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MULTIFOCUS IMAGE FUSION BASED ON MULTIRESOLUTION AND MODIFIED PRINCIPAL COMPONENT ANALYSIS

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Abstract

Multi-focus imaging fusion is a technique that puts together a fully focused object from the partly focused regions of several objects from the same scene. For producing a high quality fused image, negligible aliasing, and the ability to separate positive from negative frequencies characteristics are important. The ringed artifacts, however, were inserted into a fused image because of a lack of negligible aliasing and the ability to separate positive from negative frequencies properties. A multifocus image fusion algorithm is proposed to resolve these issues, in conjunction with multiresolution and modified principal component analysis. In this, two identical multi-focus images are considered, first they are subjected to the multi-resolution and then to the technique of modified principal component analysis. The multiresolution improves essential image features, which are best used in fusion of images, resulting in good image quality. Modified principal component analysis is applied to reduce the dimensionality of an image. The proposed fusion approach has been tested on a numeral of multifocus images and compared to various popular methods of imaging fusion. The experimental results indicate that in subjective performance and objective assessment, the proposed fusion approach could deliver better fusion results.

Keywords:

Multifocus Image Fusion, Multiresolution, Modified PCA, Evolution Metrics, Image Quality

1. INTRODUCTION

Multi-sensor data fusion has now become a technique that needs more general, systematic solutions for a variety of applications. Several situations in the processing of images in a single image involve high spatial and high spectral details. This is key in remote sensing. The instruments, however, are not able to provide this knowledge either by design or as a result of observational constraints. One logical solution is data fusion for this.

The mechanism of image fusion is specified to collect all important information from multiple images and incorporate it in fewer, typically a single image. This image, consisting of all content, is more insightful and accurate than any single source image. The fused method can not only reduce the data, but it can also generate pictures, which are more suitable and more understandable to human and machine perceptuality [1]. In computer view, multi-sensor image fusion is the method of merging appropriate information of two or several images to a single image [2]. The final image would be more accurate than any image [3].

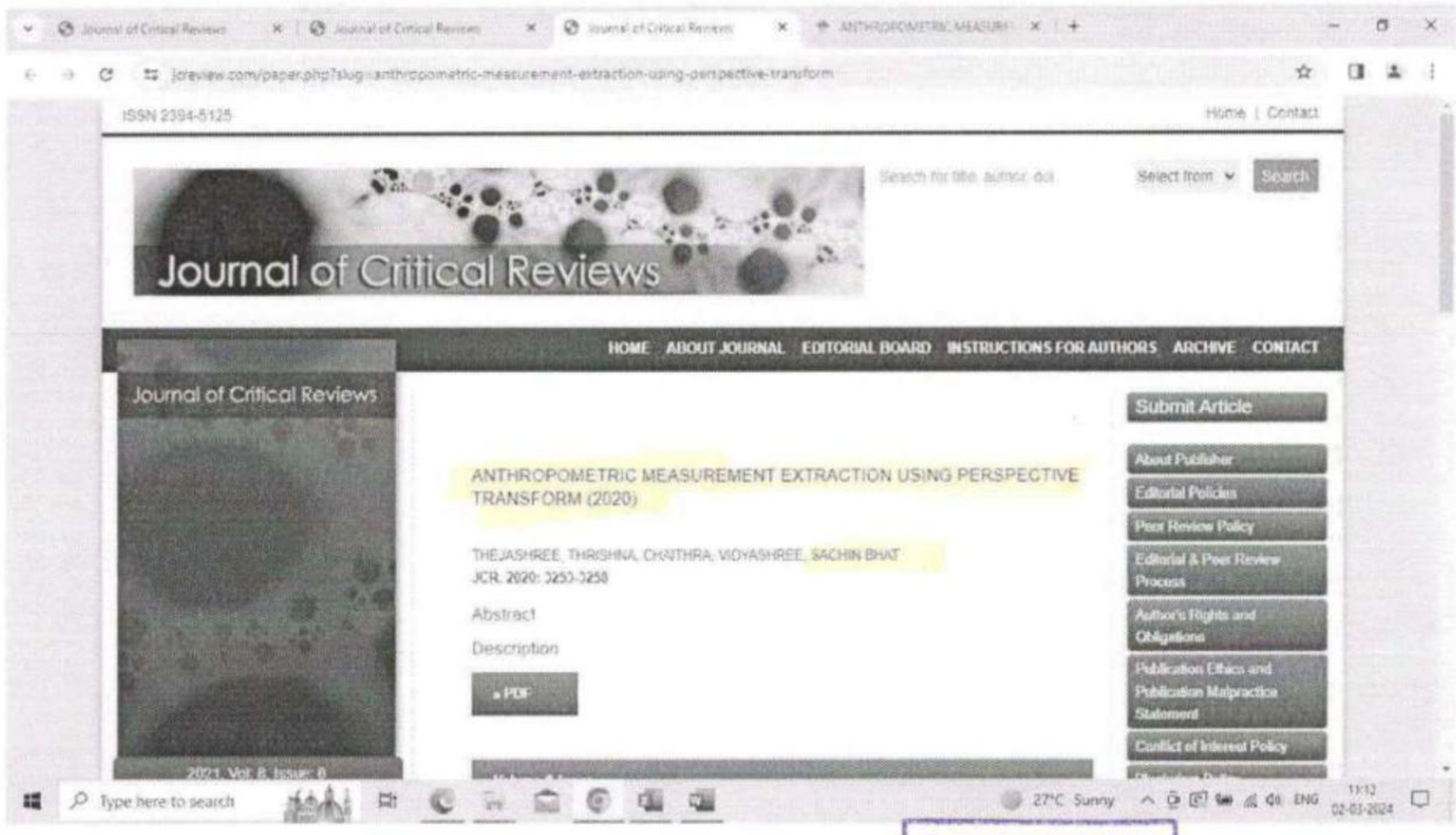
Methods for image fusion can be commonly divided into two categories-spatial domain fusion and domain fusion transformation. Methods of fusion such as averaging, Brovey method, principal component analysis (PCA) and IHS- methods come under approaches to space domains. Another essential form of spatial domain fusion is the technique that is based on high pass filtering. Here the specifics of the high frequency are inserted into upsampled version of MS images. Spatial domain approaches have the drawback that they create spatial distortion in the fused image. Spectral distortion is a detrimental factor when we go through more analysis, such as problem classification.

Analysis with multiresolution has become a very useful tool for analyzing remote sensing images. The discrete transformation of wavelets has become a very useful fusion tool. There are also several other forms of fusion, such as based on Laplacian pyramid, and curvelet transformation, etc. Such approaches show a higher performance of the fused image in spatial and spectral quality compared to other spatial fusion approaches.

The main intention to design different algorithms in image fusion is to reduce the redundant data and also to retain important information of the visual characteristics of the multi-source images. The images varying its spatial, temporal and spectral resolution characteristics may provide wide range information of the viewed objects [4]. Rapid innovative methodologies make it possible to produce fused images with high resolution containing spatial and spectral information [5]-[6]. The fusion of images has vast number of applications which includes medical imaging, police investigation, military, microscopical imaging, remote sensing, computer visual sense, and robotic visual sense and navigation.

Usually image fusion process is involved at one of the process stages such as pixel, signal and feature based levels. The well-known image fusion algorithms applied on the input images introduces serious effects such as decreasing the contrast of the image. At the later stages of the development, researchers are identified the importance to do the fusion process in the transform domain. With the evolution of wavelet theory, the multi-scale decomposition algorithmic rule is used in the image fusion process [7]. The analysis of images using wavelet domain found many applications image processing such as image restoration, removal of noise, enrichments of image edges and feature extraction. However, wavelet transforms are less efficient in acquiring information from two dimensional images [8].

