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3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during the academic year 2020-21.

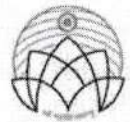| SI. N o.	Title of paper	Name of the author/s	Departme nt of the teacher	Name of journal	Cale ndar Year of publi catio n	ISSN num ber	Link to the recognition in UGC enlistment of the Journal /Digital Object Identifier (doi) number		
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1	Character Recognition of Tulu Script Using Convolutional Neural Network	Sachin Bhat	Electronic s & Communi cation Engineeri ng	Advances in Artificial Intelligen ce and Data Engineeri ng, Springer	2020	978-981-15-3513-0	https://link.s pringer.com/ book/10.100 7/978-981-15-3514-7	https://link. springer.co m/chapter/1 0.1007/978-981-15-3514-7_11	Yes
2	A combination of Wireless and Optical Mode Communication in Sensor Networks for Efficient Data Transmission	Balachandr a Achar	Electronic s & Communi cation Engineeri ng	Journal of Critical Review	2020	2394 - 5125	https://www. jcreview.co m/	https://ww w.jcreview. com/admin/ Uploads/Fil es/632d53d 56da6b9.39 545757.pdf	Yes
3	Anthropometric measurement extraction using perspective transform	Sachin Bhat,	Electronic s & Communi cation Engineeri ng	Journal of Critical Review	2020	2394 - 5126	https://www. jcreview.co m/	https://ww w.jcreview. com/paper. php?slug=a nthropomet ric-measureme nt-extraction-using-perspective -transform	Yes

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4	Crop Field Management Based on IoT Using Raspberry Pi	Sowmya Bhat	Electronics & Communication Engineering	International Journal of Current Engineering And Scientific Research	2020	2393-8374	https://troindia.in/journal/ijcesr/index.html	http://troindia.in/journal/ijcesr/vol7iss8/64-68.pdf	Yes
5	Key Generation Using Generalized Pell's Equation in Public Key Cryptography Based on the Prime Fake Modulus Principle to Image Encryption and Its Security Analysis	Dr. Ganesh Aithal	Electronics & Communication Engineering	Cybernetics and Information Technologies	2020	311-9702	https://cit.iict.bas.bg/	https://cit.iict.bas.bg/CIT-2020/v-20-3/10341-Volume20_Issue_3-07_paper.pdf	Yes
6	An App Based Online Kannada To English Transliteration System For Mobile Camera Images	Sachin Bhat	Electronics & Communication Engineering	Solid State Technology	2020	0038-111X	https://solidstatetechnology.us/index.php/JSST	http://solidstatetechnology.us/index.php/JSST/article/view/5584	Yes
7	Marvelous Significance Performance Analysis of PQ Events Prediction and Classification	Nagaraja Rao	Electronics & Communication Engineering	International journal of science and Research	2021	2319-7064	https://www.ijsr.net/	https://www.ijsr.net/archive/v10i3/SR21228144322.pdf	Yes
8	Design and numerical analysis of tool for FSP simulation of magnesium alloys	Ligraj Ritti, Dr. Thirumaleshwara Bhat	Mechanical Engineering	Materials Today	2021	2214-7853	https://www.sciencedirect.com/journal/materials-today	https://www.sciencedirect.com/science/article/pii/S2214785321005058	Yes

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10	Determinants of Entrepreneurial Intention among Engineering Students: Application of Theory of Planned Behaviour	Mr. Madhukara Nayak	Mechanical Engineering	International Journal of Mechanical and Production Engineering Research and Development	2020	2249 – 6890	https://www.tjprc.org/journals/journal-of-mechanical-engineering	http://www.tjprc.org/publishpapers/2-67-1597301512-761IJMPERDJUN2020761.pdf	Yes
11	Experimental Investigation in Determining Optimum Working Temperature for a 4-stroke Air-Cooled Motorcycle Engine	Mr. Ananth Mohan Mallya	Mechanical Engineering	Journal of Critical Reviews	2020	2394 – 5125	https://www.jcreview.com/	https://www.jcreview.com/admin/Uploads/Files/632d541139ea99.30321075.pdf	Yes

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13	Significance of Personality traits on the entrepreneurial intention and Behavior of engineering students of coastal Karnataka	Mr. Madhukara Nayak	Mechanical Engineering	International Journal of Business Excellence,2021	2021	1756-0055	https://www.inderscience.com/jhome.php?jcode=IJBEX	10.1504/IJBEX.2021.10043523	Yes(Inderscience)
14	"Effect of Equal Channel Angular Pressing on Properties Evaluation of Biodegradable Mg-Zn-Mn Alloy	Dr. Gajanan Anne	Mechanical Engineering	Journal of Bio and Tribo Corrosion	2021	2198-4220	https://link.springer.com/journal/40735	https://link.springer.com/article/10.1007/s40735-021-00506-7	Yes
15	Producing Mg Based Multilayered Composites by Accumulative Roll Bonding: Investigate Effect of Addition of Zn and Anodization on Corrosion Behaviour	Dr. Gajanan Anne	Mechanical Engineering	Journal of Mechanical Engineering and Sciences	2021	6393-640	https://journal.ump.edu.my/jmes/	https://doi.org/10.15282/jmes.14.1.2020.15.0500	Yes

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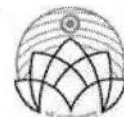| 16 | Surface modification of multi-directional forged biodegradable Mg-Zn alloy by ball burnishing process: Modeling and analysis using deep neural network | Dr. Gajanan Anne, Dr. Nagaraj Bhat | Mechanical Engineering | Journal of Manufacturing Processes | 2021 | 1526 - 6125 | https://www.sciencedirect.com/journal/journal-of-manufacturing-processes | https://www.sciencedirect.com/science/article/pii/S1526612521003790?via%3Dihub | Yes |
17	Erosion Wear Behavior of Glass Fiber Hybridized Flax and Sisal Fabric Hybrid Composites With Taguchi Experimental Design	Dr. Udaya Prasanna H	Mechanical Engineering	Materials Today Proceedings	2021	2214 - 7853	https://www.sciencedirect.com/journal/materials-today-proceedings	https://www.sciencedirect.com/science/article/pii/S2214785321033502?via%3Dihub	Yes
18	Influence of Abrasive Particles on Surface Hardness of Free cutting Brass in Ball Burnishing Process	Dr. Pavana Kumara	Mechanical Engineering	American Journal of Production and Industrial Engineering	2020	2377 - 4320	https://www.sciepub.com/journal/ajie	https://www.rame.org.in/pdf/jpie/papers2/v2i1paper2.html	Yes
19	Enhancement in Microhardness of Free Machining Brass in Ball Burnishing	Dr. Pavana Kumara	Mechanical Engineering	International Journal of Vehicle Structures and Systems	2020	0975 - 3060	https://www.i-scholar.in/index.php/IJVSS	https://yanthrika.com/eja/index.php/ijvss/article/view/1386	Yes

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21	Diabetic Retinopathy Disease Detection Using Machine Learning	Mr. Siju.V.Soman	Computer Science & Engineering	International Journal of Scientific Research and Engineering Development	2021	2581 - 7175	http://www.ijsred.com/	http://www.ijsred.com/volume4/issue3/IJSRED-V4I3P206.pdf	Yes
22	Pest Control Management System using Organic Pesticides	Ms. Ramyashree	Computer Science & Engineering	Global Transistion Proceedings	2021	2666 - 285x	https://www.sciencedirect.com/journal/global-transitions-proceedings	https://www.sciencedirect.com/science/article/pii/S2666285X21000868	Yes
23	Image Segmentation Techniques Using K-Means Clustering to Identify the Land Use Change Detection	Vasudeva	Computer Science & Engineering	International Journal of Advanced Trends in Computer Science and Engineering	2021	2278 - 3091	https://www.warse.org/IJATCSE/	http://paper.researchbib.com/view/paper/281047	Yes

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25	Facial Recognition using Haar Cascade and LBP Classifiers	Ms. Ramyashree	Computer Science & Engineering	Global Transistion Proceedings	2021	2666 - 285x	https://www.sciencedirect.com/journal/global-transitions-proceedings	https://www.sciencedirect.com/science/article/pii/S2666285X21000728	Yes
26	An optimum initial manifold for improved skill and lead in long-range forecasting of monsoon variability	Dr. Nagaraj Bhat	Computer Science & Engineering	Research Square	2021	2693 - 5015	https://www.researchsquare.com/	https://www.researchsquare.com/article/rs-233987/v1	Yes
27	Spatial variability of ground water quality: A case study of Udupi district, Karnataka State, India	Ms. Deepika B V	Civil Engineering	Journal of Earth System Science	2021	0973 - 774X	https://link.springer.com/journal/12040	https://www.ias.ac.in/article/fulltext/jess/129/0221	Yes

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29	Strongly (Properly) Set Colorable Graphs	Nisha Reena Nazareth, Bhagyalaxmi Navada, Lolita Priya Castelino	Mathematics	Indian Journal of Natural Sciences	2021	0976 – 0997	https://tnsroindia.org.in/journals.html	https://tnsroindia.org.in/JOURNAL/issue65/ISSUE%2065%20FULL%20TEXT%20-%20Part%2003.pdf	Yes
30	Dynamic mechanical behavior of unfilled and graphite filled carbon epoxy composites	Dr. Sudarshan Rao K	Mechanical Engineering	IOP Conference Series: Materials Science and Engineering	2021	1757 - 899X	https://iopscience.iop.org/journal/1757-899X	https://iopscience.iop.org/article/10.1088/1757-899X/1126/1/012033/pdf	Yes

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Character Recognition of Tulu Script Using Convolutional Neural Network

Sachin Bhat ✉ & G. Seshikala

Conference paper | First Online: 14 August 2020

Part of the Advances in Intelligent Systems and Computing book series (AISC,volume 1133)

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characters in various languages. This paper proposes a DCNN-based architecture for the classification of Tulu language characters. Tulu is one of the five Dravidian groups of languages used by around 50 Lakh people in the states of Karnataka and Kerala. This model is mainly developed to assist the character recognition of Tulu documents. A total of 90,000 characters including both vowels and consonants have been included in the dataset. This architecture is showing a satisfactory test accuracy of 92.41% for the classification of 45 handwritten characters.

