

Image Enhancement of Various techniques of shape detection based on shape boundary or interior

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Abstract— In this paper we are merely want to explore digital image processing which is a motivating field because it provides the higher image information for human understanding and process the image for storage, transmission, and illustration for machine perception. Image process could be a technique to reinforce raw pictures received from cameras/sensors placed on satellites, aircrafts or photos taken in traditional everyday life for varied applications. Pre-processing is the initial process applied on images which are at lowest level of abstraction. Also Shape analysis methods play an important role in systems for object recognition, matching, registration, analysis, accurate detection of image, Research in shape analysis has been motivated in part, for fast recognition of image from large data base. Accessing the desired and relevant image from large data base in an efficient manner is another motive for research. Various techniques of shape detection are based on shape boundary or interior.

Keywords: *Hough Transform, Image Enhancement, Image Segmentation, Shape Analysis*

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I. INTRODUCTION

Image processing could be a technique to convert a picture into digital type and perform some operations on that, so as to urge associate increased image or to extract some helpful info from it. It's a sort of signal dispensation during which input is image, like video frame or photograph and output is also image or characteristics related to that image. Typically Image process system includes treating pictures as two dimensional signals whereas applying already set signal process ways to them. It is among chop-chop growing technologies these days, with its applications in numerous aspects of a business.

Image process forms core analysis space at intervals engineering and engineering science disciplines too Image process primarily includes the subsequent three steps. – Importation the image with optical scanner or by photography. – Analysing and manipulating the image which incorporates information compression and image sweetening and recognizing patterns that don't seem to be to human eyes like satellite images. – Output is that the last stage during which result will be altered image or report that's supported image analysis – Purpose of Image process. The purpose of image process is split into five teams. They are: – Visualization: Observe the objects that aren't visible. – Image sharpening and restoration: to make a more robust image. – Image retrieval: rummage around for the image of interest. – Mensuration of pattern: Measures numerous objects in a picture. – Image Recognition: Distinguish the objects in a picture. The two styles of ways used for Image

process are Analog and Digital Image process. Analog or visual techniques of image process are often used for the exhausting copies like printouts and pictures. Image analysts use numerous fundamentals of interpretation whereas victimization these visual techniques.

Digital process techniques facilitate in manipulation of the digital pictures by victimisation computers. As information from imaging sensors from satellite platform contains deficiencies. To urge over such flaws and to urge originality of knowledge, it's to bear numerous phases of process. The 3 general phases that each one styles of information got to bear whereas victimisation digital technique are Pre- process, improvement and show, info extraction.

II. RELATED WORKS

In Various techniques are developed in Image process throughout the last four to 5 decades. Most of the techniques square measure developed for enhancing pictures obtained from unmanned space crafts, area probes and military reconnaissance mission flights.

Image process systems are getting in style thanks to straight forward availableness of powerful personnel computers, massive size memory devices, graphics software package etc. Image process is employed in numerous applications such as: – Remote Sensing – Medical Imaging – Non-destructive analysis – Rhetorical Studies – Textiles – Material Science. – Military – Industry – Document process – Graphic arts – Printing business

III. METHODOLOGY

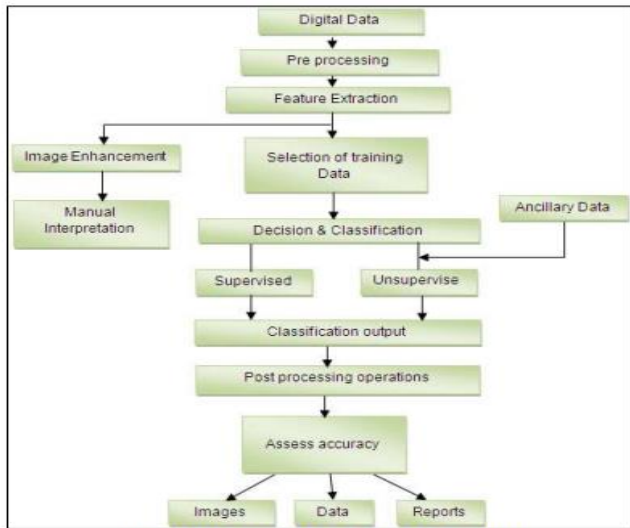


Fig. 1.1: Basic Block Diagram of Image Processing

The Shape Matching module provides the way to match a binary image to a famed info of pictures. The module is employed to acknowledge shapes and provides applied math relationships between the presently viewed object which keep within the image info. Note that the form matching relies on actual image shape and NOT on direct element matching as drained image model matching. During this approach the matches square measure invariant to form translation, size and orientation. The module uses a nominal folder for coaching. It expects to ascertain black and white pictures therein folder that square measure processed for form info. (White being the form, black being the background). Victimization this info of pictures, new pictures fed in from the camera (after being threshold) are going to be compared to the famed info with ensuing similarity being displayed. The module doesn't adapt to changes in perspective. So if your form is on the ground together with your camera inform outward, you may in all probability not get excellent matches. You will need to use the angle module to regulate the image such the form seems as if the camera was wanting right down on the form. Or else, you'll snap several pictures of the form given perspective distortion which might provide some stability ... however not as reliable as distortion the image before