Over the years many transform techniques have been recognized for the analysis of multi directional and multi-resolution images. However, the proposed techniques failed to provide good fused image in terms of obtaining reasonable values of the statistical parameters such as PSNR, Normalized correlation (NC) and MSE. Variety of transformation techniques are available in the literature among which wavelet transformation and cosine transformation are generally used in



ATTESTED

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Stress State Detection of Social Media user using Neural Network based Factor Graph Model

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Abstract:
Stress is a part and parcel of our day to day life. Stress can be certainly positive, keeping us alarm and prepared to avoid danger and it ends up negatively when a man faces persistent difficulties, without relief. With the notoriety of social media, individuals are used to imparting their every day exercises and interacting with friends via web-based networking media platform. This makes feasible to utilize the online interpersonal organization information for stress identification. As people spend long duration in the virtual world, it is easier to identify and analyze the stress levels of the social media users. In this paper, we have proposed a novel cross breed demonstrate of Factor Graph Model(FGM) with Convolutional Neural Network(CNN) to analyze the textual contents in social media users' tweets and posts to detect the level of stress of a user. Tweets of individuals are obtained from Twitter platform which are preprocessed and passed to the cross autoencoder embedded CNN Model to get user level attributes. CNN output will be fetched to FGM detect stressed tweets. Trial results have demonstrated that the proposed model can enhance the detection performance in vast scale.
***Keywords**: Stress detection, CNN, Factor graph model, Twitter*

INTRODUCTION

Mental stress has become a common disorder in this modern era which can *affect* our body, feelings, thoughts and behavior. According to a survey of Cigna TTK Health Insurance, 89% of the population in India is suffering from mental stress compared to a global average of 86%. 75% of the respondents replied that they do not feel comfortable talking about the stress with others. It is a well known fact that stress is common in our day to day life. But, this can be destructive for ones physical and emotional welfare. Hence, stress should be recognized before it becomes a serious health issue. With the expanded highlights of social media like Twitter and Facebook, number of individuals interested to share perspectives, day-to-day events and association with loved ones through online networking. These social networking platforms mirror the genuine state and feelings of the client. Also, it opens a new door for estimating, analyzing and mining the conduct design of clients through the extensive scale interpersonal organizations. Motivated by the speculations of physiology, the technique characterizes an arrangement of characteristics for stress detection from tweets and client angles where tweet-level traits are from content of single tweet and client level properties are from multiple day after day tweets. The tweet-level properties are primarily constructed out of phonic, optic and social consideration characteristics removed from the content of a solitary tweet, image and consideration list. The client level qualities are made out of posting conduct characteristics from a client's week after week tweets and social association traits separated from client's social discussions with companions. To maximally extract the user and tweet-

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COMPARATIVE PHYSICAL STUDY OF EVANS BLUE BY FE_3O_4@CF-R COATED COMBINATION OF DECORATED GO AND TIO_2 MAGNETIC NANOCOMPOSITE

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ABSTRACT

Fe_3O_4@coated@GO nanocomposite and Fe_3O_4@coated @TiO nanocomposite were arranged using utilizing the autoclave sonication strategy. The shell thickness of Fe_3O_4@ coated@ GO nanocomposite and Fe_3O_4@coated@TiO nanocomposite is successfully controlled within the extend of 44-54.47nm and 53.78-77.30 nm using shifting the response conditions. Particularly, Catechol bunches on the highest layer of nanospheres to play a critical part in chemistry to assist combined with graphene oxide (GO) to wrap the Fe3O4@ coated nanosphere. The gotten Fe_3O_4@ coated nanospheres and Fe_3O_4@ coated @GO nanocomposite can be utilized as the viable catalyst bolsters of little TiO nanoparticles combination. The prepared catalyst was proven for the diminishment of Evans blue color. The adsorption of the resultant proportion of Fe_3O_4@coated @GO and @TiO nanocomposites is affected by several variables like the nearness of isothermal, pH, contact time and temperature.

Keywords: Blue Dye, Magnetic Core-shell Nanocomposite, Physical Adsorption, Antibiological Studies

INTRODUCTION

Historically, human population and industrial activities have led to an increase in water pollution. Synthetic chemical compounds and dyes form a new class of toxic waste in the water source. Their presence in water or biosphere is generally related to pollutants that have no control or whose effects are unknown and are suspected to affect the environment[1]. The presence of skyrocketing toxic and foreign matter in-ground/surface water resources used for drinking leads to a serious problem. Among the increasing pollutants, Evans Blue dye(direct blue-53dye or T-1824), a synthetic bis azo dye has retained a long history that is used directly on fibers and textiles. The Evans blue is classified as a toxic dye, which has chronic health effect, affecting the lung function, liver, urinary bladder, and intestine. Removal of such dyes is an important part of wastewater management before being released to environment[2]. The use of Graphite Oxide(GO) tea has shown good degradation properties due to improved charge separation, porous, stability in addition to its adsorption attributes[3]. It is long-familiar that 2D structural GO has a very-big specific surface area, 2D morphology and unique multi-functional surface chemical properties[4]. Earlier studies have established that GO contains ample oxygenated functionalities, which can be utilized to fix firm and stable interaction with other materials including polymers and metal oxides etc. Earlier studies have shown that GO has comprehensive oxygenated functionalities that can be used to remedy and stable contact with other materials, including polymers and metal oxides, etc. However, via their surface oxygen which contains functional groups or defects as nucleation sites, they adsorb and embed metal particles to form stable nanocomposites. However, it is infamous for a strong tendency to aggregate metal particles due to their van der Waals interaction or stacking, so graphene composites ' chemical fictionalization is an essential method for improving or solving the above problem[5]. Also, the metal/metal oxide composite materials supported by graphene are a kind of catalyst with great potential and have better catalytic performance compared to those ordinary catalysts which benefit from the formation of

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PREPROCESSING OF HISTORICAL MANUSCRIPTS USING PHASE CONGRUENCY FEATURES AND GAUSSIAN MIXTURE MODEL

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Abstract

Epigraphs are important sources of reshaping our history and culture. It is the necessity of the day to preserve them for the use of future generation. Modern paleographers find it difficult to decipher the information in the epigraphs these days because of number of reasons. It is due to the erosion of document material over the period of time, due to the existence of different types of noises and unknown character sets of ancient time. To read the information in these types of documents, first characters have to be extracted. Here, we are proposing a model for the extraction of characters through binarization and removal of background noise. This consists of phase feature based preprocessing and Gaussian model based background elimination using expectation maximization (EM) algorithm. Enhancement and preprocessing are carried out using different types of specialized

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Keywords and phrases: inscription, binarization, phase congruency, expectation maximization.

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Restoration of Characters in Degraded Inscriptions using Phase Based Binarization and Geodesic Morphology

Sachin Bhat, Seshikala G

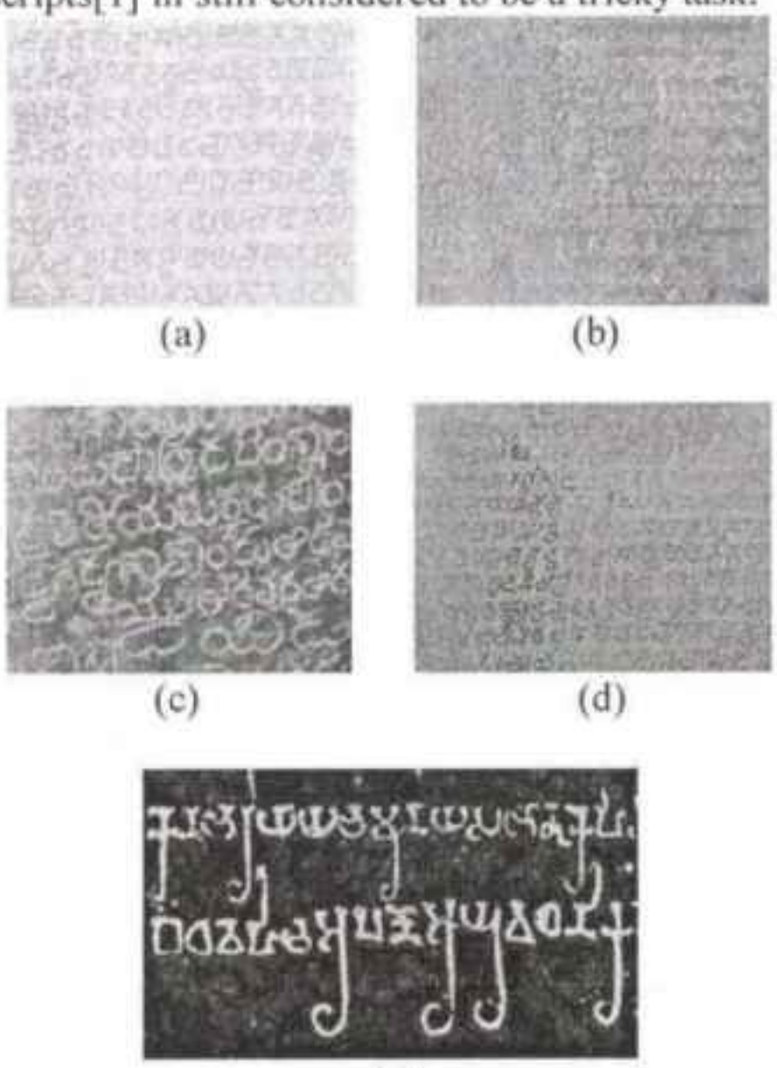
Abstract: ***It is the requirement of the time to store and conserve the ancient manuscripts for the use of next generation. Epigraphists find it hard to decrypt the information present in inscriptions due to variety of reasons including erosion of letters, noise and many more. Here, we present a new binarization and postprocessing technique to efficiently extract and reconstruct the foreground text from heavily degraded documents. The proposed method uses combination of phase based feature maps and geodesic morphology with anisotropic filtering. Phase feature maps will binarize the text by removing background noise and geodesic operators will reconstruct the deteriorated characters. Statistical performance evaluation is done on different datasets and efficiency of the proposed method is demonstrated by comparing with many state of art algorithms.***

Index Terms: Document Analysis, Image binarization, Morphological operators, Phase congruency

I. INTRODUCTION

Currently, there is a huge growing pursuit in the domain of document image analysis. Many researchers are trying to develop the systems for the extraction of pertinent information from these documents. It is a dynamic research area being studied from years for tasks like optical character recognition (OCR).