Keywords

Computer vision   **Character recognition**

Tulu language   **Convolutional neural network**

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

Akshatha Hari Bhat[1], Dr. Balachandra Achar H V [2]

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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

ANTHROPOMETRIC MEASUREMENT EXTRACTION USING PERSPECTIVE TRANSFORM

THEJASHREE, THRISHNA, CHAITHRA, VIDYASHREE, SACHIN BHAT*

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ABSTRACT

In this fast-phased world, the fashion industry is changing and tries to give confidence to people who wear their clothes. The fit of the garment depends on accuracy of measurements. The traditional method of measuring may provide wrong information if the tools are inappropriate. Even though 3D body scanning can give accurate results, they cannot be afforded by small business setups. 3D imaging makes the process expensive. Not all can afford a stylish to measure and stitch 4-5 sets of outfits and select the best. The working community has no time to visit stores/tailoring shops regularly. This paper proposes inexpensive method for extracting human body measurements from 2D images which helps the society to reach out to the different styles and fitted garments of their taste. Human body measurements are extracted with the help of - Affine and Metric correction, Green Screen Segmentation, Heuristics for detection and pixel to real world distance. It is a 2D image based system which takes one front view, side view and front view with checkerboard. This method involves manual annotation technique. **Index Terms—**Affine and Metric correction, Perspective Transformation, Green Screen Segmentation, Chroma Keying Technique, body measurement.

I. INTRODUCTION

Fashion industry is evolving and everyone wants to be fashionable. More than self-expression, fashion boosts confidence and makes to feel fresh among our peers. Not only shopping online but also customers are concerned about how the particular item looks on them before purchasing. But the fit and form of outfit depends on the accuracy of measurement and visualization. Hence the need for non-contact anthropometric measurement extraction is of very much an interesting area. Extracting the measurements using 3D scanners can be said to be of much accurate one than compared to the 2D image based measurements. However, it's not that easy for all small scale garment industries to acquire a 3D measurement tool besides the reason that is costly. Hence proposing a system that performs measurement extraction task using only 2D images with improved accuracy is much of a need.

This paper proposes a non-contact body measurement extraction with the help of computer vision. It provides easiest way for implementing the system for non-contact human body measurement and can be easily implemented in the garment industry whether it is small or large scale one.

II. LITERATURE REVIEW

The shape variation of different objects can be measured using Principal Component Analysis (PCA). The feature is extracted using part based sampling technique. This provides accurate results and is less expensive but allows measuring only 5 parameters [1]. Body features are extracted from front and side images using background subtraction and contour detection. Canny edge detector is used for contour detection. Selected points from silhouette curve are considered as feature points. MATLAB software is used for evaluation. Even though it seems to be robust and reliable method, the images has to be captured over a white background only [2]. In order to determine threshold automatically, moving object segmentation technique is accommodated which uses Euler computation method since it requires less computational time. This method incorrectly identifies foot and head position and skin colour feature is not used. It is not applicable to the dark and shadow region [3]. Body volume can be calculated using curve fitting method. Body volume is represented in pixels by adding up the areas of the slices. This provides precise measurement and the body volume calculated by the proposed method is accurate [4]. Using CNN learning, pose can be estimated and it can capture all the features of input image. However the algorithm seems to be complex [5][8].

Human body model can be synthesized with Regression analysis method. Paper includes human body contour extraction as the initial step and curve fitting method is used to calculate the circumference. Since the regression analysis accuracy is unstable, this method provides inaccurate results [6]. With the help of Muller's method human body measurements are obtained. The binary image is used to calculate the body measurement with image processing software developed in MATLAB. It processes the input image with low cost and high speed [7]. One of the outstanding methods of measuring the human body parameter was

using Alex Net. This initially created 3D model of 2D image (silhouettes were used in order to preserve the identity) and then produced the measurement [9].

III. METHODOLOGY

Proposed methodology consists of 3 parts: Acquiring the image along with its preprocessing, segmenting the foreground part of appearance and extraction of body measurements as shown in figure 1.

A. Image Acquisition and Preprocessing:

Image Acquisition:

The measurement extraction system with simple algorithm takes 3 different input images. Namely an image with checker board, arm spread image and a side image. Where the checker board image is necessary for camera calibration and affine correction processes and arm spread image used to measure the sleeve length and side image is used to measure the waist. Along with these three images it is also necessary to input the one edge length of the checker board used in the image acquisition process which is very much necessary for camera calibration, applying transformation and also for obtaining pixel to meter converted measurements.
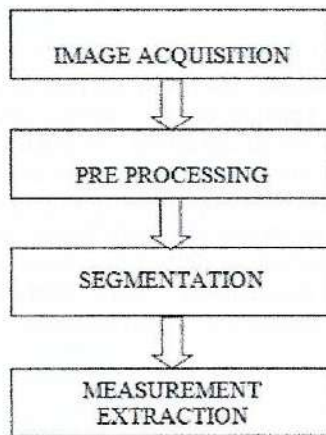
Fig. 1: flowchart of methodology

Preprocessing:

As for any image processing based algorithm preprocessing is one of the necessary steps. The acquired image might not be always up to the required quality of the algorithm to which it is fed into. The preprocessing used in our paper involves camera calibration and affine mode correction.

Camera Calibration:

Whenever an image processing algorithm deals with extraction of some information from the image it is necessary that it obtains the three dimensional co-ordinates for the particular image. This can be done by camera calibration. However, the calibration process requires any one of the original image parameters to be known so that it can retrieve other image based parameters that are of concern.

This paper uses camera calibration technique that involves checker board. The calibration technique used here is mainly concerned in retrieving the extrinsic parameters of the camera. Extrinsic parameter of a camera is related to real world co-ordinates (in 3D) and camera co-ordinates (in 3D) corresponding to any one point in the image. We use specific methods defined in the opencv library for camera calibration process. The acquired image is then fed into the algorithm as arguments.

Affine Mode Corrections:

Affine mode correction is of much necessity to preserve the information about points, straight lines and planes. When a 2D image is captured from a real world scenario it often losses its 3-dimensional properties. In particular we can say that if a real world scenario that contains some parallel lines is being captured, then the obtained 2D image will not have those parallel lines at the same place where they are in real world scenario. This is due to the perception that a 2D capturing device makes some delusions regarding some 3D coordinates. This needs to be corrected before one head to any sort of further operation with the image.

This process of correcting the perception occurred in capturing the 3D scenario by a 2D device is done by using perceptive transformation.

Perspective Transformation:

As the name suggests in perspective transformation perceptive of the image can be changed. Perspective transformation reserves parallelism of an image. Here the checker board image that is fed as input is used to apply the perceptive transformation to the rest of the image.

The perceptive transform requires four different corner points in the 2D image which is also called as quadrangle vertices. The

methods provided in opencv for finding the checkerboard edges are used in the algorithm for obtaining these points to give them as inputs for perspective transform function.

B. Segmentation:

Among image segmentation algorithms there are two major groups: (a) methods assuming known appearance models and (b) methods estimating appearance models jointly with segmentation. Typically, the first group optimizes appearance log-likelihoods in combination with some spatial regularization. This problem is relatively simple and many methods guarantee globally optimal results. The second group treats model parameters as additional variables transforming simple segmentation energies into high order NP-hard functionals [11].

The grabcut segmentation method is based on graph cuts. Starting with a user-specified bounding box around the object to be segmented, the algorithm estimates the color distribution of the target object and that of the background using a Gaussian mixture model. This segments the input image iteratively. It uses color data modeling by iterative energy minimization. Iterations are extremely slow. Hence this segmentation method is discarded.

The Chroma keying method is used to segment the human body from background. In this technique a specific colour is removed from the image and is replaced with another colour element in specific by black. It is also referred as green screen segmentation. The term green refers to the colour of the background used. In Chroma keying method any background can be used as background but the bright green is usually preferred as it is the colour that is farthest away from the human skin tones.

In this method following transformation is applied on the each pixel of the input image:

$$F(r, g, b) \rightarrow \alpha \qquad (1)$$

If $\alpha=0$, means the pixel is fully in the green screen. If $\alpha>0$ i.e., 1 means the pixel is in the foreground object.

C. Measurement Extraction:

Further step is to obtain measurement for waist, shoulder length and sleeve length. Measurement is done by manually obtaining the points on three different images that are fed onto the algorithm each time by considering two images for a particular measurement in order to increase the accuracy. The user is supposed to mark two points in each image that appears. The pixel corresponding to the point that is marked in the image is used for measurement.

Distance between any two points on the image is given by the formula,

$$dist = x - y \qquad (2)$$

(x, y)-Pixel coordinates

The distance obtained after each step is then converted to corresponding meter units.

Waist measurement:

After marking the waist in first 2 images distances images d1 and d2 between waist ends in both is obtained using the equation (2). Waist measurement is done by approximating the measurement obtained for 2 images as an ellipse.