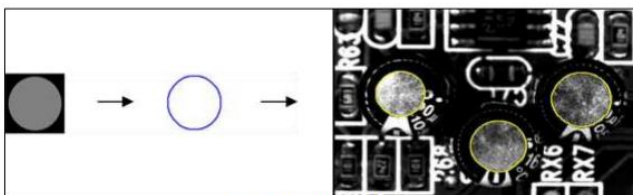


Fig. 2.1: Input Shape Comparison

IV. VARIOUS TECHNIQUES OF SHAPE MATCHING

Shape detection generally searches for effective and important shape features base on either shape boundary or content. Various features have been developed for detecting shapes. Shape signature, signature histogram, shape invariants. Basically here we discuss two methods. Hough Transform It is a technique to isolate the curves of a given shapes in a given image, Hough Transform can locate regular curves like straight lines, circles, parabolas, ellipses, etc. Requires that the curve be specified in some parametric form and Hough transform performed after Edge Detection The straight line equation: $Y=m.x+c$

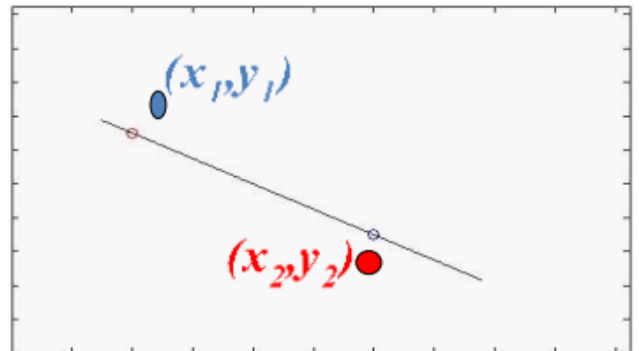


Fig. 3.1: The Straight Line Equation $Y=m.x+c$.

For each point (x, y) in the line following equation are applies: $Y=m.x+b$; Therefore, $y1=m.x1+b$ and $Y2=m.x2+b$ this representation fails in case of vertical line more useful representation in this case is:

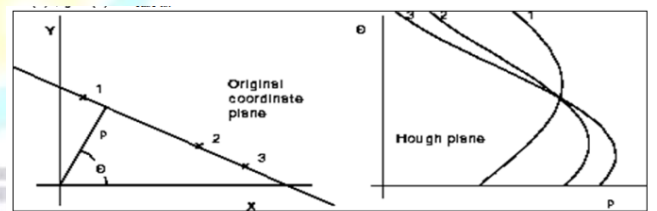


Fig. 3.2: Representation of Multiple Line Over Single Point Each Pair of (m, b) Defines Straight Line Containing Point (x, y)

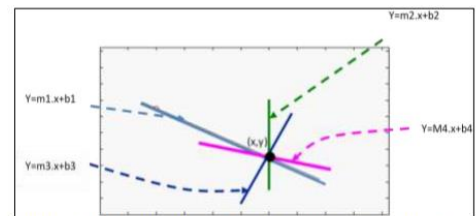


Fig. 3.3: Representation of Multiple Line Over Single Point Each Pair of (m, b) Defines Straight Line Containing Point (x, y)

Each point in the (x, y) space (image plane) is mapped to a straight line in the (m, b) space (parameter plane). A straight line in the (x, y) space (image plane) is mapped to the intersection point of the lines corresponding to its points, in the (m, b) space (parameter plane). when we dealing with the digital picture line formed by $M (N)$ pixels in the image space will be mapped to the intersection point of $M (N)$ lines in the parameters space, where each line corresponds to a pixel in the image space .The number of lines intersecting in

a single point in the parameter space represents the length of the original line in the image space.

Algorithm for Shape Detection – Use Quantize the Hough Transform space: identify the maximum and minimum values of r and q – Generate an accumulator array $A(r, q)$; set all values to zero – For all edge points (x_i, y_i) in the image – Use gradient direction for q – Computer from the equation – Increment $A(r, q)$ by one For all cells in $A(r, q)$ – Search for the maximum value of $A(r, q)$ – Calculate the equation of the line – To reduce the effect of noise more than one element in the accumulator array are increased

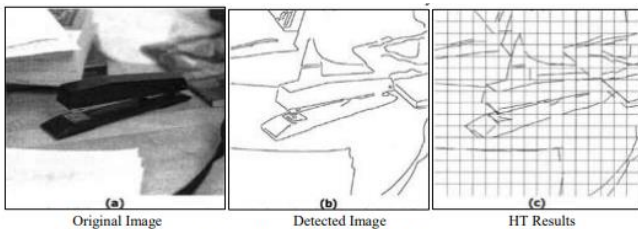


Fig. 3.5: Example of Hough Transforms.