Documentation existed even in the ancient ages without papers or gadgets. Information was created on palm leaves, clothes, metal plates or on stone surfaces. These writings are generally termed as inscriptions or epigraphs. It is the key tool used in history to be able to study the life of ancient time. Manuscripts like epigraphs attained across the globe expose the details of lifestyle, sociocultural environment, political position, fine art and even about the society regarding that time frame and location. These manuscripts became a crucial part of passing the information and procedures from one generation to another. To save this information for the future use to save our culture and heritage is necessity of the day. Preservation of any manuscript generally requires digitization, preprocessing, data extraction and recognition. Primary technique used in any document analysis is preprocessing and binarization which helps in the extraction of useful information from these manuscripts. Document image binarization(BZ) aims at segmenting the foreground characters of a manuscript from the noisy background during the preprocessing stage. manuscripts generally suffer from various degradations over time making BZ an intimidating task. Typically, an epigraph can be heavily degraded due to erosion of characters over time as they are exposed to different environmental conditions, low or varying contrast, stains, intra/inter variation between text and background, missing data noise due to variation of light during image acquisition. Thou' document analysis is being studied across-the-board in the recent past, BZ and postprocessing of highly degraded images is still a largely undiscovered problem which is mainly because of the difficulties in moulding different types of degradations and varying noise. As far as the field of inscriptions and olden manuscripts are concerned, no standard existing methods deal with the issues of foreground extraction, uneven noise removal and character reconstruction. The Document Image Binarization Competition (DIBCO) aims to cover this problem by bringing in datasets of handwritten degraded documents to assess the recent advancement in image binarization. However, enhancement and binarization of ancient manuscripts[1] in still considered to be a tricky task.



(a) (b) (c) (d) (e)

Fig 1(a)-(e). Sample inscription images

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Text Extraction and a Deep CNN Based Model for Character Classification in Kannada Documents

Sachin Bhat, Seshikala G

Abstract: ***Pattern analysis in documents is one of the most interesting issues in the current research because of its wide are of of applications. It has leveraged its potential in reducing the manual work of converting the documents containing handwritten characters to machine-readable texts. The Deep Convolutional-Neural-Networks (DCNN) are successfully implemented for the recognition of characters in various languages. But due to high noise, degradation over a long time period, low contrast and intensity to separate the foreground text plays a spoiler in the extraction of characters from the document images. This paper proposes covers both the aspects including preprocessing of Kannada documents and a DCNN based architecture for the classification of Kannada language characters. Kannada is one of the 22 official languages in India spoken by more than 60 million people across the globe. This model is mainly developed to assist the character recognition of Kannada documents. A total of 84000 characters including both vowels and consonants have been included in the dataset. This architecture is showing a satisfactory test accuracy of 98.87% for the classification of 42 handwritten characters.***

Index Terms: ***CNN, Document Analysis, Image Enhancement, Optical Character Recognition***

I. INTRODUCTION

Writing information on papers, palm leaves, copper plates, stones existed from several centuries. This method was followed by hundreds of years not only in India, but all over the world. These types of writings are generally called as manuscripts. This is the main tool used in history to study the life of ancient time. Manuscripts became the important tool in transmitting the information and traditions from one generation to another. Document analysis is a technique to upgrade the calibre of a document to improve the human perception and to help later automated processing of images. This is also a major preprocessing step in the Optical Character Recognition(OCR). OCR is a process of converting the documents containing printed/handwritten characters into machine-readable format. In recent times, it has shown its potential of cutting down the manual work of digitizing the images of printed or handwritten text. Both preprocessing and OCR have become very interesting research fields helping to improve the calibre of documents and thereby recognising and classifying the text from images. Various conventional algorithms are used for OCR like template matching, hidden markov model etc. With advancing technology and processing power, machine learning algorithms are taking over the traditional methods with improved accuracy and high speed. But, OCR of handwritten text in a document is still a complex problem for researchers because to its poor quality, indifferentiable foreground and background and variety of handwriting styles. It is particularly true for Indian languages due to a vast character set and complex writing style. OCR with high accuracy is reported in English and other western languages which have a less number of characters and minimum structural complexity. But character recognition of Indian scripts is comparatively acute coz of its compound structure and similar nature of characters.Remaining part of the paper has been arranged in the below format. Part II lists some of the notable works accomplished in the domain of document image binarization and character recognition. Part III depicts the methodology developed in detail. Experimentation with result evaluation is shown in part IV. Part V will be the conclusion

II. REVIEW OF LITERATURE

In this part, we briefly depict some of the text extraction and character recognition methods used by earlier researchers. Generally, the techniques used for BZ can be either local or global. The global binarization techniques allot a single threshold for the entire image whereas threshold for individual or group of pixels in the document image will be identified in local binarization. Histogram shape based global binarization methods [1][2] tries to estimate a global threshold to minimize intra-class variance. It requires a bimodal histogram pattern and therefore, cannot handle the document images with high variation in background. Though local binarization methods comparatively yield a better result, it is still an unsolved problem in case of ancient manuscripts. This is mainly due to different variety of noise, degradation and unclear foreground. Adaptive thresholding methods like Sauvola[3] which is an improvement over Niblack's[4] and Bernsen[5] will either generate a certain quantity of noise or fail to identify the text with a low contrast[6]. All these algorithms use mean, variance or standard deviation and contrast information of local region to calculate different thresholds. They have also failed to handle the images with light texture background.

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Design and Analysis of 8-T and 5-T based XOR and XNOR gates using Soft Computing Tools

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Abstract— **XOR and XNOR gates are the basic building block of arithmetic and logic circuits. In the modern era, VLSI technology demands the circuit design with least area consumption, least power consumption and high speed in operation. There are various CMOS logic structures available to design digital VLSI circuits, like, pass transistor logic, transmission gate logic, pseudo NMOS logic, CMOS logic, dynamic and domino CMOS logic, clocked CMOS logic, CVSL logic and so on. This paper presents the design of XOR and XNOR gates using pass transistor logic. Simulation results obtained in the mentor graphics tool are used to compare the number of transistor usage, area consumption, delay between 8-T and 5-T based XOR and XNOR gates and it proves that 5-T based design is the best in all the above-mentioned parameters.**

Keywords—Pass transistor logic; XOR and XNOR gates; area; delay

I. INTRODUCTION

Nowadays, the primary concern for any Very Large-Scale Integration (VLSI) system designers focuses mainly on System on Chip (SoC) design of VLSI circuits pertaining to minimum transistor count, thereby reducing the area consumption, power consumption, which is a crucial factor to be taken into consideration in case of any processor. XOR and XNOR gates are the fundamental components in designing of VLSI based circuits like adders, multipliers, comparators, multiplexers, demultiplexers, phase locked loop and so on.

Henceforth, a careful design and analysis is very much essential in designing these building blocks of VLSI circuits that is, designing XOR and XNOR gates. There are several Complementary Metal Oxide Semiconductor (CMOS) logic structures like pass transistor logic, transmission gate logic, dynamic CMOS logic, domino CMOS logic, clocked CMOS logic, cascade voltage switch logic (CVSL) available for designing digital VLSI circuits. Each type is having its own advantages and drawback. Since our main intention is to reduce the transistor count, in this paper we present a detailed design of XOR and XNOR gates using pass transistor logic by making use of 5 transistors and 8 transistors [1] thereby simulating and analyzing various performance parameters which needs to be taken into consideration for ease of design (simplicity) as well as better performance.

II. RELATED WORK

There are several techniques applicable to design XOR and XNOR gates which have its own advantages and drawbacks. Depending upon the designer and end user requirement, suitable CMOS logic structures. Pass transistor logic is a series combination of a set of transistors. Pass transistors can be categorized as PMOS pass transistor logic and NMOS pass transistor logic. PMOS pass transistor can pass good logic 1 whereas NMOS pass transistor can pass exact logic 0. Due to threshold voltage effect, PMOS and NMOS pass transistors are not capable of passing good logic 0 and logic 1 respectively. However, by connecting the substrate terminal of PMOS transistor to VDD and substrate terminal of NMOS to ground, this effect can be minimized to some extent. Due to minimal transistor usage in case of pass transistor, in this paper we have implemented the design of XOR and XNOR gates using this logic.

