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INDIAN CURRENCY RECOGNITION SYSTEM FOR VISUALLY IMPAIRED PEOPLE USING MACHINE LEARNING

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Abstract:

Visually injured populations frequently face trouble recognizing a theory of services. Indian cash outlines are free in different sizes and colors accompanying touchable kinds that authorize the visibly injured to label various currency outlines, but these touchable creators are overused accompanying habits. Various smart phone-located apps are possible for note labeling, but utilizing a smart phone by an optically injured guy gets troublesome. So, it should design a ploy that supports visibly injured crowds in note labeling.[5] There are few visibly injured populations throughout the whole of the planet. Some ruling classes grant permission to be about us. The visibly injured life finds trouble while operating day-to-day growth tasks. So this research work aims to cultivate a tool that helps the class as a handy person. This paper shows the projected tool's joined modules and 4 functionalities that can help a blind woman. The projected plan is to supply a wearable instrument accompanying a virtual helper arrangement for the optically injured life, for a few of the elementary tasks outside needing the help of the remainder of something. The system is proposed to determine description helpers for blind family commotion tasks like understanding the environment, facing an object, understanding accompanying sentiment, studying, etc.

I. INTRODUCTION

The authorities claimed that all 500 and 1000 INR notes have been demonetized. It was difficult for the blind and 8 visually impaired community to identify the two new series of 500 INR and 2000 INR banknotes that Mahatma Gandhi authorized.because of have nearly similar diameters. The new outlines have a distinctness of just 4 mm, which makes it difficult for women who are following the clearly injured to identify them. Traditional outlines had a distinctness of 10 mm in both breadth and time in each classification.[5]. This services indicator app helps visibly injured subjects to identify and discover services. Using this use blind community can talk and present command to open camcorder of a smartphone and camcorder will click exact DOI: likeness the note and understand the consumer by talk by virtue of what much person engaged in private ownership of business note is. This Android project uses talk to manual change to convert the command likely for one blind patient. Speech Recognition is a

electronics that admits consumers to specify uttered recommendation into the arrangements.

II. LITERATURE SURVEY

Kanchan Patil, Avinash Kharat, PratikChaudhary, Shrikant Bidgar, Rushikesh Gavhane [4]

reviewed prior, projected order is a wearable design. The ploy is principally calm of two parts: The first individual is a tendency along a camcorder, mic, and earphones and the second is a deal with tool that can surely be used or transported in a bag and holds the artillery and the seller. One rope will help to link the bias accompanying deal with instrument.

Rohith Pokala, Varun Teja [3]

Real-time Paper Currency Identification and Audio Output System Development for the Optimally Disputed, thus enabling ruling class to manage it alone, using open-source Raspberry Pi hardware and Python operating system particular new Indian banknotes, recognizing their returned funds throughout their era-to-epoch endeavors.

ShwetaYadav, Mr. Zulfikar Ali Ansari, KaushikiGautam Singh [1]

To resolve the question met by ignorant see the cash utilizing camcorder and scanning in of documents located. Prof Shradha **Nanda,Mahtasham Abbas ,Nitin Momaya ,Kulkarni Abhilash Mahesh [2]**

The projected System uses a deep education model that determines better veracity in acknowledgment Indian Currency and has the facility of deriving more appearance.

Kamal Thakur, Zeeshan Akhtar, Antim Dev Mishra, Monica Chaudhry [5]

outline by way of Arduino Uno that process the news got from the colour sensor, the mp3 piece is triggered and the productivity voice is risked from the store mp3 in accordance with the result got through the Arduino Uno by mp3 piece.

III. METHODOLOGY

1.Data gathering and pre-processing are the initial steps in our approach. Each currency note in the dataset is classified into distinct categories.

2.Training the model by instructing it to create resolutions established the news that has existed, been assembled, and been resolved. During this stage of the process, the dossier is partitioned into unconnected classes by the mark of the class name.