Generalized Hough Transform The Hough transform is a method for curves by exploiting the duality between points on a curve and parameters of that curve. The Generalized Hough Transform (GHT) is used to find any arbitrary shape GHT is robust to partial or slightly deformed shape it is essentially a method for object recognition and it is also robust to the presence of additional structures in the image. It requires a lot of storage and extensive computation. Algorithm for Generalized Hough Transform – Define I/O ports of the system – Define port's signal flow direction and their respective data-types – Define various wires, registers and constants required in code Using Cardiac core find sine and cosine values of input angles – Define always block and rotate is at rising edge of clock – Initialize all the counters used in loops – Perform voting procedure and store votes in Registers

V. APPLICATION IN SHAPE

Hough Transform Application in Medical Visualization Hough transform will mainly focus on real world applications of the aforementioned techniques with a main focus on medical visualization, medical visualization offers a lot of interesting applications where the HT can be useful. Some of these will be introduced here. Valid Region Recognition in X-Ray Images An important part of such systems is the digital processing of medical X-ray images. Although the output of X-ray systems is mostly a rectangular image, the valid region slightly differs from device to device. Valid region recognition is important for reduction of storage space and operation quantity, as well as the image quality improvement for further image analysis.

Automatic Determination of the Center of Rotation of the Glen Humeral Joint Rheumatic arthritis is an

inflammation of the joints that affects the articular surfaces. The replacement of the affected joint by a prosthesis can reduce its effects that can result in pain and loss of function. The success rate for the replacement of joints, such as the hip has reached a level as high as 90%. Shoulder replacements unfortunately do not reach these levels, which is mainly caused by the complex anatomy of the shoulder. Most important for a successful surgery is that the position of the center of rotation of the globoid. For a description of the human shoulder components glen humeral joint is maintained.

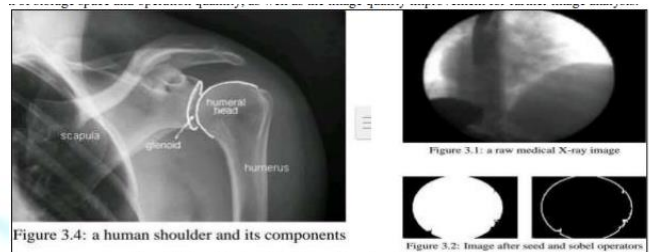


Figure 4.1: Determination of the Center of Rotation of the Glen Humeral Joint

VI. CONCLUSION

Here throughout this paper we discussed the various techniques that has been carried out on query shape. This paper also described Various Filter techniques for reducing noise related to Image, but primarily an image restoration is usually done by Weiner filter. Here we described method for detecting shape of image which are Hough transform and Generalized Hough transform this two method that greatly enhance the process of shape detection. Development has been influenced by achievements from other related research disciplines as well as by image analysis applications.

REFERENCES

- [1]. P. Nirmala, T. Manimegalai, J. R. Arunkumar, S. Vimala, G. Vinoth Rajkumar, Raja Raju, "A Mechanism for Detecting the Intruder in the Network through a Stacking Dilated CNN Model", Wireless Communications and Mobile Computing, vol. 2022, Article ID 1955009, 13 pages, 2022. <https://doi.org/10.1155/2022/1955009>.
- [2]. D. Sathyanarayanan, T. S. Reddy, A. Sathish, P. Geetha, J. R. Arunkumar and S. P. K. Deepak, "American Sign Language Recognition System for Numerical and Alphabets," 2023 International Conference on Research Methodologies in Knowledge Management, Artificial Intelligence and Telecommunication Engineering (RMKMATE), Chennai, India, 2023, pp. 1-6, doi: 10.1109/RMKMATE59243.2023.10369455.
- [3]. J. R. Arunkumar, Tägele berihun Mengist, 2020" Developing Ethiopian Yirgacheffe Coffee Grading Model using a Deep Learning Classifier" International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9 Issue-4, February 2020. DOI: 10.35940/ijitee.D1823.029420.
- [4]. Ashwini, S., Arunkumar, J.R., Prabu, R.T. et al. Diagnosis and multi-classification of lung diseases in CXR images using