Pass transistor logic based XOR and XNOR gates and Complementary Metal Oxide Semiconductor inverter proved to dissipate less power, speed in operation and lower power delay product [2] when compared to design with a lower supply voltage [3].Usage of VDD and ground connection in the design of 6 transistor based XOR and XNOR gates using pass transistor has proved to have better driving capability and

FACE RECOGNITION STUDENT ATTENDANCE SYSTEM USING DEEP LEARNING

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Abstract

As we all know nowadays in any academic organization recording a student attendance plays a very important role in judging a performance of each students. Current biometric methods for attendance system is too impertinent to follow,as labour involved in this method is time consuming.So to overcome this problem this paper as introduced stress-free non-intrusive way of taking attendance in the class using face recognition technique.This system consists of 2 phases that is enrollment and verification phase.During enrollment, a camera was used to acquire facial images that were stored in a database. During verification, facial features extracted from acquired face images and stored picture were compared using HOG algorithm and CNN.After successfully recognizing the student face the proposed system will update the attendance of that particular student in csv file.So this system helps in maintaining time management in a successful way by eliminating manual calling, marking and entry of attendance.

Keywords -Face Recognition, HOG Algorithm, CNN, Csv, Attendance

I. INTRODUCTION

Numerous Organizations utilize participation frameworks to record when understudy begin and halt to work, and the division where the work is performed. A few organizations moreover keep point by point records of participation issues such as who calls in debilitated and who comes in late. An participation framework gives numerous benefits to organizations. There was a time when the participation of the understudies and workers was checked on registers. When it comes to schools and colleges, the participation observing framework may be a awesome offer assistance for guardians and instructors both. Guardians are never uninformed of the constancy of their children within the course in the event that the college is utilizing an participation observing framework. The registers may effortlessly be misused by understudies and in case data was sent to the guardians, there were tall chances that sends may be made to vanish some time recently guardians indeed saw them. With the checking framework in put, the data can effectively be printed or a delicate duplicate can be sent specifically to guardians in their individual e-mail accounts.Regularly, a great biometric framework has two stages; the enrolment stage and the acknowledgment stage. Enrolment includes getting the biometric characteristic of an person, putting away the highlights in a database as well as an identifier to empower the characteristic to be related with the person. The acknowledgment stage includes procuring the biometric characteristic, extricating the identifier and checking the database to see in the event that there's any coordinate. Confront acknowledgment has various merits over other biometric strategies. Most of the other biometric shapes require a few shape of activity by the client. In any case, confront acknowledgment can be done without the inclusion of the client due to the reality that confront pictures can be procured from a separate by a camera. Within the conclusion, confront acknowledgment is completely non-intrusive and so does not uncover the user to germs which will be predominant in a framework that has numerous client. Amid the enrollment prepare, the picture

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A COMBINATION OF WIRELESS AND OPTICAL MODE COMMUNICATION IN SENSOR NETWORKS FOR EFFICIENT DATA TRANSMISSION

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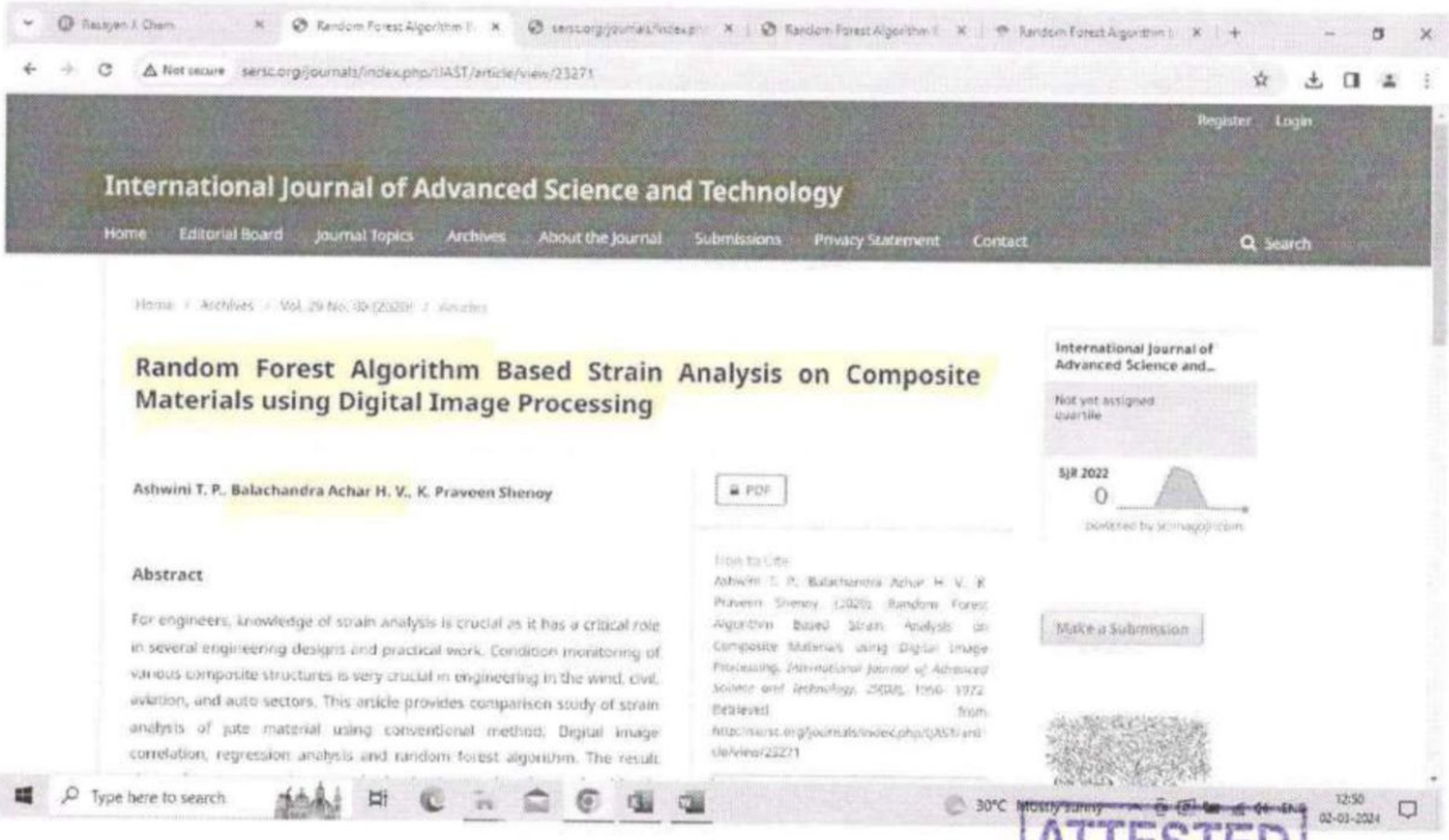
Abstract: Wireless sensor network is one of the subsets of wireless technology providing significant research and development interest from various domains of engineering. They are mostly used in remote terminal unit which may be in remote location for data aggregation, SCADA operation, data collection. Their power consumption as well as the cost is very less. The rapid positioning of these sensors have served as an advantage and has applications in the field like recovery after the disaster, surveillance in military, administration in health sector and etc..., and do not require human intervention. Nodes consist of sensor devices. These sensor devices sense the parameters to be measured and pass this value to a transceiver unit. This unit forwards the data to a remote location where it is monitored for controlling certain operations. Wireless communication provides long range transmission using Multi-Hop topology. The interference causes degradation of data quality and makes it difficult to control the distributed units through automation. Preserving the accuracy of data that is to be transmitted and providing fastest data transmission rate for appropriate data exchange in the network is important. Hence, optical fiber communication has gained research interest due to offered large bandwidth and less interference to multi access communication. The proposed solution is concentrated to develop a spectrum allocation in WSN Optical Communication model with reference to offered service rate and therefore the interference margin. The dynamic behavior of modulation control, leads to a higher resource utilization, lower computation overhead, higher accuracy and higher offered throughput.
Index Terms: Multi-Hop topology, Optical Fiber Communication (OFC), Wireless Sensor Networks (WSN)