The measurement that is obtained between two points marked of two different images is treated as semi major axes and are used to find the total perimeter of the waist similar the way of finding the perimeter of the ellipse when two semi major axes lengths are known. The formula is as shown below:

$$Waist\_perimeter = 2\pi \sqrt{\frac{(dist1)^2 + (dist2)^2}{2}} \qquad (3)$$

dist1=d1/2
dist2=d2/2

Where d1 and d2 are semi major axes lengths.

Shoulder and sleeve length measurement:

The shoulder measurement can either be done by using image marked manually or by heuristic selection. The heuristic point selection is done by first finding the head tip in the silhouette image. Traversing horizontally through the edge and finding the point where there is a drastic change in the slope that referring the shoulder edge. In the same way wrist edges are also found whereas option for manual marking is also given. We prefer marking manually as it is the method in which it is possible to get the exact edges compared to heuristic marking which results in larger error due to incorrect marking. In manual marking distance between two pixels are obtained in the same way as mentioned in the case of waist measurement. In first image fall near both sides of the neck are marked. However in the next image shoulder edge is marked. The same is repeated for next two images.

In case of shoulder measurement total shoulder measurement is done in terms of meter pixel using the formula:

$$Shoulder = dist1 + dist2 + dist3 \qquad (4)$$

dist1-distance from left shoulder to left fall
dist2-distance from right shoulder to right fall
dist3-distance from left shoulder to right shoulder

Two different shoulder measurements in terms of meter pixel are obtained using four different images that are marked and the final shoulder length is obtained by taking the mean between the two different shoulder measurements obtained as below:

$$shoulder\_measurement = shoulder1 + shoulder2 \qquad (5)$$

shoulder1 and shoulder2 – two different shoulder measurements extracted using the equation in (4)

To obtain sleeve length measurement distance between left shoulder and left wrist and right shoulder and right wrist obtained from two images which are then averaged to get the final result.

$$\text{Sleeve\_measurement} = (\text{left\_sleeve} + \text{right\_sleeve})/2 \tag{6}$$

All the distance measurements done are in meter pixel unit which are then converted to the proper distance unit i.e., to centimeters using the formula:

$$\text{PixelToDistance} = \sqrt{(\text{point}[0] \times mx)^2 + (\text{point}[1] \times my)^2} \tag{7}$$

IV. RESULTS AND COMPARISON

Initially three different images of the person whose measurements are to be extracted are given as input. The different images are arm-spread image, waist/side image and image with checker board.

Figure 2 shows the effect of applying perspective transformation onto the input checker board. As shown the result of the transformation is an image with the edges having same positions as in the real world scenario.
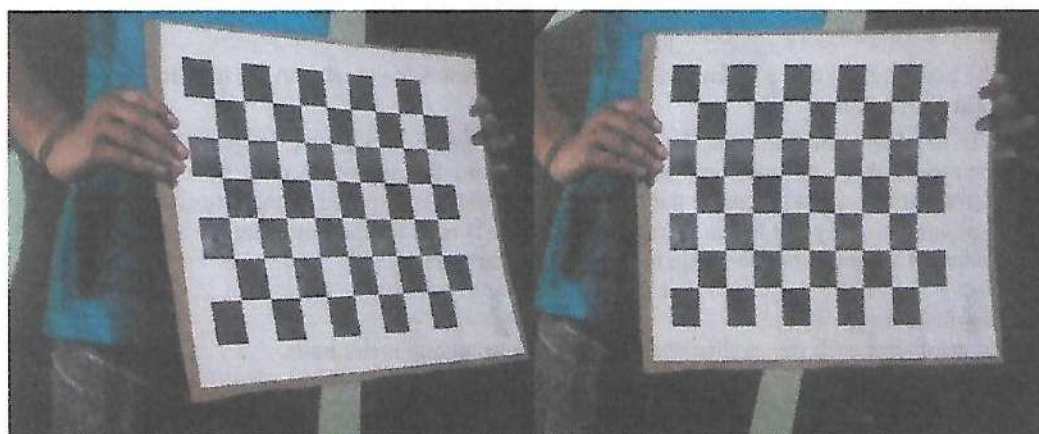
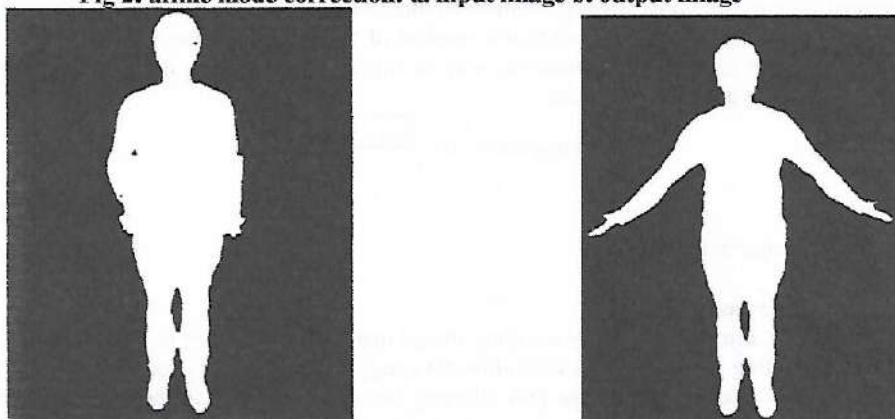**Fig 2: affine mode correction: a. input image b. output image**

Fig. 3: segmentation results a. image with checker board, b. arm spread image

Figure 3 shows the result of segmentation process. Chroma keying segmentation method used converts RGB image into a binary image such that the required foreground is represented in binary 1 or white and the green background converted to binary 0 or black.

After applying the algorithm to the input images extracted measurements are given in table 1. The table also illustrates the comparison between actual and observed measurements. Using these comparisons error in different measurements is also calculated.

OWL-Observed Waist Length (in cm)
AWL-Actual Waist Length (in cm)
OSHL-Observed Shoulder Length (in cm)
ASHL-Actual Shoulder Length (in cm)
OSLL-Observed Sleeve Length (in cm)

ASLL-Actual Sleeve Length (in cm)

E-Error (in cm)

Table 1:Extracted measurements and actual measurements and the mean difference between them

	OWL	AWL	E	OSHL	ASHL	E	OSLL	ASLL	E
Img1	107	92	15	41	38	3	48	50	2
Img2	90	82	8	41	35	6	43	45	2
Mean Error			11.5			4.5			2

As shown in the table the measurement of waist involves more error compared to the other measurements whereas the mean error for the waist measurement is around 11.5cm, which is calculated by taking the average of the two different waist measurement errors. The reason for maximum error in case of waist measurement is due to improper marking of the points.

The algorithm gives at the max 91% of accuracy for waist measurements, 92% of accuracy for the sleeve measurement and 96% of accuracy for sleeve measurement. In case of shoulder measurement kinect sensor showed an accuracy around 88% which is less when compared to the implemented algorithm.

V. CONCLUSION

This paper is concerned in extracting the human body measurements with non-contact method. It uses computer vision technique in obtaining the measurements.

This method requires background of the input image to be green only. Further segmentation can be generalized so that measurements can be taken with the help of any kind of background. Also, while selecting the alternate to green segmentation method it is necessary to consider that it meets the required level of accuracy in segmentation.

In the proposed algorithm keypoint estimation is done both heuristically and manually. Heuristic keypoint extraction is of less favorable due to the reason that its incorrect recognition of point might lead to large amount of error in the result. Whereas, on the other hand manual marking of the keypoint is also considered of less accuracy. Hence robust keypoint estimation method can be implemented rather than the one which is used.

As for this algorithm camera calibration is done using checker board which conditions the image acquisition in particular manner. More implicit method can be implemented for metric calibration so as to remove the dependency from checker board.

As the algorithm only extracts the measurements from the acquired image, it can be further generalized by developing a user friendly website that extracts the image and automatically sends the collected data to the garment-maker who fits a garment to the user using that data.

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CROP FIELD MANAGEMENT BASED ON IOT USING RASPBERRY PI

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Abstract— Sustainability of Agriculture is important during the soil degradation, scarce water resource and climate change. Improving the efficiency of water use and its productivity practiced by farmers are not sufficient nowadays. We can get solution by making use of several real time experiments. By referring to this paper it can solve problems like monitoring of water, soil degradation etc. In this paper, by using Pi it can monitor all other application like GSM, digital sensor and DC motor with pump. The device, digital sensor provides you better solution in accurate level measurement and automatic processing water levels. By using GSM it can send the information about moisture content to the field owner since field owner cannot monitor the water content every time. A digital sensor measures the moisture content in the soil and is accessed through Pi. Soon after sensing the moisture content, by using dc Motor we can make water to flow to field, if the content of moisture is low and at the same time the message is sent to the field owner. . We can also use led and buzzer to indicate moisture content, also DTH sensor and LCD to display temperature and humidity. Thus, this paper helps the farmers to yield even when there is water scarcity.

Keywords— GSM, Raspberry Pi, Digital sensor, DTH sensor, DC motor, LCD.

I. INTRODUCTION

In India the major source of income is from the field of Agriculture. It alone contributes for about 22% of the country's income. Farmers can select the required crop for their field with the use of appropriate fertilizers for their crop. The major reason for the decrease in the yield is due to the diseases which are present in the plants. Due to the disease there will also be reduction in the quality of the products [1].As the technology is growing up, it can be implemented in the agriculture too. The use of IOT in agriculture provides solution to all the problems faced in the traditional agriculture method. Controlling the field condition is a tedious task. By the use of wireless system in the field of agriculture various issues can be solved [2].

