SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

KSCST - 46th SERIES OF STUDENT PROJECT PROGRAMME

Project Synopsis on

Medicine names and Currency detection using machine learning for visually impaired people

Project Proposal Reference No: 46S_BE_3103

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Keywords:

Brute Force, currency, g-TTS, k-NN, medicines, OpenCV, ORB algorithm.

Introduction:

Visually impaired people are the ones suffering from vision impairment. Vision impairment means that a person's eyesight cannot be corrected to a normal level. These are the individuals who have partial or total vision loss. Loss of vision is another way of loss of independence. The ability to identify any object without human input is unfavorable for visually challenged people. The number of visually impaired people across the world is huge.

The World Health Organization (WHO) conducted a global survey on visual impairment, the survey estimated that approximately 2.2 billion people worldwide and around 12 million people in India have a vision impairment including blindness and low vision. Problems faced by the visually impaired in performing daily activities are in great numbers. They face countless challenges in reading any printed material, identifying objects, recognizing medicines and currency values, etc.

Currency plays a significant role in our daily lives and real-time detection and analysis are required for the same. Proper medication management is essential, any errors in medication administration can have serious consequences on health. It brings a deep need for an automatic recognition system. Assistive technology is one of the most basic necessary and important systems that helps a person with a disability to work around his challenges. The project presents progressive efforts for developing assistive technology for the visually impaired so that they can lead their life independently both socially and financially. The proposed system assists visually impaired people by providing feedback about the value of Indian currency and the name of medicines for maintaining good health and quality life.

Objectives:

The objective is to help visually challenged patients recognize different types of Indian currencies while their monetary transactions and daily consumable medicine without relying on others. It can be achieved by a detector system with the following training procedure.

- Collection of sufficient input images of Indian currency notes and commonly used medicines, in all possible deviations and angles.
- Usage of proper feature extraction algorithm to detect textual or symbolic information and text-to-speech technology and machine learning techniques with adequate concepts of image processing have a great scope to provide intelligence for designing an automation system.

- Development of a state-of-the-art system for detecting and recognizing currency notes, and medicine names and providing speech output for the same and to thoroughly measure and estimate the system's performance and accuracy. Results and Discussion of the work implementations.

Methodology:

The development of the proposed detector system involves the following methods:

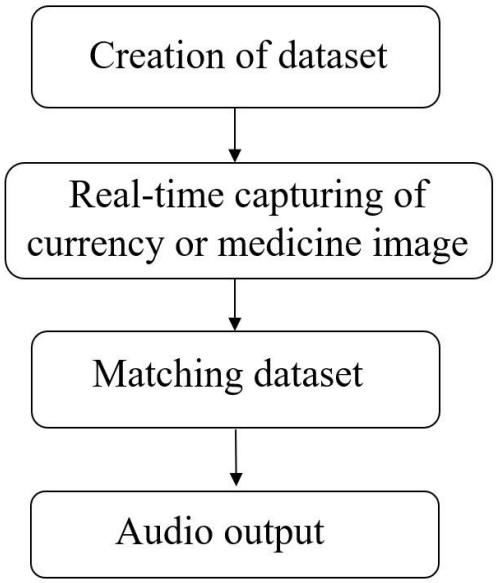

Figure: Steps involved in the proposed system

1) Creation of dataset: The initial and crucial step in designing such a detector system requires the creation of a dataset. The dataset includes all the various Indian currency notes (both new and old notes) and a few commonly used medicines such as flu tablets, anti-biotics, and allergy tablets. The dataset consists of 90 images of currency and 50 images of medicines containing all the required information. The size, shape, characters, orientation, and angle of every currency and medicine image is different.

The dataset allows to train and test machine learning models accurately and efficiently and makes sure that the model is robust and can handle variations in lighting, orientation, and other factors.

2) **Real-time capturing of currency or medicine image:** The user must place the medicine box or currency note positioning to the camera in order to capture the input image. The system then applies various algorithms using image processing on captured images for feature detection and extraction.

3) Matching dataset: In order to confirm image similarity, the system compares the extracted features of the input image with the features of currency notes and medicine packages from the pre-defined dataset. It involves checking whether the key points in the test image are in spatial consistency with the retrieved image with the help of an appropriate algorithm (ex: Brute Force matcher, k-NN matcher). Once the match is found, the output in the form of text is produced.

4) Audio output: The recognized text codes are recorded in script files using appropriate text-to-speech technology to convey the relevant information to the user. For currency notes, the system will convey the denomination value, while for medicines the name will be spelled.

