Currency Recognition System For Visually Impaired

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ABSTRACT

In this paper we introduced a mobile system for currency recognition that recognizes Indian currency in different view and scale. In this paper, we developed a dataset for Indian currency on an Android Platform. After that we applied automatic mobile recognition system using a smart phone on the dataset using scale-invariant feature transform (SIFT) algorithm. SIFT has been developed to be the most robust and efficient local invariant feature descriptor. Color provides significant information and important values in the object description process and matching tasks. Many objects cannot be classified correctly without their color features. One of the most important problems come up against visual impaired people is currency identification especially for currency note. In this system we introduce a simple currency recognition system applied on Indian banknote.

Keyword: - *Currency recognition, SIFT, Android application, image processing*

1. INTRODUCTION

The ability to identify currency (both coins and bills) without human input is unfavorable for a number of applications. Probably the most important one is assisting visually impaired people. According to GOVERNMENT OF MAHARASHTRA the number of visually disabled persons was found to be higher[1] . About 165 persons per lakh persons were visually disabled. Among them 82 percent were blind and 18 percent had low vision [1]. Recent development of mobile platforms makes the idea of currency recognition with a smart phone an appealing one. In this study we develop a simple approach of template matching with SURF key point detector for Android platform. We are representing an app in which currency is recognized by app and result is sent through audio devices. One of the main problems resist by people with visual impaired is the incapacity to identify the paper currencies due to the approximation of paper texture and size between the different currencies. Hence, the role of this system is to develop a solution to resolve this trouble to make blind people feel safety and determination in the financial approach. There are two types in currency recognition research field; Scanner-based and Camera-based[2]. Scanner-based systems supposed to scan the whole paper. Such systems are suitable for the equipment of currency counters. While camera-based systems except capturing the currency by a camera which may capture a part of the currency[3]. Most related works in documentation assign with the scanner-based type [2-5]. For visual disabled usage, it's assume to enable users to capture any part of the currency by their mobile phone and let the system identify it and notify the currency value. In this paper, camera-based Indian currency is trained to be identified using very simple image processing equipment's what makes the processing time is very short with allowable authority. The present systems have the skill to tend currency captured limitedly and contrast lighting situations.

The algorithm is intended for use by blind and visually impaired subjects walking through city scenes. We first obtain a dataset of currency images taken by blind and normally sighted subjects. From this dataset, we manually label and extract the text regions. Next we perform statistical analysis of the text regions to determine which image features are reliable indicators of text and have low entropy (i.e. Feature response is similar for all text images).We obtain weak classifiers by using joint probabilities for feature responses on and of text. These weak classifiers are used as input to an Ada Boost ma-chine learning algorithm to train a strong classifier. In practice, we trained a cataract with 4 strong classifiers containing 9 features. An adaptive binarization and extension algorithm is applied to those regions selected by the cascade classifier. Commercial OCR software is used to read the text or reject it as a non-text region. The overall algorithm has a success rate of over 90 percent.