Till now the identification of disease was done manually, in all of these techniques the digital domain is widely being used. The use of digital system gives intuitive judgment. The early judgment of disease makes the farmers to avoid losses. The agriculture will provide good result in return. The use of non-applicable fertilizers can be avoided. In most of the case the disease symptoms are seen in the parts of leaf, stem and the fruit. In this system we are develop a system that detects the disease present in the plant leaf [3].

II. LITERATURE SURVEY

[2] The paper aims to accumulate the readings from multiple nodes and assist the farmers cope with diverse operations wirelessly presenting a smart agricultural field for farmers. They have developed smart Agro Mobile Application. This application provides details about weather forecast and also provides features like Agro Calendar and Agro News. The disadvantage is point-to-point communication can be affected by topology of the wind, rain and land.

[3] The paper aims at designing a complete device which helps to automize the agricultural field, which reduces the work load on the farmers. This proposed system provides an automatic irrigation device and rooftop control

Key Generation Using Generalized Pell's Equation in Public Key Cryptography Based on the Prime Fake Modulus Principle to Image Encryption and Its Security Analysis

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Abstract: *RSA is one among the most popular public key cryptographic algorithm for security systems. It is explored in the results that RSA is prone to factorization problem, since it is sharing common modulus and public key exponent. In this paper the concept of fake modulus and generalized Pell's equation is used for enhancing the security of RSA. Using generalized Pell's equation it is explored that public key exponent depends on several parameters, hence obtaining private key parameter itself is a big challenge. Fake modulus concept eliminates the distribution of common modulus, by replacing it with a prime integer, which will reduce the problem of factorization. It also emphasizes the algebraic cryptanalysis methods by exploring Fermat's factorization, Wiener's attack, and Trial and division attacks.*

Keywords: *Public Key Cryptography, Fermat's Factorization, Standard Deviation, Pell's Equation, Wiener's Attack, Trial and Division.*

1. Introduction

There are two approaches in cryptography which are based on the usage of keys; they are Private or Symmetric Key and Public or Asymmetric key. In Symmetric key, both sending end and receiving end use the same key while in asymmetric, different key will be used. This paper concentrates on asymmetric key, especially on RSA which is explained briefly in next section.
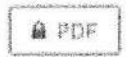
1.1. Asymmetric Key Cryptography

RSA is a public key system which is also referred to as Asymmetric key. In this algorithm, couple of related keys are used for enciphering and deciphering. The

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An App Based Online Kannada To English Transliteration System For Mobile Camera Images

Sachin Bhat*, Kannika Priyadarshini, Bhagyashree Bhat, Annapurna Upadhya, Harshitha

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Abstract

A common problem faced by any non-native people and travelers from other states visiting Karnataka is the inability to read the Kannada text in public places like street boards, bus names and signboards. So, the transliteration from Kannada to English is essential in such cases. Transliteration is the process which will convert the script of one language to other language without altering the meaning. This paper focuses on different approaches to solve the problems of reading Kannada text using machine learning techniques. We have used Tesseract android software development kit(SDK) for Optical character Recognition. LIBINDIC Soundex Algorithm is used for the transliteration purpose. Main aim of the paper is to build an app to capture the image, process it and also to have its transliterated output

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Marvelous Significance Performance Analysis of PQ Events Prediction and Classification

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Abstract: *This paper compares various significant research techniques concerning the Power Quality (PQ) events prediction and classification system presented by the authors previously and examines its viability scale as far as the research gap. This paper examines some of the frequently exercised PQ classification techniques named as Feedforward Neural Network (FNN), Sequential Ant Lion Optimizer and Recurrent Neural Network (SALRNN), dual-layer Feedforward network and Short-Time Fourier Transform (STFT)) from the most significant literature in order to have more insights of the techniques. The research work has presented a simple framework that retains a balance between higher accuracy in the detection of disturbances as well as also maintains an effective computational performance for a large number of the power signals. The principle aim of the paper is research and comparative analysis of above-mentioned algorithms for searching the best impressive technique in detecting and classifying the PQ events. The simulation results of this research can be reasoned that the SALRNN technique detects and classifies accurately the PQ disturbances when compared with the other two techniques such as FNN and STFT.*

Keywords: Power Quality (PQ) events, PQ classification, Feedforward Neural Network (FNN), Sequential Ant Lion Optimizer, Recurrent Neural Network, Dual-layer Feedforward network, Short-Time Fourier Transform (STFT)

1. Introduction

These days, the uses of delicate electronic parts, computers, programmable logic controllers, assurance and transferring types of gear have been expanded in a business domain. Because of this developing interest of the electronic supplies, the power utilizations likewise expanded [1]. So as to fulfill the power utilization, the normal power supply is constantly conveyed the high caliber to the shoppers with the assistance of the electrical power systems [2]. These voltage or current irregularities are treated as PQ issues that outcome in disappointment or failing of electrical/electronic types of gear [3]. The dangers of power outages are expanded because of the developing of PQ disturbances; particularly as results of the disappointment of inter dependencies between sub-networks and related dynamical spreads [4]. These issues are all around exorbitant [5-7].

In the distribution systems, the uses of nonlinear electronically switched devices along with the assistance of current control types of gear which misrepresent issues related to deviations in phase as well as frequency [8-10]. In most recent two decades, the nature of provided power is improved by a global academic network utilizing a few solid-state electronic/control electronic gadgets [11]. This causes expanded operational and arranging intricacy of power supply networks which requires expanded consideration for nature of power supply [12].

Because of the abrupt changes in the working conditions, the low frequencies signals are seen in electrical networks are utilized to balance the harmonics and power sinusoids [13-16]. These occasions can be fined for customers, so as to help the expense of auxiliary administrations, lessening costs, for example, response proficiency, repayment cost and power over load decrease costs. Hence, the standard of supply and financial working conditions are kept up by checked and relieved the PQ occasions [17]. For observing programs, the examination is troublesome because of the enormous measure of estimated PQ events information amid activities in intricate and vast power systems [18]. Subsequently, for clear and shrewd comprehension of uses, this data is recognized and ordered by the operational conditions which require a keen apparatus and strategy [19]. In such a manner, the feature extraction and the order forms are considered as the most essential apparatus to perceive the PQ events and distinguishing the feature of the disturbances. The viable investigation is fabricated subject to the better features ought to be accessible to report the disturbance signal effectively [20].

In this paper comparison of various techniques such as FNN, STFT, and SALRNN for searching best impressive technique to identify and classify the PQ disturbances. The FNN technique utilized by the research employed orthogonal transforms for feature extraction and uses feed forward algorithm for optimizing the search towards the elite result of convergence. In the STFT research work, the dual-layer Feedforward network was utilized by the author for trained and modeled the disturbances of the power system. In this classification of power quality disturbance, the system utilized the STFT technique. In the SALRNN research technique, the healthy or unhealthy conditions of the system signal are recognized by the RNN. In that research, the ALO algorithm was presented to enhance the RNN learning procedure subject to the minimum error objective function. It has been well tested on various events like transients, sag, swell, harmonics and their combinations in real-time. The detailed description of each technique is delineated in the following section 3-5.

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Design and numerical analysis of tool fo magnesium alloys

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Design and numerical analysis of tool
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Materials Today: Proceedings, Volume 46, 2021
Ritti, L., Bhat, T.

Abstract

Friction stir processing tool is designed based on the torque capacity of the CN(
The tool shoulder of diameter 20 mm and taper pin of average diameter 4 mm a
shear strength of the material respectively. The structural and fatigue analysis (
deformation, low stress and high fatigue life. The simulation resulted in no def(
that there is sufficient plastic deformation at the stir zone, and hence the desig
alloys experimentally to fabricate the surface composites successfully.

Introduction

Magnesium is one-fourth times lighter than that of steel and two-third than th
applications in light weight components of automobile and aerospace industrie
such as poor hardness, poor wear resistance and also it is very reactive metal w
overcome these limitations and to enhance the mechanical and tribological prc
[1]

Friction Stir Process is the modified process of Friction Stir Welding (FSW) whi(
Institute in 1991. By using FSP the grain size modification in the microstructure
at certain thickness will be achieved, which improves the surface properties, lil

In Friction Stir Process a rotating tool having shoulder with pin is used to proce
contact surface of the rotating tool shoulder and the base material leads to the
base material soft and it undergoes plastic deformation and hence the grain siz
takes place. The stirring motion of the tool pin mixes the grain particles homog
the tool travel in the desired direction, the material forged below the tool shou

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AN ENGINEERING STUDENT'S VIEWPOINT ON THE IMPLEMENTATION OF ACTIVE LEARNING TECHNIQUES AND MODERN TOOLS FOR THE TEACHING-LEARNING PROCESS

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Abstract— Large number of graduates coming out of higher educational institutions, especially the technical institutions facing tough competition in the job market, which demands high quality education for preparing competitive graduates coming out of their institution. In view of this Accreditation by National Board of Accreditation (NBA) is a mandatory requirement for every technical institution in India. Accreditation by NBA is based on Outcome Based Education (OBE) practices. Active learning techniques and use of modern technology in teaching learning process are key components of OBE practice. The investigation on the above components carried out determined the level of implementation of active learning techniques and use of modern tools for teaching-learning process with student's acceptance towards these techniques in Engineering Institute.

