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The Brief Review on the Image Processing Techniques

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ABSTRACT: ***Image editing is one of today's fastest-growing technologies, having applications in a variety of industries. Within the hardware design and software engineering trains, picture processing structures are a major research area. Picture processing is a technique for improving images obtained from satellites, space experiments, aircraft, military observation missions, or photographs shot with regular cameras in daily life. Because of really wonderful PCs, huge memories of accessible devices, and realistic virtual goods and instruments accessible with those gadgets and contraptions, the sector is coming out to be ground-breaking and well-known. The various important steps in picture managing are image acquisition, pre-handling, division, portrayal, acknowledgement, and comprehension. The potential for widespread use of mage recognition technology in a variety of sectors is enormous. In reality, it is not a technology of the future, but rather one that is currently here.***

KEYWORDS: ***Analog Image Processing, Computer, Image Processing, Mathematical Processing.***

1. INTRODUCTION

Image processing is the mathematical processing of pictures utilizing any type of signal processing on any form of an image, such as a photograph or video frame[1]. Image recognition is used extensively by companies and startups such as Tesla, Google, Uber, Adobe Systems, and others. Image tech applications based on image identification are being developed for a variety of purposes and business sectors[2]. The use of a digital computer to process digital pictures using an algorithm is known as image processing.

Digital image processing, as a subset or area of digital signal processing, offers a number of benefits over analog image processing. It enables a considerably broader variety of algorithms to be applied to the input data, as well as avoiding issues like noise and distortion during processing. Digital image processing may be represented as multidimensional systems since pictures are specified in two dimensions (or more). Three factors have influenced the generation and development of digital image processing: first, the advancement of computers; second, the advancement of mathematics (particularly the creation and improvement of discrete mathematics theory); and third, the increased demand for a wide range of applications in the environment, agriculture, military, industry, and medical science[3].

Many of the techniques of digital image processing, also known as digital picture processing, were developed in the 1960s at Bell Laboratories, the Jet Propulsion Laboratory, the Massachusetts Institute of Technology, the University of Maryland, and a few other research facilities, with applications in satellite imagery, wire-photo standards conversion, medical imaging, videophone, and character recognition[4]. The goal of early image processing was to improve the picture's quality. It was created with the intention of improving people's visual effects. The input of image processing is a low-quality picture, and the output is a higher-quality image. Image enhancement, restoration, encoding, and compression are all common image processing techniques. The American Jet Propulsion Laboratory was the first successful application (JPL).

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 11, Nov 2022

On the hundreds of lunar pictures returned by the Space Detector Ranger 7 in 1964, they employed image processing methods such as geometric correction, gradation transformation, noise reduction, and others, taking into consideration the position of the sun and the moon's surroundings. The effect of the computer's successful mapping of the moon's surface map has been enormous. Later, more sophisticated image processing was applied to the approximately 100,000 pictures returned by the spacecraft, resulting in the topographic map, color map, and panoramic mosaic of the moon, which produced remarkable results and lay the groundwork for a human landing on the moon.

However, given the computer technology of the time, the cost of processing was very expensive. That changed in the 1970s, when cheaper computers and specialized gear made digital image processing more accessible. For certain specific issues, such as television standards conversion, this resulted in pictures being processed in real-time. With the advancement of general-purpose computers, they began to replace specialist hardware in all but the most specialized and computer-intensive tasks. Digital image processing has become the most popular type of image processing in the 2000s, thanks to the availability of fast computers and signal processors. It is widely utilized since it is not only the most flexible but also the most cost-effective technique.