Results:

The input image is captured using a phone camera module and the image is processed through image processing techniques. Using the ORB algorithm, the features present in the input image are detected. The image is then processed using k-NN and Brute Force algorithm for recognizing each class of banknote and medicines. The developed system is successfully able to detect the various Indian currencies of Rs. 10, 20, 50, 100, 200, and 500 and the frequently used medicines such as flu tablets and allergy tablets. The output in the form of speech is produced through speakers.

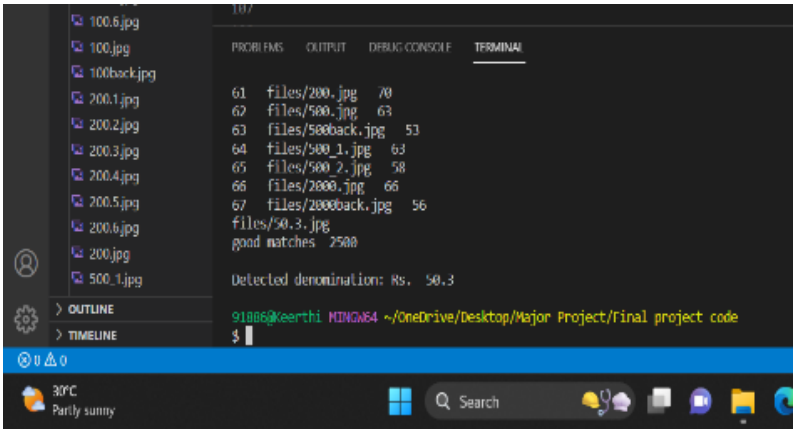

Figure: Currency recognition output

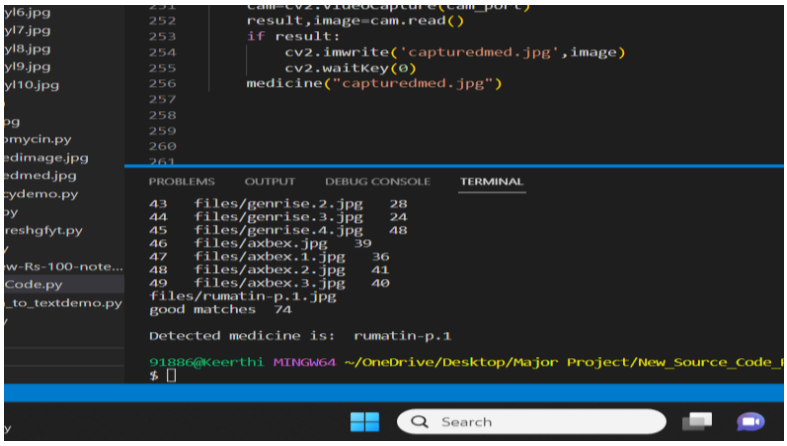

Figure: Medicine recognition output

Conclusion:

To deal with the common aiming problem faced by visually impaired people, the proposed system assists them to manage financial and health-related activities independently. The developed system is a multi-purpose module that can detect and spell the denomination of the Indian currency and medicine names with the help of image processing algorithms developed on the OpenCV platform.

The developed system is successfully able to extract the required features of the currency and medicine i.e., numeric, and textual content. After successful recognition, the text is converted into audio output, and the necessary information is spelled to the user.

Innovation:

The proposed system introduces a ground-breaking innovation by combining currency and medicine detection capabilities into a single system. By harnessing the image processing concepts, and text-to-speech technology, the is aim to create an automation system that can revolutionize the lives of visually challenged individuals.

Traditionally, separate systems have been developed for currency recognition and medicine identification. However, the proposed approach breaks new ground by integrating both functionalities into one cohesive solution.

Through the fusion of intelligent algorithms, extensive image datasets, and advanced speech synthesis, the intention to help visually challenged individuals to confidently navigate their financial and healthcare needs with ease. The pioneering integration of currency and medicine detection represents a significant step forward in enhancing accessibility and autonomy for the visually impaired community.

Future Scope:

- The currency recognition system can be further integrated with counterfeiting applications i.e., fake note detection system.
- The scope can further be expanded to medicine bottles and extract manufacturing and expiry date and provide dosage instructions of the same, thereby enhancing the safety measures in health care.

- Furthermore, using deep learning algorithms, the system can be trained to provide more comprehensive information regarding medicine usage, including what the medicine is used for and any potential side effects or drug interactions, making it even more valuable tool for visually impaired individuals to manage their medication.
- Currently, the system generates the speech output in English, it can be customized to produce voice in other languages which could make it more widely applicable.
- The prototype system can be integrated with any operating system or can be deployed as a mobile application, providing users with greater flexibility and ease of access to the system.