The study has been carried out in an Engineering College to investigate the level of implementation of active learning and modern tool usage has revealed a positive response from the stakeholders. The study also indicates that Active learning techniques such as summarizing, group discussion, quiz and usage of modern tools in the teaching learning process are very effective.
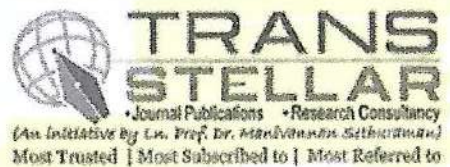
Index Terms— Active learning techniques, Outcome Based Education, Teaching learning process.

I. INTRODUCTION

The progress of any country is directly related to the education system adopted. In recent decades, the number of technical higher educational institutions has drastically increased in the country. The huge number of graduates from these institutions every year has created a tough and competitive job market. Many industry experts are of the view that a considerable percentage of these candidates are unsuitable to be directly employed in the industrial sector. Hence institutions are required to undergo some process to conform to certain sets of service and operational standards. Outcome Based Education criteria is one such standard that are adopted by technical institutions with a view to get accredited by bodies such as NBA and NAAC. These accreditations showcase the institutions' capabilities in developing candidates who will be better employable with lesser need of training in the industrial sector after graduation. An effective implementation of Outcomes-Based Education is the key factor for any program to become ready for accreditation.

The traditional methods of teaching have been in practice for many generations which is completely teacher centric in which many teachers have observed passive learning without much involvement of students in the classroom teaching. Hence, the faculty members face a lot of challenges with respect to effective involvement of students during classroom teaching. Due to the availability of enormous sources of online information related to various subjects, and due to the massive distractions that the students are facing in the form of social media, classroom teaching has become quite a challenge for the teaching faculty. Also, because of the changing academic atmosphere, student's involvement should not be limited to just attending and listening to the class. There are other related aspects to classroom learning where a student can actively participate. To change the mindset of the students and to make the classes more interesting, certain techniques need to be adopted to increase their involvement in the classroom   The recent trend witnessed a huge transformation in the teaching learning process compared to the traditional way of teaching. Due to the implementation of OBE, the focus has shifted from teacher centric to learner centric. Therefore, to ensure the effective implementation of OBE process, classroom teaching using modern tools are recommended. [1]

The modern teaching-learning process, under the Outcome Based Education system demands faculty members to set the learning objectives and methodologies for achieving those objectives, before delivering the subject content. They would also need to prepare an effective lesson plan wherein the student's involvement will be high. Recently, many faculty

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Determinants of Entrepreneurial Intention among Engineering Students: Application of Theory of Planned Behaviour

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EXPERIMENTAL INVESTIGATION IN DETERMINING OPTIMUM WORKING TEMPERATURE FOR A 4-STROKE AIR-COOLED MOTORCYCLE ENGINE

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Abstract— Almost every motorcycles on Indian roads is of the commuter variant and typically use air cooled single cylinder four strokes. Depending on the type of usage, these engines are optimized for fuel efficiency, rather than for outright power. Yet, the Indian obsession with fuel efficiency makes the riders run the engines very lean with the sole purpose of extracting the maximum possible mileage. Without sufficient airflow over the fins, these engines characteristically overheat in traffic conditions, affecting fuel efficiency drastically. This work aims at determining the optimum working temperature of an air cooled engine, where maximum fuel efficiency is obtained under static conditions.

Index Terms—engine, temperature, optimum working temperature

I. INTRODUCTION

Most entry level air-cooled motorcycle engines in the Indian market are within the 180cc capacity. These engines rely purely on the movement of the motorcycle for heat dissipation and cooling. The heat reduction is taken care of by fins on the engine block as well as on the engine head. Almost all engines have a standard fin geometry, size, pitch, material and distribution depending on their cooling needs.

The engine cylinders themselves have different configurations such as horizontal, vertical and inclined from vertical (either towards the front or towards the rear of the motorcycle) depending on packaging needs and aesthetics among other factors. Motorcycles engines are designed for cooling based on a range of motorcycle and engine speeds. As the motorcycle moves faster, the engine also usually spins at a higher rpm, generating more heat. But the volume of air flow over the fins also increases, and thus a fine balance maintains the optimum working temperature of the engine.

Most air-cooled engines have their cylinders oriented towards the wind stream and follow tried and tested methods of fin arrangement, number, pitch, material etc. Optimum cooling usually happens when the motorcycle is moving forward with some appreciable velocity. But in static conditions such as in heavy traffic, insufficient air flow over the engine cylinder results in localized hot spots on the cylinder surface, which can result in surface warping, followed by a considerable drop in performance due to overheating. Further overheating can lead to irreversible engine seizure, which can result in catastrophic mishaps.

Some commuters even have the unnecessary habit of keeping their idling speeds extremely low, again in the interests of fuel efficiency. Then to prevent their motorcycles from stalling in traffic, there is another bad habit of twisting the throttle on an idling engine.

All these practices put undue thermal loads on the engine, which can result in the following effects [1]:

> Engine valves warp (twist) due to overheating
> Damage to the materials of cylinder body and piston
> Lubricating oil decomposes to form gummy residue and carbon particles

Entrepreneurial Intention among Undergraduates-
A review Paper

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Abstract - This research aims to develop a unique model for undergraduate entrepreneurs ' intention. In Asia, Europe, Africa and cross cultures we examined existing studies in the fields of entrepreneurial intention. We created a unique framework for entrepreneurial professional purposes, focused on the review of the literature of entrepreneurial intention. Depending upon the conceptual framework design, the entrepreneurial inspiration of the graduates at the global level is recognized as an important factor to improve their entrepreneurial intentions. In the meantime, this conceptual framework is special and extremely appropriate for the Asian point of view. This model may be used by researchers or entrepreneurship scholars to forecast the effect of the entrepreneurial inspiration on the undergraduate entrepreneurial intention.

Index Terms - Entrepreneurial Motivation, Entrepreneurial Intention, and Undergraduates.

I. INTRODUCTION

The economic, psychological, sociological and strategic management studies have been influenced by entrepreneurship and provide established theoretical framework and methodological instruments [11]. In the context of the entrepreneurship phenomenon, this multidisciplinary approach is no shock. The multidisciplinary approach to entrepreneurship was seen by [7] as a positive indicator that this is one of the strengths of the entrepreneurship field since its framework and methodologies are drawn from other legitimate social sciences. Nevertheless, definition area of conflict is maturing and three underlying approaches to entrepreneurship [9] have been widely accepted.1) as a feature of the economy, entrepreneurship is a central theme, instead of a type of personality, the economic position of the entrepreneur [10]. In this situation, the entrepreneur

act as an mediator to collect information and allocate resources to take advantage of the opportunity emerging from consumer demand and supply shortages.2) The definition of the enterprise as a process has provided a popular context for research into entrepreneurship and is presented in literature through two different approaches: first of all the event sequence associated with the creation of new companies, and the second is the process of identifying and evaluating opportunities. Entrepreneurship as a process and (3) the individual entrepreneur can be separated into three different streams through previous research of the individual entrepreneur. (I) trait orientation, many researchers have been following trait approach to entrepreneurship to separate entrepreneurs from non-entrepreneurs and to establish a list of characteristics that are specific to the entrepreneur [14], (II) Compatibility perspectives The entrepreneur is highly regarded as an individual who is capable of recognizing, exploiting, and acting on opportunities other people do not see for profit. This is a behaviour which intrigues researchers to learn more about the creation of new enterprises [6] and (III) the processes of thought. Work on entrepreneurial cognitive processes seeks to understand how businesspeople [17] and how entrepreneurs manage information [7]. Enterprise awareness, people sort and understand all the information they perceive by knowledge. [20] defined the cognition as: "Personal thinking processes, including the way the organism processes information, including perception, memories and language." By this method, people build cognitive systems [17], also named visual maps [24]. It is important to study the cognitive process and the cognitive mechanism because it allows us to understand the relevance of new knowledge, how we process information and how we organize it [14]. The

- **Significance of Personality traits on the entrepreneurial intention and behaviour of engineering students of coastal Karnataka** ⬤

by Madhukara Nayak, Narasimha Marakala

Abstract: The objective of the study was to investigate the significance of personality traits (locus of control, need for achievement (NACH), risk tolerance (RT) and entrepreneurial alertness) on entrepreneurial intention (EI) among final year engineering students from the coastal Karnataka region. The study was conducted based on a quantitative research methodology for which a structured questionnaire was developed to collect data from 622 respondents. A random sampling technique was adopted for data collection. Collected data were analysed using SEM-AMOS and SPSS version 23. The result revealed that locus of control, NACH, RT and entrepreneurial alertness had a significant influence on EI and EI had a significant influence on entrepreneurial behaviour. The outcomes of this study will help academicians and policymakers in designing effective entrepreneurial programs and activities to foster student entrepreneurship.
Keywords: personality traits; locus of control; LOC; need for achievement; NACH; risk tolerance; entrepreneurial alertness; entrepreneurial intention.