- optimized deep convolutional neural network. *Soft Comput* (2023). <https://doi.org/10.1007/s00500-023-09480-3>
- [5]. J.R.Arunkumar, Dr.E.Muthukumar," A Novel Method to Improve AODV Protocol for WSN" in *Journal of Engineering Sciences*" ISSN NO: 0377-9254 Volume 3, Issue 1, Jul 2012.
- [6]. R. K, A. Shameem, P. Biswas, B. T. Geetha, J. R. Arunkumar and P. K. Lakineni, "Supply Chain Management Using Blockchain: Opportunities, Challenges, and Future Directions," 2023 Second International Conference on Informatics (ICI), Noida, India, 2023, pp. 1-6, doi: 10.1109/ICI60088.2023.10421633.
- [7]. Arunkumar, J. R. "Study Analysis of Cloud Security Challenges and Issues in Cloud Computing Technologies." *Journal of Science, Computing and Engineering Research* 6.8 (2023): 06-10.
- [8]. J. R. Arunkumar, R. Raman, S. Sivakumar and R. Pavithra, "Wearable Devices for Patient Monitoring System using IoT," 2023 8th International Conference on Communication and Electronics Systems (ICES), Coimbatore, India, 2023, pp. 381-385, doi: 10.1109/ICES57224.2023.10192741.
- [9]. S. Sugumaran, C. Geetha, S. S, P. C. Bharath Kumar, T. D. Subha and J. R. Arunkumar, "Energy Efficient Routing Algorithm with Mobile Sink Assistance in Wireless Sensor Networks," 2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ACCAI58221.2023.10201142.
- [10].R. S. Vignesh, V. Chinnammal, Gururaj,D, A. K. Kumar, K. V. Karthikeyan and J. R. Arunkumar, "Secured Data Access and Control Abilities Management over Cloud Environment using Novel Cryptographic Principles," 2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2023, pp. 1-8, doi: 10.1109/ACCAI58221.2023.10199616.
- [11].Syamala, M., Anusuya, R., Sonkar, S.K. et al. Big data analytics for dynamic network slicing in 5G and beyond with dynamic user preferences. *Opt Quant Electron* 56, 61 (2024). <https://doi.org/10.1007/s11082-023-05663-2>
- [12].Krishna Veni, S. R., and R. Anusuya. "Design and Study Analysis Automated Recognition system of Fake Currency Notes." *Journal of Science, Computing and Engineering Research* 6.6 (2023): 16-20.
- [13].V. RamKumar, S. Shanthi, K. S. Kumar, S. Kanageswari, S. Mahalakshmi and R. Anusuya, "Internet of Things Assisted Remote Health and Safety Monitoring Scheme Using Intelligent Sensors," 2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2023, pp. 1-8, doi: 10.1109/ACCAI58221.2023.10199766.
- [14].R. S. Vignesh, R. Sankar, A. Balaji, K. S. Kumar, V. Sharmila Bhargavi and R. Anusuya, "IoT Assisted Drunk and Drive People Identification to Avoid Accidents and Ensure Road Safety Measures," 2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ACCAI58221.2023.10200809.
- [15].I. Chandra, G. Sowmiya, G. Charulatha, S. D, S. Gomathi and R. Anusuya, "An efficient Intelligent Systems for Low-Power Consumption Zigbee-Based Wearable Device for Voice Data Transmission," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10083856.
- [16].G. Karthikeyan, D. T. G, R. Anusuya, K. K. G, J. T and R. T. Prabu, "Real-Time Sidewalk Crack Identification and Classification based on Convolutional Neural Network using Thermal Images," 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS), Pudukkottai, India, 2022, pp. 1266-1274, doi: 10.1109/ICACRS55517.2022.10029202.
- [17].R. Meena, T. Kavitha, A. K. S, D. M. Mathew, R. Anusuya and G. Karthik, "Extracting Behavioral Characteristics of College Students Using Data Mining on Big Data," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10084276.
- [18].S. Bharathi, A. Balaji, D. Irene. J, C. Kalaivanan and R. Anusuya, "An Efficient Liver Disease Prediction based on Deep Convolutional Neural Network using Biopsy Images," 2022 3rd International Conference on Smart Electronics and Communication (ICOSEC), Trichy, India, 2022, pp. 1141-1147, doi: 10.1109/ICOSEC54921.2022.9951870.
- [19].I. Chandra, G. Sowmiya, G. Charulatha, S. D, S. Gomathi and R. Anusuya, "An efficient Intelligent Systems for Low-Power Consumption Zigbee-Based Wearable Device for Voice Data Transmission," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-7, doi: 10.1109/ICECONF57129.2023.10083856.
- [20].Revathi, S., et al. "Developing an Infant Monitoring System using IoT (INMOS)." *International Scientific Journal of Contemporary Research in Engineering Science and Management* 6.1 (2021): 111-115.