A MAJOR PROJECT REPORT
ON

Currency Detector App for Visually impaired Android Application

Submitted in partial fulfillment of the requirement
for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

by

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DECLARATION

We, **N.Rajesh, N.Ram Shankar, P.Vamshi,** bearing hall ticket numbers **(20P61A05E8, 20P61A05F0, 20P61A05H1)** here by declare that the major project report entitled "**Currency Detector App for Visually impaired Android Application**" under the guidance of **Mr.D.Srinivas Goud,** Assistant Professor,Department of Computer Science and Engineering, **Vignana Bharathi Institute of Technology**, **Hyderabad,** have submitted to Jawaharlal Nehru Technological University Hyderabad, Kukatpally, in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in Computer Science and Engineering.

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OF

COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the major project titled ***"Currency Detector App for Visually Impared Android Application"*** *Submitted by* ***N.Rajesh(20p61A05E8), N.Ram Shankar(20P61A05F0) , P.Vamshi(20P61A05H1)*** *in B.tech IV-II semester Computer Science and Engineering is a record of the bonafide work carried out by them.*

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ABSTRACT

The currency detector app is a software application that uses a smartphone's camera to identify and recognize different types of currency notes. For visually impaired people, this app can be particularly useful in enabling them to independently handle money transactions without needing the help of others.

The main problem faced by people with visual disabilities is the inability to recognize paper currencies due to the similarity of paper texture and size between the different categories. These people face a lot of difficulty in their monetary transactions. This application can help the visually impaired recognize money.

In this application, blind people can speak and give a command to open the camera and the camera will click the picture of the note and tell the user by speech medium how much rupee note it is. This system uses speech-to-text to convert command given by blind people, Speech recognition is the interdisciplinary subfield of computational linguistics that develops methodologies and technologies that enables the recognition and translation of spoken language into text.

For the result purpose, this system has text to speech concept which helps to read the value of notes and then converts the text value into speech. Android allows converting your text into voice as an output.

Keywords: currency recognition, image processing, currency verification.

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DM-1: Provide a rigorous theoretical and practical framework across ***State-of-the-art*** infrastructure with an emphasis on ***software development***.

DM-2: Impact the skills necessary to amplify the pedagogy to grow technically and to meet ***interdisciplinary needs*** with collaborations.

DM-3: Inculcate the habit of attaining the professional knowledge, firm ethical values, ***innovative research*** abilities and societal needs.

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PEO-02: Professional Employment: Succeed at entry- level engineering positions in the software industries and government agencies.

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PSO-02: Ability to apply different algorithms indifferent domains to create innovative products.

PSO-03: Ability to gain knowledge to work on various platforms to develop useful and secured applications to the society.

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PO-04: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-05: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

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PO-07: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-08: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-09: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11: Project management and finance: Demonstrate knowledge and understandingof the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Life-long learning: Recognize the need for, and have the preparation and abilityto engage in independent and life-long learning in the broadest context of technological change.

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CHAPTER -1

INTRODUCTION

1. INTRODUCTION

A currency detector app is a software application that can be used to identify and recognize different types of currency notes using a smartphone's camera. It is particularly helpful for blind or visually impaired individuals who may have difficulty identifying the denominations of currency notes through touch alone.

The app works by scanning the currency note using the smartphone camera and analysing the image to determine the denomination of the note. It then communicates this information to the user through voice feedback. This enables the user to independently handle money transactions without needing the help of others.

World Health Organization estimated the number of visually impaired at the global level, based on the latest studies, that there are about 285 million people who suffer from visual impairment worldwide, of whom 246 million people have a visual impairment and39 million people are totally blind. It is also estimated that the Eastern Mediterranean Region constitute 12.6% of the proportion of blindness in the world but needs assistance from others.

Due to the similarities in paper texture and size between the various categories, one of the biggest issues for those with visual impairments is their inability to distinguish paper money. Therefore, our currency detector app job is to create a solution to this dilemma so that blind people can feel secure and confident in their financial interactions.

Overall, a currency detector app can be a valuable tool for individuals with visual impairments who wish to independently handle money transactions. It is an innovative and practical solution that can improve their quality of life and empower them to be more self-sufficient.

1.1 Problem Statement

Visually impaired individuals face difficulties in distinguishing different types of currency notes, which makes it challenging for them to carry out financial transactions independently. This problem can cause inconvenience, delay, and even potential financial loss. Therefore,there is a need for a device or system that can detect and identify different types of currency notes accurately and provide audio or tactile feedback to visually impaired individuals. The currency detector should be portable, user-friendly, and cost-effective to enable independent financial transactions and enhance the quality of life of visually impaired individuals.

1.2 Scope

A currency detector app has a wide scope, as it provides users with a convenient and efficient way to identify and authenticate different currencies. It can be used by travellers, businesses, and individuals involved in monitorial transactions to quickly determine the value and legitimacy of banknotes. The app can recognize various currencies in Indiandenominations, including rare or less commonly encountered ones, ensuring broad applicability. Additionally, it can offer security features to protect against counterfeit money, making it an essential tool for anyone dealing with cash transactions on a global scale.