- **Digitalisation, Servitisation and Financial Performance: Evidence from Small and Medium-sized Enterprises in Vietnam** ⬤

by MALIK A.B.U. AFIFA, Hien Vo Van, Trang Le Hoang Van

Abstract: The purpose of this study is to investigate the relationship between digitalisation, servitisation and financial performance in small and medium-sized enterprises in Vietnam from the manager's perspective. The data are collected from 156 questionnaires. Through quantitative analysis technique, we provide some quite new and interesting results. Firstly, the age and size of the enterprise do not support the implementation of servitisation, and they have no impact on improving financial performance based on digitalisation. Secondly, we quantify the positive impact of digitalisation on servitisation. In addition to the positive correlation between digitalisation,

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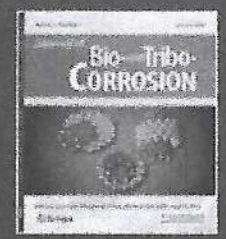
S. Ramesh, Goutham Kumar, C. Jagadeesh, Gajanan Anne ✉ & H. Shivananda Nayaka

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ECAP grain size was decreased to 6 μm. Electron back-scattered diffraction (EBSD) shows

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S. Ramesh [a] ✉, Gajanan Anne [b] ☺ ✉, Nagaraj Bhat [c], Ganesh Aithal [d],
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Volume 47, Part 17, 2021, Pages 5901-5906

Erosion wear behavior of glass fiber hybridized flax and sisal fabric hybrid composites with taguchi experimental design

Ganesh Kalagi [a], Abdulrajak Buradi [b], Abdul Razak Kaladgi [c] 👤 ✉, H.K. Madhusudhana [d], H. Udaya Prasanna [e], Raja Yateesh Yadav [c], Asif Afzal [c], C. Ahamed Saleel [e]

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Influence of abrasive particles on surface hardness of free cutting brass in ball burnishing process

Abstract— Ball burnishing process is a cold working-based finishing process believed to have more advantages than other conventionally applied finishing techniques. The plastic deformation action during burnishing process increases hardness of burnished surfaces. Turned free cutting brass surfaces were ball burnished in presence of differently sized abrasive particles at various burnishing forces. The effect of abrasive particles size and varying burnishing forces were studied. It was found that the turned surface hardness was improved by 18.67, 17.33, 16% in dry, fine particle used ball burnishing and medium abrasive particles used ball burnishing process respectively.

Keywords— Turning, ball burnishing, abrasive particles, plastic deformation, hardness term

I. INTRODUCTION

Conventionally machined surfaces consist of inherently peaks and valleys produced due to various causes such as machining parameters, workpiece and tool settings, machine rigidity, cutting tool conditions etc. Although the necessary precautions are taken while machining, the required or ready to use surface texture cannot be achieved in most of the cases [1]. The surface finish of machined components and method of surface finish achieving also plays a role in deciding surface hardness. Residual stresses[2], corrosion resistance[3], wear resistance[4] are the other surface properties that can be improved by burnishing and are affected by surface finish. Finishing operations like grinding, lapping, honing etc. enhance surface finish but at decreased hardness.

In this context, burnishing process becomes interesting by improving many properties in a single step. The surface finish achieved will increase surface hardness due to plastic deformation of surface layers. Compressive residual stresses will be induced and surface will become more wear resistance. Figure 1 shows the schematic representation of ball burnishing process.
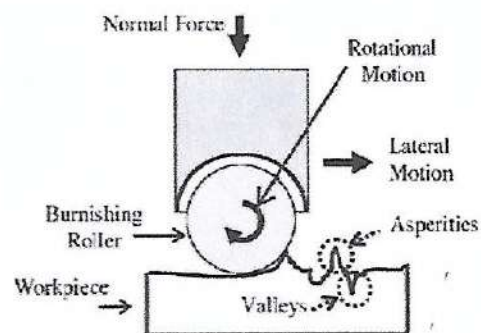

Figure 1. Schematic representation of ball burnishing process [5]

Adel Mahmood Hassan et al. [5] examined the effect of ball burnishing process on aluminum and brass. The results showed that parameters force and number of passes exhibited considerable effect on surface finish and microhardness. N.H.Loh et.al [6] done experimental work based on 3^4 factorial designs on a vertical machining

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Enhancement in Microhardness of Free Machining Brass in Ball Burnishing

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Keywords:
Machining, Ball burnishing, Lubricated, Abrasive particles, RSM

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Abstract

The burnishing process is becoming an attractive way among post-machining, metal finishing techniques due to its excellent features. The burnishing process carried out with ball or roller, smooth out

Prediction the best price for crops and spices using Machine Learning

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Abstract:

In the current scenario, many farmers and cultivators are unaware of the future prices of their crops and the export value of their spices in the market. Due to which a lot of these farmers and cultivators are not getting their rightful share of the profit margin while selling their produce. To solve this problem, this paper presents a solution i.e. the creation of a model which predicts the future price of crops and also estimates the export value of spices by applying Machine Learning Algorithm. This proposed system will help farmers and cultivators to know the future estimate their crops and export value of their spices, through which they can increase their productivity and profit margins.

Keywords —farmers, cultivators, crops, spices, predict, estimate, Machine Learning Algorithm.

****

I. INTRODUCTION

Farmers generally grow the crops that have been planted traditionally in their region and can suffer losses due to the lack of information of the possible value of the crop at the time of harvesting and selling. Without the prior knowledge about the future market value of the crops, farmers invest a lot of money in the cultivation of crops in their fields and if in case the market value of these crops fall below their expectations then these farmers will have to suffer huge financial losses. Every year nearly 10,000 farmers commit suicide due to mounting debts, failure of their yields and failure in selling their crops at their minimum expected rate. After doing many research, it was found that the major reason behind farmers turning to such as drastic step is that the farmers were unable to repay the loans which they have to take for the purchase of seeds, equipment, fertilizers and other essential items for cultivation of crops as their produce does not fetch them the price they require not only to pay back the loans but also to make their living. To address this issue, this model has been proposed

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Diabetic Retinopathy Disease Detection Using Machine Learning

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Abstract:

Diabetic Retinopathy (DR) is a human disease among individuals with diabetes that causes damage to tissue layer of eye and if not detected at earlier stage, will eventually result in complete visual defect. Detection of DR at earlier stage is necessary to avoid visual defect and we ought to distinguish them ahead of schedule for viable treatment. As the disease advances, the sight of an affected person might weaken and lead to Diabetic Retinopathy. Subsequently, two gatherings are present, to be specific, (PDR) Proliferative Diabetic Retinopathy and (NPDR) Non Proliferative Diabetic Retinopathy. Different techniques are used to detect the disease.The measures for the infection caused in the eye could be distinguished by removing the features or highlights of the blood vessels. The highlights like veins, hemorrhages of NPDR picture and exudates of PDR picture are removed from the crude picture utilizing the picture processing procedures. After that the pictures are fed t o classifier forgrouping.

Keywords:
Diabetic Retinopathy,Retina,SVM,RF,Retinal Fundus Image

I. INTRODUCTION

The person related to diabetics mellitus (or diabetics) are influenced by assortment of eye conditions, for example DME or Diabetic Macular edema, DR or Diabetic Retinopathy and glaucoma. These diabetic eye infections can cause visual lack or vision loss. Diabetic Retinopathy is the disease that causes visual harm between working - age adults. In this examination, Diabetic Retinopathy is included and it includes changes to retinal veins that harms or cause the veins hole and loss of vision. It is shown that early assurance and helpful treatment could gainfully stay away from this vision loss. Among the working age grown-ups, the vision misfortune can cause the visual deficiency and debilitation among theindividuals

Diabetic Retinopathy is created by varieties in veins of the retina. Vision misfortune or vision is impeded because of harm in nerve cells. These vessels may spill blood and new vessels may be created as a result of veins harm. Diabetic Retinopathy (DR) may advance in following sorts. NPDR or Non Proliferative Diabetic Retinopathy specifically mellow, moderate and serious PDR or Proliferative Diabetic Retinopathy. In mallow or mild NPDR, micro aneurysms are nothing but swelling in sides of retinal blood vessels that causes leak of blood. In Moderate PDR, we can see the growth of new blood vessels and in severe PDR blocking of some blood vessels takes place.

In Preprocessing step the problems like non clarity images, blurred images, etc are treated. Preprocessing involves increasing or decreasing of the pixel sizes.

. Then the input image is converted into HSI, followed by increasing of the contrast of the image. That is done by stretching out the intensity range of images. Then the image clarity is improved by adjusting the contrast, followed by mapping the maximum intensity to 1 and the minimum intensity to 0. Later the salt and pepper noise in the image is removed.

Optic plate end: In this prepare the optic plate is veiled and evacuated from picture. Blood vessels extraction and expulsion: Blood vessels are identified and evacuated by utilizing Edge discovery strategies. Discovery of exudates and micro-aneurysms: Exudates and micro-aneurysms are identified by morphological operations.

SVM classification is utilized to classify the pictures based on seriousness. The pictures are classified as NPDR and PDR.

Our project aims in predicting the severity of diabetic retinopathy in patients. Support vector machine ,an machine learning algorithm can be used for training by pro- viding dataset so that it can predict the severity of the disease by comparing it with the trained data set. Our main objective here is to train our model by providing proper data set in order to detect the level of severity in patients.

Following are the steps of methodology for diabetic retinopathy disease detection-

Pest control management system using organic pesticides

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ARTICLE INFO

ABSTRACT

Pest detection is the biggest challenge for the farmers in the field of agriculture. Farmer have to take proper measures to fight against pests by using organic pesticides. This project describes a software prototype system for pest control by identifying the name of the pest. Farmers have to capture the image of the pest using the Android application. Then they have to upload the pest image to the software. Identifying pests over crops is one of the major challenging tasks for the crop technicians and farmers in the field of agriculture. This also causes damage to crops leading to low yield and to the farmers. Image database of the pests is also taken for consideration. Set of training images are compared with the testing images to enable. The convolutional neural network classification approach is adopted to identify the class of Pests.