3.Optimizing the model by making use of the judgments taken from the first preparation of the model and therefore experimenting with the model. Modifying the limits of the epochs, learning rate, and batch size at which point the model searches out acquired information accounts for the likelihood of the model's acting being enhanced.

4.When judging the acting of our models, we will take advantage of a range of integrity per class and disorientation forms. These verifications, which are frequently second hand for categorization tasks, determine a sign of the model's veracity and conduct by admitting the consumer to equate it to different related models.

5.After the model has been prepared and civilized, you can use it to form forecasts about the denominations of the various cash outlines. Keep an eye on how well the model acts over occasion, and retrain it if it's necessary to catch the desired level of accuracy.

IV. DEFINITIONS

(1) Pattern-Based Recognition Techniques

Pattern acknowledgment is a dossier study pattern that uses machine intelligence algorithms to inevitably identify patterns and regularities in the dossier. This dossier maybe everything from ideas and representations to sounds or additional determinable kinds. Pattern acknowledgment methods can understand friendly patterns quickly and correctly. Pattern acknowledgment is a derivative of machine intelligence that uses dossier study to acknowledge succeeding patterns and regularities. This dossier may include everything from quotations and representations to sounds or add, determinable statistics. Various cash outline methods can quickly and correctly acknowledge incompletely unseen patterns, even in different objects. Pattern acknowledgment includes classifying and assembling dossier points established by the information derived statistically from past likenesses.

(2) Channel Color-Based Recognition Techniques

A color discovery invention recognizes pixels in a figure that match a particular color or color range. The color of the discovered pixels can therefore be altered to distinguish the ruling class from the rest of the concept. It is established by turning the RGB into number principles. Then, if we are going to label the banner of the countenance, the plan is to break this representation into smaller.

(3) Image Pre-Processing Image retreat is

secondhand for movements on figures at a hostile level of musing. The pre-alter does not increase representation facts content but decreases it if the deterioration is a facts measure. For example, as histogram counterweight, it modifies the shine and contrast of the concept, making it look more clear. The different models search to erase the explosion on the countenance and develop the character of edge discovery (countenance).

(4) Edge Detection

The extent of feature discovery and distillation uses a fundamental finish of representation conversion, which is edge discovery. The aim of it is to search out and recognize points in mathematical countenance at which the representation shines, changes piercingly. It indicates a sharp change in the color of the representations. It recognizes the object barriers of a concept. These algorithms contain Sobel, Prewitt, Roberts, and Canny. The Canny pattern is stronger because it can discover real feeble edges, it has reduced the wrong rate, and edge points are well local and give a singular reaction to a sole edge. So, initially, the figure conceded the possibility of evolving into a twofold countenance, and therefore edge discovery must be acted upon at which point countenance utilizing the Canny edge discovery method to discover forceful and feeble edges.

(5)Segmentation

Segmentation is one of the main parts of the countenance dossier. It aims to separate a concept into parts that have a powerful equivalence with accompanying objects.

(6) Brute Force Classification

The matching process involves comparing the descriptor of a particular feature in the first set with all the other features in the second set. This is done by calculating the distance between them, and the closest match is identified as the most similar one. When comparing two images, the hamming distance is calculated using their descriptors, and the point with the lowest hamming distance is returned. The provided information includes the mapping of key points to their respective descriptors.

V. PROBLEM STATEMENT

Post-demonetization, the size the currency of India outline has intensely altered. For instance,The recently introduced denominations of Rs. 100 and Rs. 200 have been released into circulation.outline comparable material ranges. Though the color of Such notes are very divergent; this difference is beneficial only to those with sanctified accompanying vision. The community of the visibly questioned in India is an overwhelming.This nation has a hardship labeling these new outlines. This aims to take responsibility for a few of their questions utilizing functional electronics.

VI. PROJECT GOALS

The main goal of the Indian currency recognition system recognize the Indian paper currency and obtain the output is to in the form of voice for the blind and impaired people.