I. INTRODUCTION

The growth in the field of Wireless Communication has given way to many other communication approaches for exchanging the data which leads to high resource utilization and offers greater system efficiency. Systems such as hybrid network, heterogeneous network, cognitive network, Ad-hoc network, wireless sensor network are few of the examples of advanced networks. With each of these networks there is an improvement in resource utilization, throughput, data accuracy, service compatibility, etc. Among these approaches, wireless sensor network are used for various critical monitoring applications such as the power plants, medical data monitoring, distributed industries, military applications, corporate applications etc. Wireless Sensor Networks (WSNs) find their applications in many isolated and engineering applications. Besides the advantages, efficient routing protocol improves the efficiency of these WSNs. This routing protocol plays an important role in transmission of data from sensors. These sensors which are used can have certain limitation in resources like bandwidth, power and inconstant network topology with data being redundant. In WSN, there exist multiple paths to exchange information for every node. These paths also route the information between the nodes. The nodes are connected through various nodes increasing the throughput thus allowing various information's to be transmitted at a time through multiple paths. This kind of routing over multiple paths increases the life time of network. Balancing the energy consumption of each node by shunting messages through multipath also elevate stability and reliability. Therefore, it can provide much better service for network applications. Even in multipath routing the issue of congestion is predominant, which results in blockage leading to the decrease in throughput of the system. For improvement in resource optimization and throughput, optical networks are integrated to offer higher optical spectrum. Studies show that various approaches were made by the researchers in this domain. Zahurul et al in [1] defined a method where the data exchange happens in real time. The author has discussed micro grid system with sensor nodes and optical communication methods for exchanging the data between the nodes. L. Alwis et al in [2] explained the optical fiber sensor (OFS) in communication. In [3] Joel Villatoron and Josebazubia defined various sensors and their structure of communication for future generation OFS communication. Photonic Crystal Fiber (PCF) technique in OFS is outlined by A. Xenakis et al in [4]. The technique provides improvement in the efficiency of data exchange. In [5], Zilong Liao et al defined a simulated Annealing (SA) approach. Cluster based scheme was discussed in [6], Guodong Sun et al. To conserve energy, based on conservation RF-MAC protocol was recently proposed by Junaid Ahmed Khan et al in [7]. In this approach the method of energy transmission via RF media to recharge the distributed nodes over wide distributed nodes is defined. Joint optimization considering hardware power consumption is investigated in [8-10]. S



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Dual Parametric Stabilization of Interference and Throughput in Wireless Sensor Network- Optical Communication

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ABSTRACT

Self-adapting wireless communication in data exchange has gained a lot of interest and importance in the recent past. For monitoring and controlling of vital physical parameters Wireless Sensor Network (WSN) has evolved. The property of WSN to link to itself is very useful and this acts as an advantage under critical access zones. With the significance of using interface in a wireless mode and easy deployment, WSNs are now used in various real-time monitoring applications. However, these networks are bounded with the need of accuracy and transmission throughput to perform efficiently in real-time applications. Wherein the new hybrid techniques such as integrated optical communication offer high communication spectrum, still the accuracy and throughput are always the dual problems. In this paper, we present an optimal communication approach in WSN interface to Optical Communication based on adaptive light modulation for minimal interference and maximum throughput. The proposed solution is focused to develop a spectrum allocation in WSN Optical Communication model with respect to offered service rate and the interference margin. The dynamic behavior of modulation control, leads to a higher resource utilization, lower computation overhead, higher accuracy and higher offered throughput.

Key words: Dual problem, Dynamic Modulation high throughput, Optical Communication (OC), Wireless Sensor Network (WSN)

1. INTRODUCTION

The revolutionary evolution in the area of wireless communication has developed many new communication approaches for data exchange which leads to high resource utilization and offers greater system efficiency. Systems such as hybrid network, heterogeneous network, cognitive network, Ad-hoc network, WSN are a few of these advanced networks. Each of these networks has given a boost to resource utilization, throughput, data accuracy, service compatibility, etc. Among these approaches, WSNs are now been developed for various critical monitoring applications, such as the power plants, medical data monitoring, distributed industries, military applications, corporate applications etc. WSNs represent a new mode of communication in wireless technology with significant interest in remote and industrial applications. WSNs offer exclusive benefits and compatibility in case of low-power and low-cost rapid positioning applications that do not need human supervision. Some of these applications include disaster recovery, military surveillance, health administration, environmental & habitat monitoring, target-tracking, etc. Besides these advantages, to utilize a WSN efficiently, there is a need of an efficient routing protocol, which plays an important role in the data transfer from sensors. The sensors in WSN also have limited resources like limited bandwidth, limited power and inconstant network topology with data redundancy. In WSN, every node has multiple paths to exchange information with another node and also acts as a router to send information from one node to another. The nodes route through various nodes, increasing the throughput of the entire network by sending multiple information at a time through multiple paths. Multipath routing strategy can prolong the life span of network by balancing the energy consumption of each node by shunting messages through multipath. Multiple routing strategies further improve the stability and reliability of the network. Therefore, it can provide much better service for network applications. In addition to the advantages of multipath routing, the issue of congestion is predominant, resulting in the bottle neck problem which leads to the decrement in throughput of the system. The advantage of wireless deployment and dynamic routing/linking gets disrupted due to dynamic trafficking and hence leads to decrease in system throughput. For the enhancement of resource optimization and throughput, optical networks are integrated to offer higher optical spectrum.

In the approach of exchanging data in optical domain for sensor network, Zuhurul et al [1] presented an approach to real-time data exchange. The recent development in the field of micro grid system is applied with sensor nodes and integrated with optical communication for data exchange among different nodes and such application is presented using different modes of communication, such as ZigBee, Wi-Fi, Wi-Max and cellular network. Alwis et al [2] presented the mode of communication in sensor network which is termed as optical fiber sensor (OFS). This approach is observed to be an emerging area of communication where long range communication is possible with the usage of optical signal

Experimental and Numerical Investigations on Heat Transfer Characteristics of Open Cell Al6061 Alloy Foam

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Abstract

This paper reports on fabrication of open cell Al foam by sand salt mould method, using NaCl crystal as space holder and Al6061 alloy as base metal. The developed Aluminum foam specimens have been tested in wind tunnel to determine relative heat transfer coefficient for different velocities of air, mass flow rate and temperatures. Thus, obtained experimental results were compared with the CFD results obtained by simulating the wind tunnel test using CFD packages. Heat transfer coefficient increases with increase in temperature for both experimentation and finite element approach. Experimentation results were found to be well supported by simulation results and both conduction and convection as main mode of heat transfer. Increase in mass flow rate had significant effect on heat transfer coefficient.

Keywords: Al6061, Open Cell, Metal Foam, Heat Transfer Coefficient, FEM.

1.0 Introduction

Engineering technologies are emerging to new ideas and concepts at very fast rate and there is huge demand for new, versatile, compact and lightweight material. Metal foams are one such kind of materials that open up to the requirement of new demanding arenas in numerous applications of industry. These class of materials are heterogeneous in nature and appear to be cellular structured normally made up of gas and metal which proves them to have very low density, that adds up to the improvised properties such as higher stiffness to weight ratio, less weight, enhanced property of energy, sound and vibration absorption, with great ability to act as thermal insulator. The important character of such materials is; they can be produced on the basis of need and requirement for particular applications. Metal foams are basically made up of outer dense material and inner core is the form of matrix or pores. The design understanding and concept was evolved through naturally available substances such as stones, sponges etc. Aluminum, titanium and tantalum are few major elements in engineering applications that has varied applications, the foams developed by these elements are extensively studied. Higher compressible strength, porous in nature, low specific weight in comparison to its solid structure, great thermal conductivity due to voids in the internal structure and excellent acoustic benefits has made this material to be sought after than the solid form. NihadDukhanet. al. [1] have

Development of Eco-Friendly Silencer

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Abstract*— Automobile Silencer is a device used to reduce the noise produced by the engine. Silencer is used in automobile vehicles to reduce the noise produced by the exhaust gases of the engine. Silencer is also used in many other engines and generators. The size, shape and construction vary according to the type and size of the engine. The main pollutants contribute by automobiles are carbon monoxide (CO), unburned hydrocarbon (UBHC), oxides of nitrogen (NOx) and Lead. In the present work, an eco-friendly silencer is developed to reduce the pollution level from automobiles. As the exhaust smoke enters into the eco-friendly silencer system, the perforated tube converts high mass bubbles in to low mass bubbles, after that it is made to pass through the activated carbon layer which is embedded between glass fiber membranes to make filter like structure that surrounds the perforated tube which purify the gases. Activated carbon is highly porous and possesses extra free valences so it has high adsorption capacity. Hence eco-friendly silencer reduces pollution.

***Keywords*—Silencer, Exhaust gases, Activated carbon, Adsorption**

I. INTRODUCTION

An automobile was first invented in Germany and France in the late 1800s. Americans quickly came to dominate the automotive industry in the first half of the twentieth century. Automobile emissions cause immediate and long-term effects on the environment. Car exhausts emit a wide range of gases and solid matter. Automobile emissions cause air pollution, global warming, acid rain and cause damage to human health. Engine noise and fuel spills also cause pollution. Cars, trucks and other forms of transportation is the single largest contributor to air pollution.