What is currently assisting the advancement of image recognition technology? Open-source tools make programming simpler while also lowering the cost of computers. Companies may now profit enormously from image recognition technology thanks to open-source frameworks and libraries. Massive open databases like Pascal VOC and ImageNet, for example, provide access to millions of labeled pictures. In fact, they assist businesses and imaging technology startups in developing and improving their own machine learning algorithms and applications. Professional developers also utilize an open-source, cross-platform package called OpenCV for real-time picture recognition. It is the most authoritative site for image recognition experts and is regarded the initial point of contact. OpenNN, VXL, and a number of additional libraries for computer vision are also excellent. It is used in a variety of applications, including. Document processing in the printing industry are given:

1) Textiles
2) Imaging in medicine
3) Centers for research
4) Military uses for graphic arts
5) Material science is the study of materials.
6) Forensic investigations

Image processing may be divided into two categories [5].

1.1 Analog Image Processing:

Simple image preparation entails changing the look of a picture by electrically varying the sign. The sign's abundance is altered, resulting in altered brightness and contrast in the images [6].

1.2 Digital Image Processing:

In computerized picture handling, the image is first converted into an advanced structure using a scanner or digitizer, and then it is managed. For example, image data is not only basic in nature, but it also contains a wide range of unpredictability. Because there is just one measurement of variation, such as temperature, the information may be calculated directly (cold to hot). When mathematical characteristics are applied to temperature, the image tends to

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be numerical [7]. Fundamentally, to provide useful information in a rational manner. Imaging bundles provide image enhancement methods (such as difference extending or de-obscuring using a nearest neighbor approach) that do not rely on the previous model of the cycle that created the image.

1.3 Morphological Analysis:

Morphological image preparation is a group of nonlinear problems concerned with the form or morphology of highlights in a photograph. Morphological activities are especially well suited to the processing of parallel images since they rely only on the general concept of pixel values rather than their mathematical values. Greyscale images may also be subjected to morphological tasks in order to conceal their light exchange capabilities and, as a result, their explicit pixel values are of little or small relevance. Expulsion of commotion, for example, or image handling. Fig. 1 shows morphological image processing.

Fig. 1: Morphological Image Processing.

1.4 Segmentation:

It's a technique for breaking down an image into its component components. Yield is often pixel data in its most basic form. In most cases, picture division is used to locate objects and boundaries (lines, bends, and so on) in images. Image division, to put it more precisely, is the process of assigning a name to each pixel in a picture in such a manner that pixels with similar names share certain characteristics [8]. Fig. 2 shows Segmentation.

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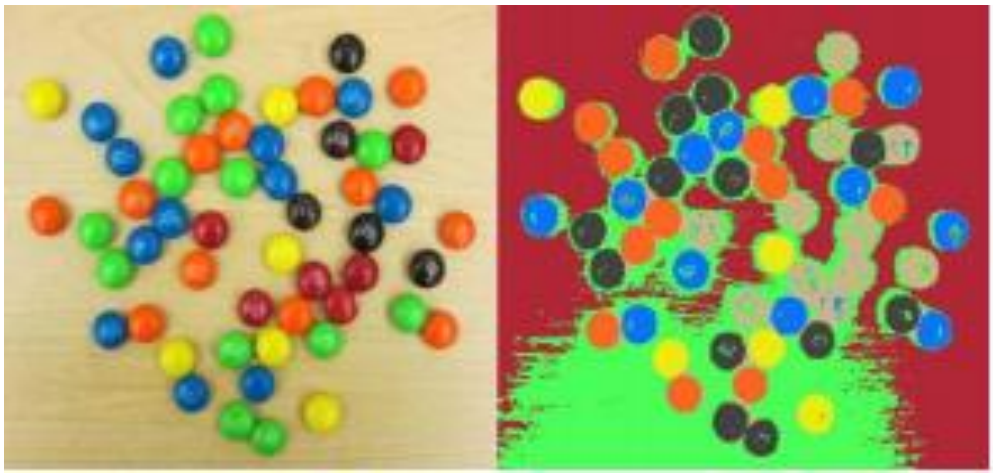

Fig. 2: Shows Segmentation.