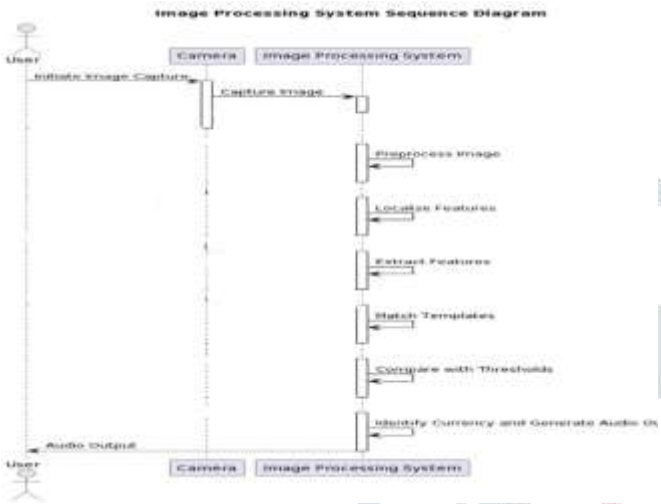
VII. APPLICATIONS

The Application of the Indian

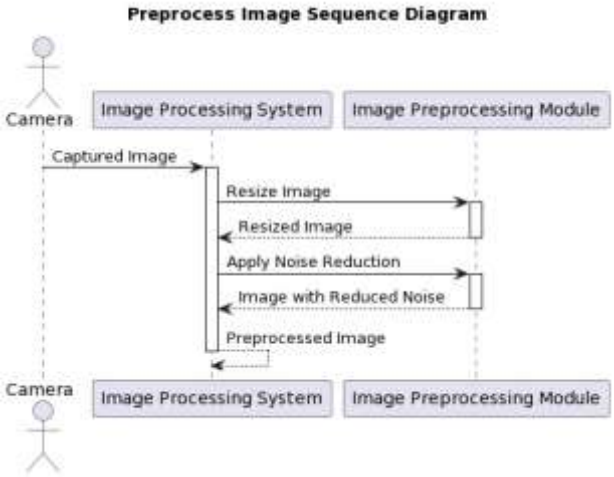
- The main objective currency recognition system are: of cash acknowledgment order search out help optically injured crowd to label the bills advantage by way of countenance handle methods.
- Currency discovery for blind family is that occupying some constituent bills paper in some management, streamline the method of feature ancestry and corresponding.
- By utilizing mathematical representation prepare, reasoning of Currency countenance is more correct in addition to this design is effective in conditions of cost and opportunity absorbing distinguished to existent methods.

• The system should that are likely be flexible towards a to be captured by the wide variety of images target user.

