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Currency Recognization for visually impaired People using Tensorflow

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***Abstract*—In this research, we present an image processing-based system for automatic money recognition. The proposed approach can be used to identify a banknote's country of origin, as well as its denomination and value.Only paper currencies have been taken into account. This method works by first identifying the country of origin using predetermined areas of interest, and then extracting the denomination value from the note's size, colour, or text. Picture preprocessing, image analysis, and image recognition are all part of the detecting system. The descriptor of an individual input scene is matched with multiple training photos of the same category to improve the determination of money recognition.The currency is then recognised with greater confidence after assessing their matching result. We've turned the technology into a smartphone application for real-time recognition.**

***Keywords – Image processing, Data analysis, aspect ratio, curruency regontion*.**

I. INTRODUCTION

Approximately 1.3 billion people worldwide are believed to have some sort of distant or near vision impairment. According to the World Health Organization[1], 188.5 million individuals have mild vision impairment, 217 million have moderate to severe vision impairment, and 36 million are blind when it comes to distant vision. It is concerning because 80 percent of visually impaired people reside in rural areas with inadequate treatment facilities, since 90 percent of doctors and paramedics work in urban areas. With these figures, it's worth noting that the number of visually impaired personnel in the public and commercial sectors has climbed dramatically.

The similarity of paper size and texture across different banknotes is one of the key issues that a visually impaired person faces when attempting to recognise paper currency. Understanding the value of banknotes is a critical skill for children because currencies are often utilised in everyday life. As a result, we've created a real-time system to assist them in recognising currencies and resolving the situation, allowing visually impaired persons to have trust in their financial operations without relying on others.

With the use of modern image processing techniques, camera-based systems may be constructed, and every smartphone has camera features, making it accessible to the visually handicapped. As a result, camera-based systems will be far more user-friendly and practical for the intended audience.

The Money Talker [2], a gadget designed for Australian dollars, the Note Teller 2 [3], and the K-NFB Mobile Reader [9], both of which can read US banknotes, are examples of portable banknote recognition devices. The first two items are developed on unique hardware, whilst the third is only available on a single brand of cell phone. None of these technologies, unlike the bioniceye glass, can be expanded to include additional features such as colour recognition, sign recognition, and so on.

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Figure 1.Banknote

II. LITERATURE SURVEY

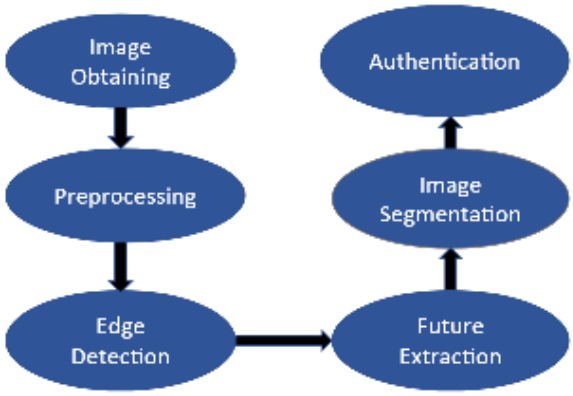
In various ways, a large number of researchers have aided the development of currency recognition techniques. Researchers tackle the recognition challenge differently for coins and bills (notes) due to differences in features. In this section, we'll go over some of the previous work on currency recognition techniques.

Shahbaj Khan et.al [1] explain about the authentication of different currency notes with basic image processing techniques. The image isconverted from RGB to Grayscale for easy preprocessing of the acquired image. The edges are detected using Sobel operator and edge-based segmentation is applied to the image. Features are extracted using ORB feature detector. Extracted features include security thread, intaglio printing, micro-lettering etc. It may face many challenges such as old notes, worn out notes, image quality etc. the features are compared with the features of originalcurrency which is templated in the dataset. Template matching is performed to obtain the output.

Many of the currency recognition systems are proposed. In [2], the author recognizes and classifies four different kinds of currencies through computer vision. The typical Accuracy rate was 93.84%. Also, in [3], the author proposed an Android paper currencyrecognition system that applied to Saudi Arabian papers. Recognizing paper currency methods that relies on some features and correlations between two currency Images.

However, the preceding research did not address the issue of the ORB algorithm's accuracy being reduced/decreased when the dimensions of the monetary picture of an enlarged external environment alter dramatically. Yanyan Qin et al. [4] integrate the core SIFT method with the ORB method and establish the SIRB (SIFT and ORB) algorithm, which is based on the original ORB image registration method. SIRB managed the strengths of ORB in matching quickly while resolving the errors of ORB scale inconsistency.

R Bhavani et al. [5] explore banknote recognition using SURF, a novel feature extraction technique that combines an interest point detector and a descriptor.The reading of the image, pre-processing, feature extraction, classification, and outcome are all covered in this step. The system will extract a feature from the test image and compare it to the database's features. Image segmentation and feature extraction are performed by SURF. The regionof interest is used to extract features. The obtained result demonstrates the efficacy of the SURF approach as well as currencyrecognition.This system activates precise money recognition. It shows the results of picture recognition by comparing them to the attributes of template images.



III.METHODOLOGY

Figure 2. Stages Of Curruency Recognitation system

A. Image Obtaining

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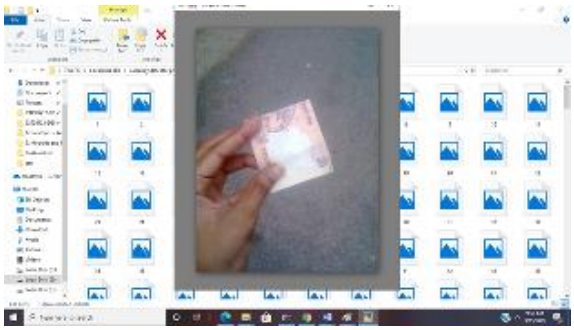

As input, the image is provided. The image of the banknote is captured. Image quality is unaffected by high precision. It's okay if the image is in JPEG format.

Figure 3. Image Capture

B. Pre-processing of images

The input image is pre-processed to eliminate noise, improve it and adapt it to the standard quality of the displayed image may be affected by a variety of factor Colour recognition is possible even at this stage, image preprocessing is essential to improve an image and achieve better and more precise results.

C. Edge Detection

To extract the function, edge detection technology is utilised to extract the limits of an object in an image, evaluate and detect brightness. It can be implemented using a variety of operators and functions, including the Sobel operator, the Prewitt operator, and the wavelet Transformation function.

D. Feature Extraction

The features are retrieved from the money by a machine learning system. It's essentially a dimensional reduction technique from a large reference line dataset to a smaller dataset that's more relevant. Scale-invariant function transformation analysis will be utilised to extract functions in addition to edge detection.

Figure 4. Future Extraction

E. Segmentation

The objective of image segmentation is to split the image into several segments for easier and more meaningful analysis.

IV. CONCLUSION & FUTURE WORK

An innovative model of a currency recognition system using digital image processing was discussed with the aim of improving efficiency by increasing accurate output .A variety of image processing methodologies have been adopted to design and build a recognition mechanism.The extracting technique of the ORB feature is faster than SURF. But SURF produces more precise results. In that system, accuracy is more important. Using digital image processing, paper money analysis is most effective on the basis for a longer cost and time compared to the existing system.

The future work on this system will focus to optimize the proposed system and to enlarge the training dataset by incorporating more banknotes of different countries as well.

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