In the present work an attempt has been made to develop an eco-friendly silencer, which reduces the particulate emissions from the exhaust. Also the activated charcoal used in the developed system oxidizes the carbon monoxide to carbon dioxide thus emission of carbon monoxide reduces.

As the exhaust smoke enters into the eco-friendly silencer system, the perforated tube converts high mass bubbles in to low mass bubbles, after that it is made to flow through the activated carbon layer which is embedded between glass fibre membranes to make filter like structure that surrounds the perforated tube which filters the gases. Activated carbon is highly porous and possesses extra free valences so it has high adsorption capacity. Hence eco-friendly silencer reduces pollution.

II. FABRICATION OF THE MODEL

The eco-friendly silencer is a device that is built at an economic cost with an objective to reduce the emission of pollutants such as CO, HC emissions and to improve the oxygen utilization for to chemical treatment of the exhaust smoke by utilizing the high absorptivity and high porosity properties of activated charcoal. The working model of the eco-friendly silencer consists of a perforated tube where the large smoke mass is broken into small smoke bubbles. The perforated tube is made of a mild steel tube having small perforations of 6 mm holes on its outer periphery. The tube is surrounded by an activated charcoal filter element in which activated charcoal is embedded in between two layers of glass fiber membrane. Finally, the smoke from the filter holes is collected in an outer casing which allows safe conditioned smoke into the atmosphere without causing the much pressure drop.

A. Materials/Components used for fabrication

Mild steel tubes:

Mild steel is one of the most commonly used construction materials. It is very strong and can be made from readily available natural materials. It is known as mild steel because of its relatively low carbon content.

Mild steel is especially desirable for construction due to its weldability and machinability. Because of its high strength and malleability, it is quite soft. This means that it can be easily machined compared to harder steels. It takes a nice finish and is polishable. However, it cannot be hardened through heat treatment processes, as higher carbon steels can. This is not entirely a bad thing, because harder steels are not as strong, making them a poor choice for construction projects.

Perforated tube:

It is a tube having perforation over its circumferential periphery; main function of this component is to split the mass flow of smoke into small smoke bubbles.

Dimensions of the perforated tube are as follows:

Length: 600 mm

Diameter: 45 mm

Holes drilled on tube: 90

Diameter of holes: 6 mm

Fig. 1 Perforated tube

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Improvement of Mechanical Properties of Aluminium 6061 based Metal Matrix Composite with Addition of Granite Particulate

Koli Gajanan Chandrashekhar, D.P .Girish, Katkar Ajit Ashok, Raja Yateesh Yadav

Abstract: ***Aluminium is considered as one of the material of future. Aluminium based metal matrix comes with a fascinating set of material properties which combines strength with less weight. Due to this these Al-base metal matrix finds their application in aerospace and automotive sector. Many types of reinforcements are done with Aluminium since last many years to check the improvement in its performance. Therefore many reinforcements are found suitable to form the composite which finds variety of novel applications. In this present investigation MMCs are fabricated with Al 6061 alloy and reinforced with granite particulate of 2-3 microns size in different compositions are used to see their effect on the mechanical properties of Al6061 alloy. The vortex method of stir casting is used to from the metal matrix wherein reinforcements are forced into the vortex created by the molten metal by means of mechanical stirrer. The castings prepared by above method are machined with turning operation on lathe. Improvement in Ultimate tensile strength, Yield strength, % Elongation and Hardness are found with increasing the percentage of granite particulates..***

Keywords : Aluminium 6061, Composite, Mechanical Properties, Hardness

I. INTRODUCTION AND LITERATURE REVIEW

Conventional materials have limitations to their use in aerospace and advanced automotive applications because of limited set of properties which they posses. Researchers around the world are investigation many materials to suit for different applications. Composites are one group of material which researchers are focusing on recently. Since composite comes with enhanced mechanical, chemical and thermal properties they are replacing conventional materials at many applications. Aluminium based metal matrix comes with a fascinating set of material properties which combines high strength with less weight. Due to this these Al-base metal matrix finds their application in aerospace and automotive sector. Many types of reinforcements are done with Aluminium since last many years to check the improvement in its performance. Therefore many reinforcements are found suitable to form the composite which finds variety of novel applications. Al6061 alloy is one the Al- family alloy which has properties which suits for formation of metal matrix as base material.Kumar et al.[1] conducted experiments on Al6061-SiC and Al7075-Al2O3 to make analysis with respect to density of composites and hardness. They found increase in the density and hardness of the composites compared to the base matrix. Swamy et al.[2] found increase in Hardness of the composite with the increase of reinforcing particulate content while investigating Al6061-Tungsten carbide metal matrix composites. Ramani et al. [3] studied heat treatment aspects of ceramic reinforced aluminum matrix composites. They outlined different heat treatment procedures for aluminum based metal matrix composites with emphasis on the T6 tempers. Shaikshavali et al.[4] found that Al6061-10%, Al2O3 MMC material has good ultimate tensile strength property when compared to other ceramic reinforced MMCs.

II. METHODOLOGY AND EXPERIMENTAL DETAILS

The MMCs are fabricated with Al 6061 alloy and 3µm size granite particulates (GP) (reinforcement). Table 2.1 shows the detailed material composition.

Table 2.1 Details of Material Composition

Sample	%	
	Al6061	Granite
1	100%	0%
2	98%	2%
3	96%	4%
4	94%	6%
5	92%	8%

Tensile tests are as per ASTM E8 standards with samples of diameter 8.9 mm and gauge length 76 mm. The cast complements are machined for above specifications. Brinell hardness test is done as per standard procedure.

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DOI

Optimization of ball-burnishing process parameters on surface roughness, micro hardness of Mg–Zn–Ca alloy and investigation of corrosion behavior

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2019

Abstract

[en] In this work, optimization of ball burnishing parameters (depth of press, feed, burnishing force, number of passes) and their effect on surface roughness, microhardness and corrosion behavior of Mg-4%Zn-1%Ca alloy is investigated. The Taguchi optimization technique was used to determine the number of experiments and by considering S/N ratios, right combination of ball burnishing parameters were selected. Results obtained from the experiments were investigated and it is understood that depth of press, feed and number of passes have a significant effect on surface roughness, microhardness and consequently improves corrosion resistance of Mg-4%Zn-1%Ca alloy. From ball burnishing experiments it is deduced that there is large increase in microhardness of 107 Hv and surface roughness of 129 nm, achieved for the depth of press 0.45 mm, burnishing force 250 N, feed 450 mm min^{-1} and number of passes: 2. Corrosion behavior of the alloys were analyzed using potentiodynamic polarization and electrochemical impedance spectroscopy techniques in Hank's balanced salt solution. The lowest corrosion rate was observed in DFN 442 sample (1.43 mm y^{-1}) which is 4.7 times better than the homogenized alloy (6.73 mm y^{-1}). It has been found

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ORIGINAL PAPER

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Influence of Ball Burnishing Process on Equal Channel Angular Pressed Mg-Zn-Si Alloy on the Evolution of Microstructure and Corrosion Properties

S. Ramesh[1] · Gajanan Anne[2] · Goutham Kumar[1] · C. Jagadeesh[1] · H. Shivananda Nayaka[1]

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Abstract
In the present study, Mg-4Zn-1Si alloy was subjected to equal channel angular pressing (ECAP) up to 4 passes at 300 °C, followed by ball burnishing using 0.3 mm depth of press, 300 mm/min feed and 1 pass successfully. The effect of ECAP and ECAP + ball burnishing process on microstructure, mechanical properties (tensile and hardness) and corrosion behavior was systematically investigated. After 4 pass ECAP, initial coarse grains (210 μm) were refined and average grain size is 6 μm and after ball burnishing, the grain size is found to be 3.3 μm. Microstructure evolution is discussed using optical images, scanning electron microscope images and transmission electron microscope images. For ECAP samples, maximum strength and hardness was recorded at 3 pass. Both strength and hardness decreased for 4 pass ECAP processed samples, even though grain size decreased, this is because of texture modification in the material. ECAP 4 pass + ball burnished samples exhibited 48.5% enhancement of microhardness as compared to 4 pass ECAP samples. Corrosion resistance of the samples decreased with increase in the number of ECAP passes, this is due to strain-induced grain refinement with more crystalline defects in samples. Combined process of ECAP and ball burnishing effectively reduces the Icorr and this consequently reduces corrosion rate of the Mg–4Zn-1Si alloy.