1. Introduction

India is a land of Agriculture. Many peoples are directly dependent on Farming. Agriculture also plays a very important role in a nation's economy. Farmers come from rural backgrounds. They completely depend on Agricultural activity. It contributes 17% of GDP. It will help the nation by resolving unemployment problems. Some pests like Bacteria, virus, fungus cause harm to the crops. Which results in decrease of quality and quantity of yields of crops. So without using chemical pesticides it is possible to control the Quality as well as quantity of crops. Yes, this is done by organic pesticides. It is better to use Organic Pesticides, which kills pests without causing any side effects to plants and also increases good quality and quantity. But Identifying of pests is a major challenge to farmers. a manual method for analyzing consumes more time. By the help of applications of Image processing recognition technique, there is a way to Pest identifications as well as provide particular pesticides organically. First thing is pest images are captured using cameras or through an android app. Then the captured image has to be processed to the software. The main focus of this project is on the identifications of pest image for taking biological precautions.

Identification of the pest and applying proper organic pesticides in agriculture is the main key way to stop the losses in the yields of the farmer and Quality of the food. It becomes very difficult to identify particular pests and provide proper organic pesticides manually, so Digital Image Processing used for early detection of pests [1]. This process also involves few steps like Image-acquisition, Image pre-processing, Image segmentation, Feature extraction and at the end Classification. Systems are intelligent computer programs that are capable of providing solutions and advice related to specific Problems in a given area, it compares the given images with the datasets. Advantage of system is to perform tasks more consistently than human experts. In agricultural mass production, it is needed to identify the pests at beginning stages of plant. It avoids damages in production costs and increases the yield [9].

2. Literature Survey

David Headrick.2021 [2] The Future of Organic Insecct Pest Management: this paper mainly focuses on Federal(NOP) national organic program guidelines for pest management which can be viewed to certified organic growth in their approach at economically successful management of a varieties of pests situations and knowledge required mainly entomology, for successfully implement present management techniques is overwhelming, and also there are significant gap in guidelines in which resolved could make aid in growth adoption of practices that informs good decision making and accuracy.

Mayank Mishra, Tanupriya Choudhury and Tanmay Sarkar in 2021, [3] they proposed pest control system which use IOT and Image processing technologies. CNN based efficient image classification system for smartphone device. System use infrared sensors for detecting pest. pests detected by using sensor and ultrasonic wave equipment with the help of Image processing which keeps insects away from the field.

Yaowei Wang, Haihong Pan, Zaijun Pang Yijue Wang in 2020, [4] New Image Recognition and Classification Method by Combining Transfer Learning Algorithms. In this paper they propose the importance of TL-MobileNet for welding defects detections. In this experiment of welding defects classification using 'Weld' datasets verify that the TL-MobileNet can be able to correctly identify specific defects in a

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Image Segmentation Techniques Using K-Means Clustering to Identify the Land Use Change Detection

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ABSTRACT

The change detection of the agriculture land and other land useis one of the important application of remote sensing imagery.The major objective of this paper tomeasure the different boundary regionsof the land classes using an image segmentation techniques. The initial categorizing of different land use classes is experimented by using k-means clustering, which basically clusters the point of interest with the pixel similarity. The measurement of the different pixel region represent the different classes of agriculture area is a challenging task with the real and synthetic images. The important characteristics of the algorithm preserves the cluster pixel details at most of the iterations, however for the similar canopy values the cluster effeminacy varies and the identification of the land clusters also deviates as compared with the ground truth data.

Key words: Image Segmentation, Remote Sensing, Graph Based Algorithms, K-Means Clustering

1. INTRODUCTION

This century witnessed global revolution in each and every corner of the world. The application of technology in the field of science revolutionized the global economy which indirectly helped and also effected the remote area, especially in India. It is believed that the Indian economy mostly bounded with the agriculture business. But during the last decade more and more science related application are evolved. The remote area is neither deforested nor changed its traditional agriculture crop selection. But in both the way the revolution effected the biological disorders into the environment and now we are witnessing it in the form flooding, draught and seasonal changes. The said advancement also seriously caused the economical disorders in the agriculture sector. Sometime because of very good yields the prices are fallen to the extreme and vice-versa. The fancy pricing for the particular crop initiatesmajority of

the farmers to grow the similar crop increases product inflow into market, results in price fall leave the farmers with huge loss. The proposed study focus on to the change detection techniques for the particular crop using remote sensing application.

The rapid advancement in the remote sensing imagery given enormous opportunities to the researchers. The wide scope of application of remote sensing in the field agriculture land cover /land use fulfilled several societal needs in the remote area. The new generation satellite instruments provides images with high spectral and spatial resolution with a global coverage helps in change detection of the agriculture area[1-4].

2. REMOTE SENSING APPLICATION IN LAND COVER/LAND USE

The remote sensing application in the field of agriculture is competitively applied from last 10-15 years to categorize land cover, monitor land-cover, study of vegetation life system and its productivity etc. The increase in number of such applications demands a high accuracy land classifications for the accurate identification of the object of interest. The early advancement in the remote sensing technology started with normalized difference vegetation index (NDVI) for images, but the accuracy characteristics of these images fall short to determine specific vegetation mapping.In the early years of 2000 the MODIS data provided improved spatial and spectral resolution of 250 m contributed greatly to assess the agriculture change detection. In addition to this the free availability of Landasat data with 30 metre spatial resolution greatly helped to improve the accuracy in agriculture change detection process. In addition to these, the availability of Indian satellite images like IRS, Resourcesat and Awifs series boosted the enormous applications in the field of agriculture and provided an eco-friendly environment for the researchers in the applied sciences[5-11]

AN ENHANCEMENT PROCESS FOR GRAY-SCALE IMAGES RESULTED FROM IMAGE FUSION USING MULTIRESOLUTION AND LAPLACIAN PYRAMID

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Abstract

The main issue with the multi-focus images lies in obtaining the relative information about the identification of objects in the individual images with less resolution. Hence the image fusion methods have attracted attention to obtain high resolute image with a pair of multifocus images. An attempt has been made in the present work to develop an image fusion methodology designing on multiresolution for the feature extraction and for better morphological details, the paper discussed about the Laplacian pyramid algorithm. Five sets of multifocus images obtained with different formats have been introduced to the sixteen different image fusion algorithms including the proposed method. Various statistical metrics were evaluated for each image fusion method. The careful comparison of the visual and objective metrics reveals that the proposed method shows best performance with not only having visual quality and also confirmed based on the variation of the statistical metrics.

Keywords:

Multifocus Image Fusion, Multiresolution, Laplacian Pyramid, 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 these 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 image processing. In wavelet transformation algorithms, lifting wavelet and stationary wavelet transformation are majorly used. Discrete cosine transform (DCT) was frequently used by many researchers in group of cosine transforms.

Facial recognition using Haar cascade and LBP classifiers

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ABSTRACT

Facial Recognition is the biometric technique used in face detection. The task for validating or recognizing a face from the multi-media photographs is done using facial recognition technique. With the evolution of advanced society the requirement for face identification has been really important. Detection and identification of faces has been grown worldwide. It owes the demand for security such as authorization, national safety and other vital circumstances. There are number of algorithms for facial detection. This paper aspires to present the comparison of two face recognition techniques Haar Cascade and Local Binary Pattern edified for the classification. As a result the accuracy of Haar Cascade is more than the Local Binary Pattern but the execution time in Haar Cascade is more than Local Binary Pattern.

Introduction

Biometric Recognition is he statistical data analysis of people's unique behavioral and physical characteristics which is mainly used for security and identification which includes fingerprints, facial features, retina, iris, voice, gaits palm print etc. Among these methods face detection is considered to be most precise and safe. Facial recognition is an activity of discovering a peep's face by estimating and evaluating motifs on the exclusive facial markers of the face. Biometric software is used for this purpose.

There are number of strategies for recognizing person's face. Some of them are adaptive regional blend matching method and generalized matching face detection method. The values of the nodal points on the person's face plays crucial task in face recognition system.

Many researches had been done on LBP and Haar cascading techniques [1]. But either they are using only one algorithm or they are detecting a single face in the image. In the current work two algorithmsare used to detect the faces in the image containing many faces to calculate the accuracy then the acquired accuracy will becompared by plotting the curve and bar graph to find the efficient algorithm.

There are two types of image positive image and negative image. Positive images are those images which contain the face in that and negative images are the images which contains non-face image [3]. Classifier is a device which decides whether the taken image is negative or positive. It is trained on hundreds of thousands of face and non-face images to learn to classify a new image as face or non-face image correctly. OpenCV provides two pre-trained classifiers Haar Classifier and LBP Classifier. Both of these classifiers process images in gray-scales as it doesn't need color information to decide if image has a face or not [4].

Haar Cascading

Haar Cascading is the machine learning method where a classifier is drilled from a great deal of positive and negative photos. The algorithm is put forwarded by Paul Viola and Michael Jones [5, 6]. Haar feature-based cascade classifiers are the classifiers implemented for object detection. This classifier chases machine learning procedure in which a cascade operation is inculcated from the photos to discover items in additional photos. Face detection and facial expressions in an image are also successfully detected. The exercise is finished by offering positive and negative pictures to the classifier. Then the characteristics are drawn out from the picture. Each characteristic is an individual value, which is acquired by subtracting sum of pixels in white rectangle from summation of pixels in black rectangle.In which it detects the faces of different individual in different environments. The Haar-like feature of any size can be calculated in constant time because of integral images [2].

Local Binary Patterns

Local Binary Pattern is a kind of visual course used for categorization on computer vision. LBP is the distinct case of the Texture Spectrum imitation put forwarded in 1990.