2. LITERATURE SURVEY

This system gives an algorithm for detecting and reading text in natural images[4]. There are three main categories of these systems: electronic travel aids (ETAs), electronic orientation aids (EOAs), and position locator devices (PLDs). This system presents a comparative survey among portable/wearable obstacle detection/avoidance systems (a subcategory of ETAs) in an effort to inform the research community and users about the capabilities of these systems and about the progress in assistive technology for visually impaired people. The survey is based on various features and performance parameters of the systems that classify them in categories, giving qualitative- quantitative measures. Finally, it offers a ranking, which will serve only as a reference point and not as a critique on these systems. The current system presents a novel texture-based method for detecting texts in images. A support vector Machine (SVM) is used to analyze the textural properties of texts. No external texture feature extraction module is used, but rather the intensities of the raw pixels that make up the textural pattern are fed directly to the SVM, which works well even in high-dimensional spaces. Next, text regions are identified by applying a continuously adaptive Mean shift algorithm (CAMSHIFT) to the results of the texture analysis. The combination of CAMSHIFT and SVMs produces both robust and ancient text detection, as time-consuming texture analyses for less relevant pixels are restricted, leaving only a small part of the input image to be texture-analyzed. Independent travel is a well-known challenge for blind or visually impaired persons. In this system, we propose a computer vision based indoor way finding system for assisting blind people to independently access unfamiliar buildings. In order to find Different rooms (i.e. an once, a lab, or a bathroom) and other building amenities (i.e. an exit or an elevator), we incorporate door detection with text recognition[5]. First we develop a robust and ancient algorithm to detect doors and elevators based on general geometric shape, by combining edges and corners. The algorithm is generic enough to handle large intra-class variations of the object model among different indoor environments, as well as small inter-class differences between different objects such as doors and elevators. Next, to distinguish an once door from a bathroom door, we extract and recognize the text information associated with the detected objects. We first extract text regions from indoor signs with multiple colors. Then text character localization and layout analysis of text strings are applied to filter out background interference. The extracted text is recognized by using of-the-shelf optical character recognition (OCR) software products. The object type, orientation, and location can be displayed as speech for blind travelers[7]

3. PROPOSED SYSTEM

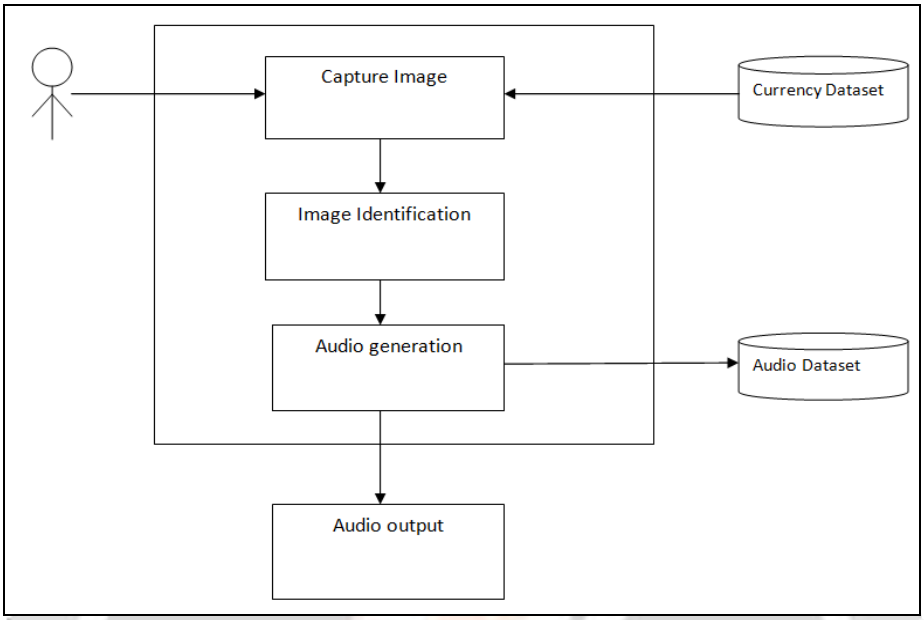

Fig -1. Architecture

3.1 Image retrieval

The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different tasks. Performing image acquisition in image processing is always the first step in the workflow sequence because, without an image, no processing is possible. There are various ways to obtain image such as with the help of camera or scanner. Acquired image should keep all the features.

3.2 Pre-processing

The main goal of the pre-processing to increase the visual appearance of images and improve the impact of datasets. Pre-processing of image are those operations that are normally required earlier to the main data analysis and extraction of information. Image preprocessing, also called image restoration, involves the correction of distortion, degradation, and noise introduced during the imaging process. Image pre-processing can notably increase the accuracy of an optical inspection.
Image Adjusting is done with the help of image interpolation. Interpolation is the technique mostly used for tasks such as zooming, rotating, shrinking etc. Removing the noise is an important step when image processing is being performed. However noise can affect segmentation and pattern matching. When performing smoothing process on a pixel, and neighbor of the pixel is used to do some conversion. After that a new value of the pixel is created.

