ORAN an aid for Visually Impaired

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Abstract— **Key challenges for a visually impaired include, recognition of characters reading the text, recognition of currency denominations, navigation and so on. Currency is the medium of exchange. Money related transactions are an important part of our day to day lives. Along with technology the banking sector is also getting modern and being explored. In spite of the widespread usage of ATMs, Credit-Debit Cards, and other digital modes of payment like as Google Pay, Paytm, and Phone Pay, money is still widely used for most daily transactions due to its convenience.**

Currency recognition or bank-note recognition is a process of identifying the denominational value of a currency. It is a simple and straightforward task for the normal human beings, but if we consider the visually challenged people currency recognition is a challenging task. Visually handicapped people have a difficult time distinguishing between different cash denominations.

Even though unique symbols are embossed on different currencies in India, the task is still too difficult and time- consuming for the blind. This brings a deep need for automatic currency recognition Systems. So, our paper studies about the systems in order to help the visually challenged or impaired people; so that they can differentiate between various types of Indian currencies through implementation of image processing techniques. The study aims to investigate different techniques for recognising Indian rupee banknotes. The proposed work extracts different and distinctive properties of Indian currency notes, few of them are the central number, RBI logo, colour band, and special symbols or marks for visually impaired, and applies algorithms designed for the detection of each and every specific feature.

From our work the visually impaired people will be capable of recognizing different types of Indian Currencies while their monetary transactions, so that they lead their life independently both socially and financially. Also the visually impaired learn to read the letters by touching and feeling them, however the task is yet difficult and tricky for them. Hence to simplify this, the paper also focuses on OCR (Optical Character Recognition) it reads (speaks) the text for the blind.

Hence Oran is model that aids the visually impaired with OCR and Currency Recognition.

Index Terms: **Currency Recognition, Visually Impaired, OCR (optical character recognition)**

INTRODUCTION

According to World Health Organization (WHO), the estimated number of people visually impaired in the world is 285 million, out of which 39 million are visionless and 246 million are having low vision. The loss of vision associated with both the eyes can be total or partial. In India a person with vision 6/6 after adequate spectacle correction is considered blind as per National Programme for Control of Blindness (NPCB). One of the major difficulty or a key challenge for a visually impaired is to recognize the currency denominations. Research work in the domain of image processing is evolving rapidly; specifically in the banking sector. Along with the evolving technologies and the growth of the banking sector; the requirement to precisely and efficiently detect currency and its denomination is also growing in parallel.

Therefore, in order to help the visually disabled; we study Different algorithms which can be implemented in a system for detection of Indian currency using image processing. Generally, currency recognition is done using a camera or any image and the result is displayed on the screen and also an audio output can be provided. One of the difficulty for people with visual impairment is the inability to identify the paper currencies due to the approximation of paper texture and size between the different types of currencies.

And also the paper depicts the different strategies used by the previous implementations for the OCR to smoothen the reading task for a Blind.

II. LITERATURE SURVEY

In the last decade several currency recognition and OCR technologies have been developed, and in this section we have filtered couple of research papers that has a similar scope and has different methodologies been followed A wide number of researchers have contributed to the Development of currency recognition techniques in various Ways. Because of the differences in features between coins and bills (notes), researchers approach the recognition problem differently for each of them. We will go over prior work done in currency recognition techniques in this section.

According to research in [1], authors have introduced an Unsupervised algorithm for segmentation of synthetic aperture radar images which is rely on fuzzy clustering approach to beat the high time complexity of rich- performance clustering algorithms which analyse all pixels for image segmentation. Their algorithm selects a subset of key pixels supported by the rule of local extrema and performs segmentation on those.

Research in [2] proposes a system for recognizing fake currency notes of Indian currency. The system verifies the real images on the premise of image processing by extraction of varied security measures of Indian currency notes. The analysis in [3] gives a dataset for the evaluation of change point detection algorithms which consist of 37 time series from different domains. By analysing the consistency of human annotations, the dataset describes evaluation metrics for measuring the performance of algorithms.