LBP was first illustrated in 1994. It has since been found to be a strong factor for texture categorization. By utilizing LBP operator, individual photo is examined as a structure of micro-patterns. Then the histogram of LBP is enumerated throughout the face, which encrypts just the circumstances of micro-patterns. The figure of documentation is assembled by splitting face picture toward m minor non over lapping sections such as R0, R1,...,Rm .The original LBP labels the pixels by threshold the 3×3 neighborhood in relation to the central pixel value. In

An Optimum Initial Manifold for Improved Skill and Lead in Long-range Forecasting of Monsoon Variability

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Spatial variability of ground water quality: A case study of Udupi district, Karnataka State, India

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Groundwater is a reliable source of fresh water for domestic and agricultural water users. It supports subsurface ecosystem by balancing the geo-biological and bio-geochemical processes at micro- and macro-scales of the ecosystem. Overexploitation, anthropogenic activities and improper agricultural practices have contributed to the pollution of groundwater sources all around the globe. The water quality index (WQI) is the most extensively used indicator which transforms the water quality information derived from several parameters into a single value/rating to categorize and provide a general perception of water quality standard. Groundwater quality analysis and mapping via geographical information system (GIS) proves to be beneficial in identifying the locations where the groundwater quality is deteriorating. In the current study, the WQI of groundwater was determined for the samples collected from open and tube wells located within the Udupi district of Karnataka state, India. The groundwater quality parameters such as pH, hardness, calcium, chlorides, nitrates, iron, fluoride, sulfates, manganese, sodium, magnesium, potassium, turbidity, and phosphate were analyzed for water samples collected from 112 randomly chosen open/tube wells in order to determine the WQI. Interpolation approaches such as inverse distance weighting (IDW) and kriging were adopted in the GIS environment to quantify the spatial variability of groundwater quality over the entire geographical area. The groundwater quality maps were generated using the best fit models. The results portray that, the accuracy of interpolation using IDW and kriging methods was dependent on the measures of central tendency and variability of water quality data of different parameters. The kriging interpolation was much accurate for most of the groundwater quality parameters compared to IDW maps. The WQI maps, perhaps signposted the poor quality of groundwater quality in about 1.88% of the geographical area of Udupi district. Further, about 21.69% of the area was affected by poor quality of groundwater where suitable strategies for replenishment of groundwater resources should be taken up by the concerned authorities. The spatial distribution maps of groundwater quality aid to locate vulnerable places where immediate action is required.

Keywords. Groundwater quality analysis; water quality index; water quality mapping; geostatistics; kriging.

Augmentation of Groundwater Recharge through Infiltration Studies in Puttur of Dakshina Kannada District, Karnataka

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Abstract - India is one of the few countries in the world endowed with abundant land and water resources. The average rainfall in the country is estimated to be over 4000 cubic km spread over the geographical area of 328 Mha of which 185 Mha is cultivable. Although India is home to 16% of the world's human population, only 2.4% of the total land and 4% of the total global water resource. Due to tropical climate conditions, India experiences vast spatial and temporal variation in the rainfall. The rate of infiltration is determined by soil characteristics including ease of entry, storage capacity, and transmission rate through the soil.

Infiltration studies plays vital role. In this study double ring infiltrometer was used to determine the constant infiltration rates. Groundwater recharge mainly depends upon infiltration capacity of the soil. The study aimed to determine constant infiltration rate at different places in Puttur taluk of Dakshina Kannada and infiltration equations are developed for each place using Horton's model. The equations developed in the study can be used at ungauged places having similar rainfall and climatic conditions as it simplifies conducting infiltration tests. Developed equations will be helpful for augment the natural groundwater as an economic reservoir.

Key Words: Infiltration, Groundwater Recharge, Horton's model. Augment.

1. INTRODUCTION

Water is the most essential fuel of life; clean and safe water for daily use is the basic need of human being. Even after decade of hard work and struggle by the government bodies and other organization to supply ample amount of potable water to each & every human being in every corner of the world, is not yet achieved. Increasing demand for water, particularly in arid and semi-arid regions of the world, has shown that the extended groundwater reservoirs formed by aquifers are invaluable for water supply and storage. Natural replenishment of this vast supply of groundwater is terribly slow. [1] Therefore, exploiting groundwater at a rate greater than it can be replenished causes groundwater tables to decline and, if not corrected, eventually leads to mining of groundwater. Artificial recharge to boost the natural supply of groundwater aquifers is becoming increasingly important in groundwater management. Groundwater can have a wide range of beneficial uses. [2].

1.1 Study area

Puttur is a town in Dakshina Kannada district, in Karnataka state of India. Puttur is located at 12046'N 750 13'E. It has an average elevation of 87 meters (285 feet). It features a Tropical Monsoon Climate (Am) according to the Koppen climate classification. The average annual rainfall in Puttur is about 4329 millimeters. The average humidity is 75% and peaks in July at 89%. The soil is mostly lateritic type, characterized by high iron and aluminum content.

The main Objectives of this paper are as follows.

- To determine the infiltration capacity of soil in selected sites of Puttur taluk and obtain equations at each site using Horton's model.
- To have uniform equation for the region to compute Infiltration and better understanding of groundwater recharge process and rates in the study area.

2. METHODOLOGY

Double ring infiltrometer (Fig 1) was used for measurement of infiltration rates at all the sites. In these two concentric rings were used. The diameter of the inner ring is 300mm + 10mm and the outer ring diameter is 600mm + 10mm. Rings are 250 mm deep and were made from 6 mm thick steel plate with sharpened bottom edge. The rings were driven at about 15cm deep in soil

Strongly (Properly) Set Colorable Graphs

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ABSTRACT

In this article we discuss about the set coloring number of star graph and it is seen that it is strongly and properly set colorable. Also, its splitting and line graphs are not found to be strongly and properly set colorable. In addition to these, we have proved that fan and wheel graphs are not strongly (properly) set colorable.

Mathematics Subject Classification 2020: 05C15

Keywords: Set coloring, set coloring number, strongly (properly) set coloring graph, splitting graph, line graph.

INTRODUCTION

In certain mathematical fields that use graph theory, it has been found that allotting colors to the vertices and to the edges of a graph is very effective. For all the notations and terminology we follow Harary [2] and West [4] and all graphs considered in our study are simple. In the year 2009, Hegde [3] introduced set coloring of a graph, motivated by the work of Acharya [1] on labelling the vertices and edges of a graph.

Definition 1.1. [3] A graph G is set colorable if the process of assigning colors to the vertices by the elements of the power set of a non empty set X subject to the condition that colors on vertices and edges are distinct. A graph G is strongly set colorable if the sets on the edges and vertices of that graph G collectively form $2^X - \{\phi\}$ subsets of X.

Also, the graph is properly set colorable if $2^X - \{\phi\}$ subsets of X are received on edges. In [3], he has also given a prerequisite, for any graph G to be a strongly set colourable is $n + m + 1 = 2k$, where $n = |V|$, $m = |E|$ and $k = |X|$. Similarly, to be properly set colorable, $m + 1 = 2^k$ is a required prerequisite for any graph G.

Dynamic mechanical behavior of unfilled and graphite filled carbon epoxy composites

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Abstract. In the present study, the viscoelastic behavior of graphite filled and unfilled carbon epoxy composite is investigated through dynamic mechanical analysis. The investigation has been conducted using a three-point bend test (flexure mode) in the range of temperature from 30 to 200° C at one Hz frequency at arate of heating of 2° C/min.The viscoelastic characteristics including loss-modulus, storage modulus, damping factor, and composite glass transition temperature have been determined. It was found that the dynamic mechanical characteristics of the carbon fabric reinforced epoxy are highly dependent on the presence of graphite particulate composites. The storage modulus, glass-transition temperature, and loss modulus of filled graphite composites were higher than the unfilled ones. However, combining a graphite filler with carbon epoxy composite limits polymer molecules movement that leads to a decrease in tan δ.

Keywords: carbon, graphite, viscoelastic, tan delta, loss modulus, storage modulus.

1. Introduction

Because of its high basic strength and special rigidity, composites have not grown only in the aerospace weight-sensitive field into attractive building materials, as well as in the railway, structural engineering sectors, marine, and automobile. A careful matrix selection and reinforcement process will produce a composite with overall strength and modulus equivalent or much stronger than those of traditional metallic materials. The mechanical, thermal, and physical properties could be further changed by applying a solid filler process to the matrix body during the fabrication of the composite, which would offer a synergism in terms of enhanced properties and efficiency and reduce material cost.

The in-plane tensile characteristics of the composites are generally described by fiber reinforced polymer, although the compression characteristics along the thickness direction are determined through the properties of the matrix resin. The most frequently utilized polymer matrix for advanced composite components is epoxy resin. Over the years, several experiments were formed to change epoxy by inserting either nano or micro fillers to enhance the matrix-dominated characteristics of the composites. Fiber is believed to be the most powerful strengthening stage in polymer materials and high mechanical performance of the fiber-reinforced composites. Particularly carbon fibers have excellent characteristics like greater strength and modulus, better electrical and thermal properties than other fibers. Thus, the most commonly used reinforced composites today are carbon fibers.

Dynamic mechanical measurements generally offer a better understanding of the behavior of the material under load than other tests, although other mechanical tests theoretically may convey the same information.These research methods were commonly used to analyze the structures and viscoelastic properties of polymeric materials to assess irrelevant hardness and damping properties for different applications. The rigidity depends on the mechanical characteristics of the material and is transformed into a modulus. Tan delta is represented in damping and is related to the quantity of energy that a material can store. The DMA is the most sensitive technique for regulating events like glass transitions because when relaxation behavior is detected, its mechanical properties change