Keywords ECAP process · Grain refinement · Ball burnishing · Corrosion behavior

1 Introduction

Owing burden of secondary surgery after broken bone heal, there exists a huge scope for research in metallic biodegradability, Mg is gaining higher attention of researchers [1, 2]. Hence, to develop novel Bio-Mg alloys for medical applications is challenging task and essential to fulfill some of requirements of clinical use. The prerequisites are biocompatibility, mechanical strength and degradation rate. Use of commercially available Mg alloys as implant materials leads to neurotoxicity and severe hepatotoxicity as it contains Al and rare earth elements [3, 4]. Hence it is necessary to develop new Mg alloy system containing low toxic elements. The common biomedical Mg alloy systems are Mg-Zn, Mg-Ca, Mg-Si, Mg-Sr based and are studied extensively for the development of biodegradable implant materials [5–7].There are very limited number of alloying elements such as Ca, Zn, Mn and Si which is tolerated by the human body [8]. The addition of Zn is preferred for improving mechanical properties through a solid solution and dispersion strengthening mechanism [9] and corrosion, bio toxicity considerations by shift in electrochemical potential of the alloy to more positive values [10]. Silicon has been considered as one of the essential minerals in the human body for the growth and development of bone and connective

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Full Length Article

Investigation of dry sliding wear properties of multi-directional forged Mg–Zn alloys

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Abstract

Effect of multi-directional forging (MDF) on wear properties of Mg–Zn alloys (with 2, 4, and 6 wt% Zn) is investigated. Dry sliding wear test was performed using pin on disk machine on MDF processed and homogenized samples. Wear behavior of samples was analyzed at loads of 10 N and 20 N, with sliding distances of 2000 m and 4000 m, at a sliding velocity of 3 m/s. Microstructures of worn samples were observed under scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), and x-ray diffraction (XRD) and the results were analyzed. Mechanical properties were evaluated using microhardness test. After 5 passes of MDF, the average grain size was found to be 30 ± 4 μm, 22 ± 3 μm, and 18 ± 3 μm, in Mg–2%Zn, Mg–4%Zn, and Mg–6%Zn alloys, respectively, with significant improvement in hardness in all cases. Wear resistance was improved after MDF processing, as well as, with increment in Zn content in Mg alloy. However, it decreased when the load and the sliding distance increased. Worn surface exhibited ploughing, delamination, plastic deformation, and wear debris along sliding direction, and abrasive wear was found to be the main mechanism.

Keywords: Multi-directional forging; Mg–Zn alloy; Microhardness; Wear; Coefficient of friction.

1. Introduction

The necessity for lightweight materials in various engineering applications like automotive, electronics, and construction industries has led to a massive demand for lighter structural materials [1]. In that aspect, there is a huge demand for Mg and its alloys owing to their unique properties such as high strength to weight ratio, low density, high thermal and electrical conductivity, good vibration and shock absorption ability, etc. [2,3]. These properties make Mg alloys more suitable and a possible alternative to steel and aluminum, particularly for moving components [4]. The major drawback encountered for widespread application of Mg alloys is related with their poor resistance towards corrosion and wear [5–7]. In general, wear is a kind of surface damage phenomena which can shorten the service life of the components and results in catastrophic failure and also, increases the operating cost of the equipments. Hence, for effective use of Mg alloys, in moving part applications, it is essential to improve its anti-wear property for better performance and reliability. One of the novel methods for improving wear properties of Mg alloys is through strengthening techniques [8]. Wear resistance and strength of material are improved by grain refinement technique, and it is considered as an effective strengthening method [9,10]. In that aspect, severe plastic deformation (SPD) is considered as one of the useful methods of grain refinement, and it is also simple in operation. Ultra-fine grained materials processed by SPD techniques exhibit higher strength, hardness, and adequate wear resistance as compared to coarse-grained materials [11–14]. Among various SPD techniques, multi-directional forging (MDF) is considered as an unique technique to

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Materials Research Express

PAPER

Effects of combined multiaxial forging and rolling process on microstructure, mechanical properties and corrosion behavior of a Cu-Ti alloys

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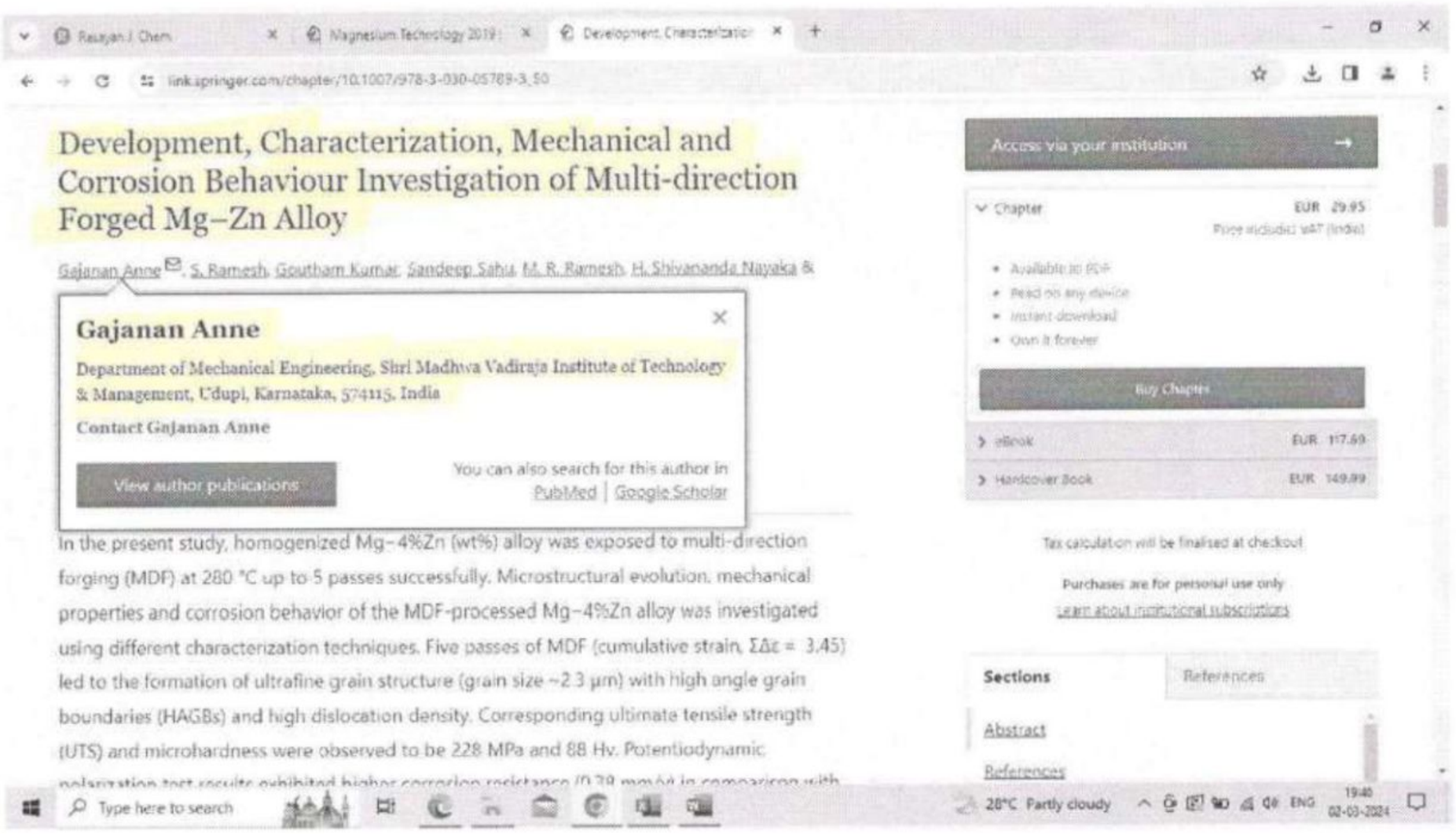
Keywords: Cu-Ti alloy, MAF, rolling, grain refinement, mechanical properties, potentiodynamic polarization

Abstract

Combined multiaxial forging (MAF) and rolling was performed on Cu-3% Ti (wt%) alloy at room temperature with emphasis on microstructural evolution, improvement in mechanical properties, and corrosion resistance. Microstructural changes were confirmed from various characterization techniques, and co-related with mechanical properties. TEM analysis revealed high shear band density in the 3 pass MAF + 90% rolled sample appearing due to high strain. EBSD analysis revealed transformation to low angle grain boundaries from high angle grain boundaries. Maximum



Development, Characterization, Mechanical and Corrosion Behaviour Investigation of Multi-direction Forged Mg–Zn Alloy

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In the present study, homogenized Mg−4%Zn (wt%) alloy was exposed to multi-direction forging (MDF) at 280 °C up to 5 passes successfully. Microstructural evolution, mechanical properties and corrosion behavior of the MDF-processed Mg−4%Zn alloy was investigated using different characterization techniques. Five passes of MDF (cumulative strain, $\Sigma\Delta\varepsilon$ = 3.45) led to the formation of ultrafine grain structure (grain size ~2.3 µm) with high angle grain boundaries (HAGBs) and high dislocation density. Corresponding ultimate tensile strength (UTS) and microhardness were observed to be 228 MPa and 88 Hv. Potentiodynamic