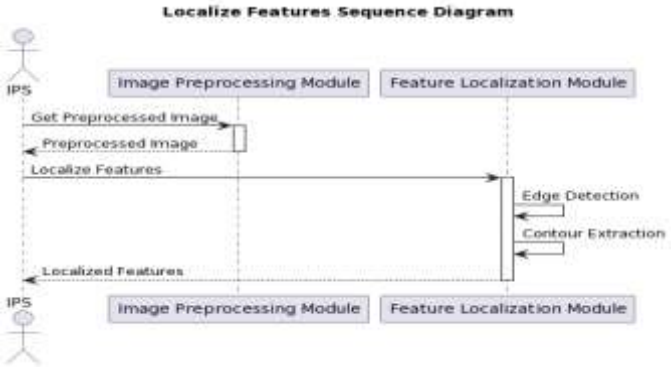
VIII. HIGH LEVEL DESIGN



User -> Camera: Initiate Image Capture The user interacts with the system to start capturing an image using the camera.
Camera -> IPS: Capture Image The camera component sends the captured image to the Image Processing System (IPS) for further processing.
Camera --> User: Image Ready The camera notifies the user that the image capture process is complete, and the image is ready for processing.
User -> IPS: Request Image Preprocessing The user requests the IPS to preprocess the captured image to enhance its quality or remove any unwanted elements.
IPS -> IPS: Preprocess Image The IPS performs image preprocessing tasks such as resizing, noise removal, or color adjustments to prepare the image for analysis.
User -> IPS: Request Image Localization The user asks the IPS to identify and localize specific features or regions of interest within the image.
IPS -> IPS: Localize Features The IPS analyzes the image to identify and locate specific features or regions of interest, such as currency notes within the image.
User -> IPS: Request Feature Extraction The user requests the IPS to extract relevant features or characteristics from the localized regions within the image.
IPS -> IPS: Extract Features The IPS analyzes the localized regions to extract important features or characteristics, such as texture patterns or edge information.
User -> IPS: Request Template Matching The user asks the IPS to compare the extracted features with predefined templates to identify matches.
IPS -> IPS: Match Templates The IPS compares the extracted features with predefined templates to identify similarities or matches.
User -> IPS: Request Comparison with Threshold Values The user requests the IPS to compare the matched templates or features with predefined threshold values to determine their significance or validity.
IPS -> IPS: Compare with Thresholds The IPS compares the matched templates or features with predefined threshold values to determine their level of significance or similarity.
User -> IPS: Request Identification and Audio Output The user asks the IPS to identify the recognized objects or patterns and provide audio output for accessibility purposes.
IPS -> IPS: Identify Currency and Generate Audio Output The IPS identifies the recognized currency notes or objects and generates audio output, such as spoken descriptions or denominations, for the user.

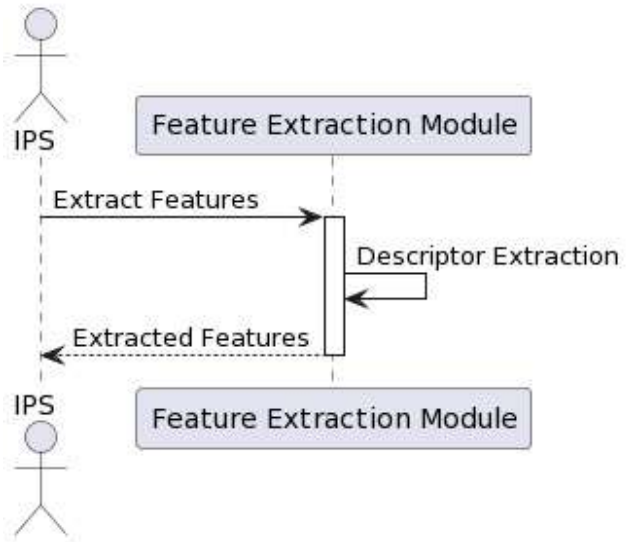


Camera -> IPS: Capture Image The camera component sends the captured image to the Image Processing System (IPS) for further processing.



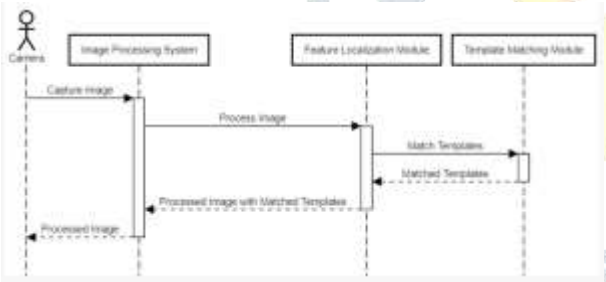
User -> IPS: Request Image Localization The user asks the IPS to identify and localize specific features or regions of interest within the image.