3.3 Remove background

As illustrated in architecture, the images are captured in a wide variety of environment, in association to lighting condition and background while the currency in the image itself could be damaged.
Image segmentation is important for reducing the data to process and remove unwanted features (background region) that would involve the decision-making. We start with a fixed rectangular region of interest (ROI) which is forty pixels smaller from all four sides than the image itself. We assume that a major part of the currency will be present inside this region. Once this region is obtained, it must be extended to a segmentation of the entire image.For removing the unwanted background here we are use Grab cut algorithm.

3.4 Feature Extraction

Feature extraction is a special type of dimensional reduction. When the input of an algorithm is too large to be processed and it is not needed then the input data will be converted into a reduced representation set of features. Transforming the input data into the set of features is called feature extraction. If the features extracted are carefully selected it is supposed to the features set will extract the related information from the input data to perform the required task using this reduced representation instead of the full size input.

3.5 Match input image with datasets

In order to confirm image similarity, we check whether the keypoints in the test image are in spatial consistency with the retrieved images. We use the popular method of geometric verification (GV) by fitting fundamental matrix (adopted from [16]) to find out the number of keypoints of the test image that are spatially consistent with those of the retrieved images. 5) Classification: In the voting mechanism, each retrieved image adds votes to its image class (type of bill) by the number of spatially consistent keypoints it has (computed in the previous step). The class with the highest vote is declared as the result.

3.6 Audio output generation

The recognized text codes are recorded in script files. Then we employ the text to speech converter to load these files and display the audio output of text information. Blind users can adjust speech rate, volume and language according to their preferences.

4. EXPERIMENTAL RESULT

Android based system is created to detect the currency. For image processing and matching opencv-2.4 framework is used. System is tested on android 4.0 and above versions.
For data set creation 8 images for each type of currency is captured: Four for front side and four for back side.

Fig -2

Here, we capture the image through android mobile which is given as input image as shown in Fig.2 .We've already stored multiple data of images in our dataset and from that dataset. Using SIFT and Grab Cut algorithm the image is recognized from stored dataset. After the matching process, the audio will be generated.

4.1 Performance Evaluation

For performance evaluation, we have tested our system on various data-set sizes. Time required for processing is captured for data-set pre-processing and currency matching **.**

Table -1

Dataset Size	dataset processing time(in Sec)	Matching time(in sec)
14	61.183	30.254
28	113.963	52.742
42	172.542	70.21
56	210.623	92.15

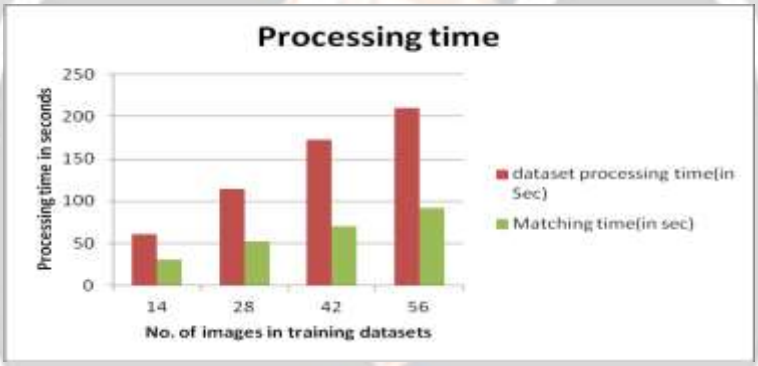

Chart -1: Graphical Representation

5. CONCLUSIONS

In this project, to deal with the common aiming problem for blind users, we have proposed a mobile application for currency recognition that recognizes Indian currency to help blind persons in their daily lives. In this project, we get the output in the form of regional audio. SIFT algorithm has better performance and recall value than existing HOG.SIFT algorithm is relatively efficient as compared to existing algorithm.

This work will be extended as to apply the classification to compare the original or forgery currency.

It is possible to add foreign languages which can be used in world wide. To develop recognition of currency notes on a low end mobile phone for Visually Impaired persons and notify user by voice note in regional language.

In future it can be extended as to recognize foreign currency.

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