1.5 Representation:

It enhances images in ways that increase the likelihood of completing certain cycles, including as Enhancement of Images: Picture enhancement is the process of altering advanced images so that the results are more suitable for display or further investigation. You may, for example, remove turbulence, hone, or lighten an image to make it easier to identify important features [9].

1.6 Pre-Processing:

It enhances images in ways that increase the likelihood of completing certain cycles, including as Enhancement of Images: Picture enhancement is the process of altering advanced images so that the results are more suitable for display or further investigation. You may, for example, remove turbulence, hone, or lighten an image to make it easier to identify important features [10].

2. LITERATURE REVIEW

Among the numerous articles published in the area of image processing techniques, Ms. Pradnya M. Kulkarni1 and Mrs. Archana.N.Naik2 wrote a paper named "Review Paper on Image Processing Techniques." Ms. Arati P. Bhadvankar3 covers image processing and its benefits and drawbacks, as well as the differences between digital and analog image processing, as well as pretreatment, picture comparison, restoration, and segmentation. Many image preparation methods are discussed in this article, including picture division, pressure, edge detection, and so on. The application for which a photo preparation method will be utilized determines which approach to employ. Each process has its own desired location and impediment, but it transforms the information picture into a format that is suitable for future preparation. Learners would benefit from this article since it will help them grasp the basic concepts of image handling. Among the numerous articles published in the area of image processing techniques, Ms. Pradnya M. Kulkarni1 and Mrs. Archana.N.Naik2 wrote a paper named "Review Paper on Image Processing Techniques." Ms. Arati P. Bhadvankar3 covers image processing and its benefits and drawbacks, as well as the differences between digital and analog image processing, as well as pretreatment, picture comparison, restoration, and segmentation. Many image preparation methods are discussed in this article, including picture division, pressure, edge detection, and so on. The application for which a photo preparation

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method will be utilized determines which approach to employ. Each process has its own desired location and impediment, but it transforms the information picture into a format that is suitable for future preparation. Learners would benefit from this article since it will help them grasp the basic concepts of image handling [9].

2. DISCUSSION

The mathematical processing of images using any kind of signal processing on any form of an image, such as a photograph or video frame, is known as image processing. The potential for mage recognition technology to be widely used in a number of industries is tremendous. In fact, it is a present-day technology, not a technology of the future. Companies and startups like Tesla, Google, Uber, Adobe Systems, and others utilize image recognition extensively. Let's take a look at some recent statistics to demonstrate how technology is advancing across the world. As a result, it's no surprise that a growing number of "image tech" applications based on picture identification are being created for a wide range of purposes and commercial sectors.

What is presently helping image recognition technology advancement? Open-source software makes programming easier while simultaneously reducing computing costs. Thanks to open-source frameworks and libraries, businesses may now reap significant benefits from image recognition technologies. Several large open databases, such as Pascal VOC and ImageNet, offer access to millions of tagged images. They even help companies and image technology startups build and improve their own machine learning algorithms and apps. For real-time image identification, professional developers use OpenCV, an open-source, cross-platform program. For image recognition specialists, it is the most authoritative site and the first point of contact. OpenNN, VXL, and a number of other computer vision libraries are also good.

Hardware designs for image and video processing is used for faster performance rather than software, to meet the requirements of the end users, keeping its market relevancy and at the same time security is another concern, so the necessity to communicate these media data securely among multiple platforms after processing to enhance human perception and satisfaction in which our focus lies. The basic 4 steps in image processing domain are pre-processing, segmentation, feature extraction and recognition and those has been keeping their strong importance in research mostly in the case of software implementation and very few implemented on hardware. Initial pre-processing step is carried out to enhance the quality of the original image by removing noise, unbalanced brightness etc. as common interfering elements followed by segmentation where images are separated from the background into various elements with properties. Next in the feature extraction stage, extraction is performed on every detected object to reduce its information to a list of parameters storing in memory. Finally in the recognition stage a set of signals are generated using this list which constitute the upper level of processing assigning a specific meaning to every detected object. In this paper we focused on image thresholding which is mainly used in the pre-processing and segmentation stages respectively, where our implementation is performing well enough in comparison to existing work (compared below), followed by secured transmission of the image data between multiple FPGA platforms and to the best of our knowledge this design belongs to a class of advanced implementation. Rest of the paper consists of three sections i.e. Hardware architecture and implementation design, results and observation followed by conclusion.