CHAPTER -2

LITERATURE SURVEY

2. LITERATURE SURVEY

2.1 Case Study 1:- Currency detector for Blind people

Despite the rapid growth of Master cards and other electronic forms of payment, money is still widely used for everyday transactions due to its convenience. Visually handicapped people, on the other hand, may have difficulty distinguishing between different currency papers. Currency Recognition Systems (CRS) can aid blind and visually impaired people whohave difficulty with financial transactions. A Currency Recognition System based on the ORB (Oriented FAST and Rotated BRIEF) and YoloV3 algorithms is proposed in this paper. The proposed approach is used with Indian paper currencies, which include six different types of cash. We will design a system to detect cash for Indian notes in the suggested work.

To begin, take the input of the supplied image and pre-process it, then transform the RGB image to a grayscale image. Apply a Sobel algorithm for the extraction of the image's inner and outer edges after pre-processing. The YOLO V3 technique will be used to cluster thedata. It does this by grouping features one by one. The YOLO V3 method was then used to classify the input image as 200, 500, or 2000 by comparing the attributes of the image and classifying it as 200, 500, 2000, or not.

One of the fundamental issues opposed by individuals with visual weakness is the inadequacy to distinguish the paper monetary standards because of the guess of paper surface and size between the various monetary forms. Subsequently, the job of this framework is to foster an answer for resolve this difficulty to cause dazzle individuals to have a sense of security and decided in the monetary methodology.

There are two sorts in the money acknowledgment research field; Scanner-based and Camera-based. Scanner- based frameworks expected to examine the entire paper. Such frameworks are appropriate for the gear of money counters. While camera-based frameworks with the exception of catching the cash by a camera that may catch a piece of the money. Most related works in documentation dole out with the scanner-based sort For outwardly incapacitated use, it's accepted to empower clients to catch any piece of the money by their PC and let the framework recognize it and advise the cash esteem.

camera based Indian money is prepared to be recognized utilizing extremely straightforward picture handling hardware's which makes the preparing time is exceptionally short with suitable position. The current frameworks have the ability to tend money caught limitedly and contrast lighting circumstances.

In this project, we offer a mobile application for money identification that recognizes Indian cash to assist blind people in their daily life, in order to address the typical aiming difficulty for blind users. The output of this project is in the form of regional audio. The yoloV3 algorithm performs better and has a higher recall value.

This work will be expanded to include the application of the categorization to compare authentic and counterfeit cash. Foreign languages that can be utilized all around the world can be added. To build cash note identification on a low-end mobile phone for visually impaired people, and to notify them via a voice note in their native language. In future, it can be extended to recognize foreign currency.

2.2 Case Study-2

Indian currency recognition for visually impaired people

The assistive innovation is perhaps the most essential and significant framework that assists an individual with an incapacity to work around his difficulties. This paper presents reformist endeavours for fostering an assistive innovation for outwardly hindered. The framework is separated into two sections, an initial segment is the determination part which will either choose shading or cash as indicated by the client's wish and the subsequent part is route part.

The choice module will help them in shading recognizable proof of different article around the client and cash division acknowledgement for making instalments lastly aural yield is created as normal language by utilizing the best highlighted RPI camera to catch the money, this handling being done in MATLAB.

The route part is utilized for hindrance location, to assist them with liberating route by giving the aural guidance utilizing text to discourse converter module. The note division can be handily recognized by the outwardly disabled people utilizing the braille script that has been forced into the new money Indian notes. Along these lines, we consider this manual confirmation as the primary approval and the subsequent approval will be tried dependent on the HSV upsides of the security string.

The innovative turn of events and explores have been working on in our day-by-day life, the human PC collaboration has been turning into the should source in our regular daily existence. These advances will help the outwardly impeded to participate in a portion of their social exercises. Thus, to blend in with the environmental factors and society and furthermore to be free in doing their every day schedule exercises, this undertaking has been started as a decent beginning for the visually impaired individuals.

In this way, there ought to be an assistive gadget for the outwardly debilitated individuals which would permit the visually impaired individuals to effectively explore or utilize the functionalities of the gadget to blend with others in the general public. Presently a day, we know that the vast majority of individuals who are outwardly debilitated are subject to different people and can't remain free. As of now, in other to give an autonomous life to the visually impaired individuals many explorers have been appeared.

One among them is the cash note acknowledgment gadget. Secure stroll with no delay and without assistance from the human inside the metropolitan climate is totally inconvenient to embrace for the visually impaired and outwardly hindered person.

The principle's major objective is to give support no sweat or help them monetarily which will allow them to investigate themselves autonomously or unreservedly into the climate. This undertaking is fundamentally focused on the space of "Picture Preparing" utilizing MATLAB and Raspberry Pi. This task is generally an equipment-based undertaking that utilizes the MATLAB programming.

This venture empowers an outwardly weakened individual know in approving themoney note to recognize whether the cash is unique or phony. My MATLAB method whensent in Raspberry Pi with a scanner or a camera so it will catch the cash note and play out the picture handling procedures forced in the undertaking by separating whether the money is unique or phony dependent on the boundaries of HSV upsides of the money note which in frontenables to a disabled individual in identifying it.