Many of the currency recognition systems are proposed. In [5], the author recognizes and classifies four different kinds of currencies through computer vision. The typical Accuracy rate was 93.84%. Also, in [6], the author proposed an Android paper currency recognition system that applied to Saudi Arabian papers. Recognizing paper currency methods that relies on some features and correlations between two currency Images.

Sungwook et al. defined an efficient and fast algorithm for Differentiating multiple national bank currencies depends on size information and correlation matching of multiple templates [7]. As different bank currencies have different sizes so this information was regarded to be a vital feature. This method was tested using 55 currencies of 30 different classes from five countries like EUR, KRW, RUB, and USD.so, results of this method is 100%

Mitsukura proposed a way to fashion a neural network (NN) Using a simulated annealing (SA) and genetic algorithm (GA). The comparable traits of the pictures of coins (i.e., size, colour, weight, and pattern) reason hassle for forex recognition. The proposed scheme located capabilities and additionally the recognition rate turned into about 98%.

This approach desires a prolonged time and excessive computational power. That's why it requires more time on Mobile phones [11].

Mirza and Nanda use 3 extracted functions from the banknote along with identity mark, watermark, and safety thread [12].

III. METHODOLOGY

Oran is an android application that uses the below technologies:-

Machine Learning – Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy.

A. How machine learning works

1.   A Decision Process: In general, machine learning algorithms are used to make a prediction or classification. Based on some input data, which can be labelled or unlabeled, your algorithm will produce an estimate about a pattern in the data.

2.   An Error Function: An error function serves to evaluate the prediction of the model. If there are known examples, an error function can make a comparison to assess the accuracy of the model.

3.   An Model Optimization Process: If the model can fit better to the data points in the training set, then weights are adjusted to reduce the discrepancy between the known example and the model estimate. The algorithm will repeat this evaluate and optimize process, updating weights autonomously until a threshold of accuracy has been met.

One Such application of ML is Computer Vision and deep learning that is applied in our model. Computer Vision is a technique used to derive information from the digital images. The Computer vision concept is

used in OCR by the model as it extracts the text to be read from the image that gets captured.

Similarly Deep learning is used in currency recognition as the image is passed with a CNN network and the denomination's classification is derived

Tenserflow -TensorFlow makes it easy for beginners and experts to create machine learning models for desktop, mobile, web, and cloud. See the sections below to get started. TensorFlow provides a collection of workflows to develop and train models using Python or JavaScript, and to easily deploy in the cloud, on-prem, in the browser, or on- device no matter what language you use.

Optical Character Recognition- OCR (optical character recognition) is the use of technology to distinguish handwritten text characters inside digital images of physical documents, such as a scanned paper document. The basic process of OCR involves examining the text of a document and translating the characters into code that can be used for data processing. OCR is sometimes also referred to as text recognition.

- Image Recognition
- Speech API
- Google mobile vision API

Below is the working of the android app:-

- The main screen of the application holds 2 options, OCR and Currency detection.
- The user has to tap on the desired option.
- If OCR is selected another screen pops up that captures the text to be read (Basically the user must place the phone on top the image's text to read) and tap on the screen once the position is set.
- When the screen is tapped, Oran reads out the captured image's text to the user.
- When the second button 'currency' is hit as an outcome of the click a new screen opens that captures the currency that needs to be identified, similar to the OCR the user has to capture the image of the currency and tap on the screen to hear the currency denominations
- The app is pretty simple to use.

It has additional features like dual mode of feedback generation, user has the privilege to switch from one mode to another based on speech recognition, and the user's navigation history is secured too.

IV. FUTURE WORK

The model can fully be operated via voice for better monitoring by the user. As the user has to press the options to carry out the desired tasks, it would become more easy for a visually Impaired to carry out the selection of operation with speech recognition rather pressing the buttons.

Further many other additions could be attached to the app that acts as challenges for the visually impaired

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