Extract Features Sequence Diagram



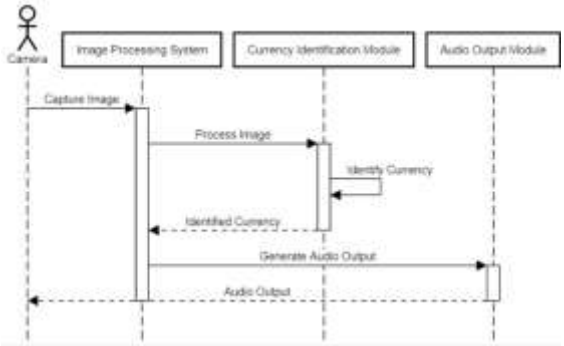
User -> IPS: Request Feature Extraction The user requests the IPS to extract relevant features or characteristics from the localized regions within the image.

Template matching Sequence Diagram



User -> IPS: Request Template Matching The user asks the IPS to compare the extracted features with predefined templates to identify matches.
IPS -> IPS: Match Templates The IPS compares the extracted features with predefined templates to identify similarities or matches.

Currency Identification and Audio output



IPS -> IPS: Compare with Thresholds The IPS compares the matched templates or features with predefined threshold values to determine their level of significance or similarity.
User -> IPS: Request Identification and Audio Output The user asks the IPS to identify the recognized objects or patterns and provide audio output for accessibility purposes.
IPS -> IPS: Identify Currency and Generate Audio Output The IPS identifies the recognized currency notes or objects and generates audio output, such as spoken descriptions or denominations, for the user.

IX. RESULTS

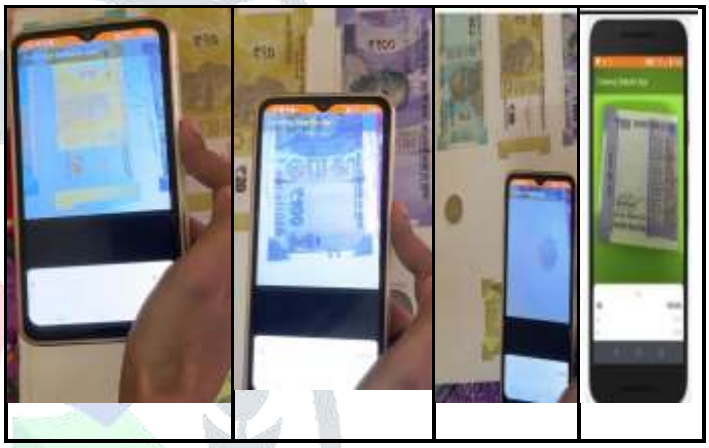


Figure 1: Snapshot of the output

1.Opening the App: When you open the app, it initializes the camera functionality to capture images.

2.Camera Input: The app uses the device's camera to capture an image of the currency.

3.Image Processing: The captured image is processed using image recognition algorithms. These algorithms identify key features of the currency note, such as serial number, color.

4.Currency Identification: Based on the processed image, the app identifies the currency value. For example Rs.100, Rs.200, Rs.500

5.Audio Output: Once the currency is identified, the app converts this information into audio output. It may use text- to-speech technology to announce the currency value.

X. CONCLUSION

The Indian Currency Recognition System using Machine Learning not only addresses a critical need for the visually impaired community but also showcases the immense potential of technology to create inclusive solutions that significantly improve

quality of life. The Indian currency recognition System with audio output is a significant advancement in accessibility technology, The machine learning algorithms ensures continuous improvement in recognition accuracy and usability, making the app increasingly reliable and user-friendly over time. 10 The Indian currency recognition app with audio output is a transformative tool that not only 4 facilitates financial independence but also fosters inclusivity and empowerment for individuals with visual impairments in the digital age.This app empowers users to independently identify and distinguish various denominations of Indian currency, promoting financial inclusivity and autonomy.

XI. FUTURE ENHANCEMENT

The Currency Recognition System can implement to recognize multiple currencies from different countries.

- Use Natural Language Processing to support multiple languages, allowing users to get the output in their native language
- This system 5 can be implemented for recognizing coins to a currency recognition app for visually impaired people.

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