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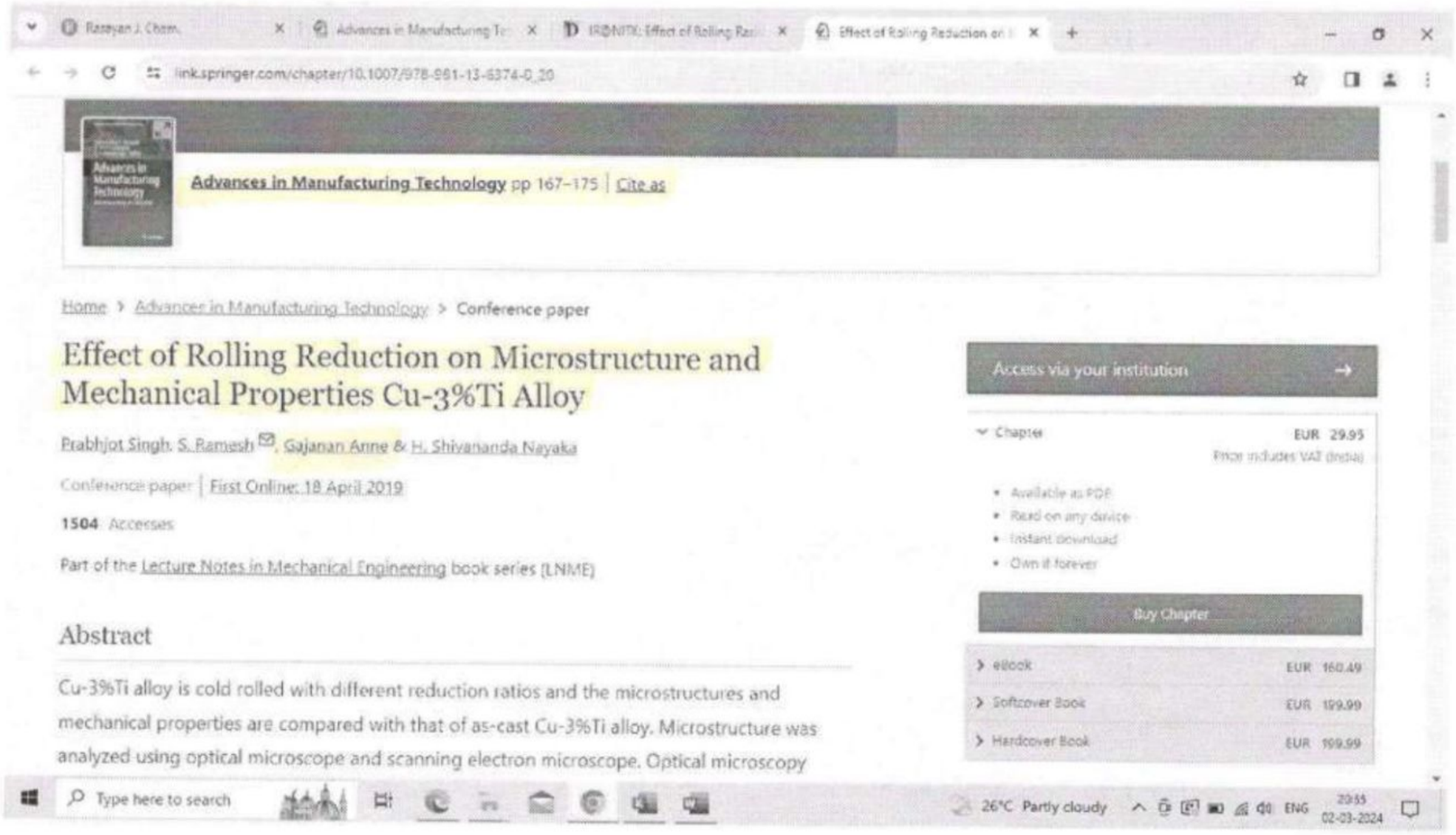

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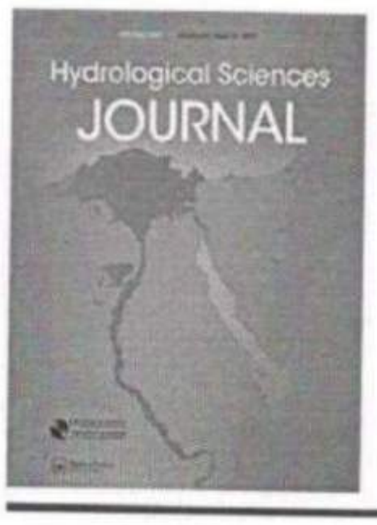

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Enhancing streamflow forecasting using the augmenting ensemble procedure coupled machine learning models: case study of Aswan High Dam

Mohammad Rezaie-Balf, Sujay Raghavendra Naganna, Ozgur Kisi & Ahmed El-Shafie

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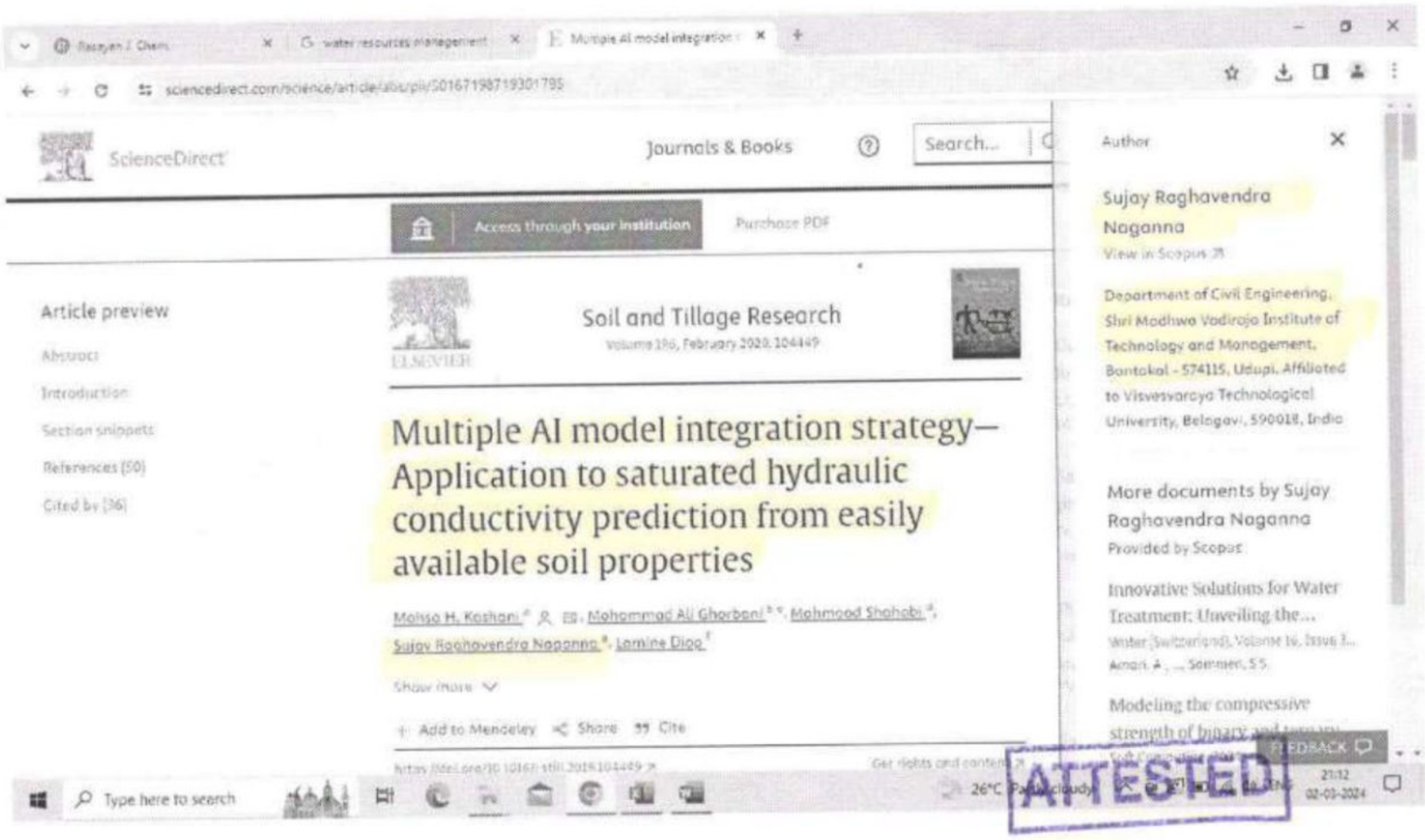

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