In order to extract the useful information from an image it needs to be divided into distinct components like foreground (where pixel value is ‘1’) and background (where pixel value is ‘0’) objects for further analysis where most often the gray level pixels of foreground

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components are quite different from that of background and in this context a very crucial and significant technique available in literature known as thresholding is applied which is the process of partitioning pixels in the images into object and background classes based upon the relationship between the gray level value of a pixel and the significant parameter threshold to separate the object from the background, finding the correct value of which to separate an image into desirable foreground and background remains a very crucial step in image processing domain. Because of its efficient performance and simplicity in theory, thresholding techniques have been studied extensively and a large number of thresholding methods have been published so far.

4. CONCLUSION

In this paper, many picture preparing procedures like picture division, pressure, edge discovery, and so on are examined. Picking a picture preparing technique depends upon its application for which it will be used. Each the procedure has its own preferred position and hindrance yet it changes over the info picture into that structure which is appropriate for further preparing. This paper will be useful to learners for understanding the fundamental ideas of picture handling. Vision processing incorporates human perception and intelligence which makes the field most interesting to the research community as it can mimic human behaviour in the computer system by means of video surveillance system, integrating more intelligence to machines such as robots, as well as in ecology, biometrics and medical applications. Interestingly, recent NASA's mission "Curiosity" on Mars, sending valuable images and information of Mars environment in a secure communication channel, transmitted images also need to processed exhaustively to find out any vital information about Mars.

REFERENCES:

[1] S. S. Panda, D. P. Ames, and S. Panigrahi, "Application of vegetation indices for agricultural crop yield prediction using neural network techniques," *Remote Sens.*, 2010, doi: 10.3390/rs2030673.

[2] G. Y. Flórez-Yepes, A. Rincon-Santamaría, P. S. Cardona, and A. M. Alzate-Alvarez, "Análisis multitemporal de las coberturas vegetales en el área de influencia de las minas de oro ubicadas en la parte alta del sector de Maltería en Manizales, Colombia," *DYNA*, 2017, doi: 10.15446/dyna.v84n201.55759.

[3] G. Y. Flórez-Yepes, A. Rincon-Santamaría, P. S. Cardona, and A. M. Alzate-Alvarez, "Multitemporal analysis of the vegetation cover in the area of influence of the mines located in the high part of Maltería in Manizales, Colombia," *DYNA*, 2017, doi: 10.15446/dyna.v84n201.55759.

[4] N. Peek, C. Combi, R. Marin, and R. Bellazzi, "Thirty years of artificial intelligence in medicine (AIME) conferences: A review of research themes," *Artificial Intelligence in Medicine*. 2015. doi: 10.1016/j.artmed.2015.07.003.

[5] W. K. Pratt, *Processing Digital Image Processing*. 2001.

[6] A. K. Prasad, "Particle image velocimetry," *Curr. Sci.*, 2000, doi: 10.1201/b19031-55.

[7] S. Vitulano, C. Di Ruberto, and M. Nappi, "Biomedical image processing," 1996. doi: 10.4018/jhisi.2012010105.

[8] C. E. Willert and M. Gharib, "Digital particle image velocimetry," *Exp. Fluids*, 1991, doi: 10.1007/BF00190388.

[9] R. D. Fiete, "Image Enhancement Processing," in *Modeling the Imaging Chain of Digital Cameras*, 2010. doi: 10.1117/3.868276.ch9.

[10] S. W. Smith, "Special Imaging Techniques," in *Digital Signal Processing*, 2003. doi: 10.1016/b978-0-7506-7444-7/50062-5.