This task can additionally be reached out to shape a credulous gadget utilizing Raspberry Pi and Simulink by making a model and infusing it into the raspberry pi. The all- inclusive form can likewise incorporate culmination of the discourse amalgamation capacity from the innocent raspberry pi gadget that can be gone about as a versatile gadget completed bythe outwardly hindered people with most extreme adaptable way.

2.3 Case Study-3

Indian currency recognition for blind people

Visually handicapped people have a difficult time distinguishing between different cash denominations. Even though unique symbols are engraved on different denominations in India, the work is still difficult for blind individuals. The shortage of identification devices prompted the development of a handheld gadget for denominational separation. In this project, image features are compared to all of the currency's reference photos, and if the difference is more than a certain threshold, the numeric part of the currency is extracted and compared, and if they match, the matching money denomination is recognized. Indian money denominations such as the 50, 100, 500, 2000, 20, and 10 are accepted.

The sizes of Indian currency notes have altered dramatically since demonetization. The newRs.100 and Rs.200, for example, have comparable physical dimensions. Despite the fact that the colour of such notes is extremely different, this difference is only advantageous to individuals who have good eyesight. The number of visually impaired people in India is staggering: 36 million. These people are having trouble recognizing the new notes (even the Braille and small dots and holes on these notes seem to fade away with prolonged usage). Using assistive technology, this project tries to alleviate some of their challenges.

With the aid of a basic image processing technique, the constructed model determines the denomination of Indian cash. The produced product is a Multi-Purpose Module that may be used in Real-Time Applications such as vending machine automation, automatic ticket counters, and so on. This module can be expanded to include the detection of counterfeit currency. This necessitates the addition of a few extra pre-processing processes as well as a little hardware adjustment to integrate UV light.

Furthermore, due to the reflecting nature of the material, the existing technology has a low accuracy for recognizing coins. To avoid this problem in the future, a suitable lighting source such as UV can be employed.

2.4 IMAGE CLASSIFICATION

1. Image classification is a fundamental component of a currency detector app. It involves analyzing images of currency to identify the denomination of the currency. Ina currency detector app, image classification can be achieved using machine learning algorithms such as convolutional neural networks (CNNs).

2. The first step in image classification is to pre-process the images to make them suitable for analysis. This involves resizing the images to a standardized size, normalizing the pixel values, and applying various filters such as noise reduction filters and contrast enhancement filters.

3. Next, the pre-processed images are fed into a CNN, which consists of multiple layers of neurons. The input layer takes in the preprocessed image, and the subsequent layers perform a series of convolutions and pooling operations to extract features from the image.

4. To train the CNN, a dataset of labelled images is required. The dataset should include a representative sample of images for each currency denomination. The labelled images are then used to train the CNN by adjusting the weights of the neurons in the network using a backpropagation algorithm. The goal of the training process is to minimize the error between the predicted output and the actual output for each image.

5. Once the CNN is trained, it can be used to classify new images of currency. The process involves feeding the new image into the CNN, which outputs a probability distribution over the possible currency denominations. The denomination with the highest probability is then selected as the predicted denomination for the input image.

6. In a currency detector app, image classification using CNNs can be used to accurately and quickly identify the denomination of various types of currency. However, the accuracy of the classification depends on the quality of the training dataset, the architecture of the CNN, and the pre-processing techniques used.

2.5 Teachable machine learning

Teachable Machine is a browser-based platform that provides a simple way to train machine learning models for image classification, object detection, and sound classification. With its intuitive user interface and powerful pre-built models, Teachable Machine allows developers to create custom machine-learning models for a wide range of applications, including currency detection.

In the context of a currency detector project, image classification using Teachable Machine can be used to identify and classify different denominations of currency. Here are the steps involved in creating an image classification model using Teachable Machine for a currency detector project:

1. Collect Data: The first step in creating an image classification model is to collect a dataset of images. In the case of a currency detector, this dataset would consist of images of different denominations of currency. Ideally, the images should be of high quality and show the currency in various orientations and lighting conditions.

2. Upload Data to Teachable Machine: Once the dataset has been collected, it can be uploaded to Teachable Machine using the platform's image classification tool. The images can be organized into different categories, such as $1 bills, $5 bills, $10 bills, etc.

3. Train the Model: After the dataset has been uploaded and organized, the machine learning model can be trained. Teachable Machine uses a deep learning model called MobileNetV2 as its default image classifier. During training, the platform analyzes the images in the dataset and identifies features that are common to each category of currency.

4. Test the Model: Once the model has been trained, it can be tested using a set of validation images. The validation images should be different from the training images to ensure that the model can generalize to new data. Teachable Machine provides a handy tool for testing the model's accuracy and making adjustments to improve its performance.

5. Integrate the Model: Finally, the trained machine learning model can be integrated into the currency detector app. The app can use the model to analyze images of currencycaptured by the device's camera and provide an accurate identification of the denomination.

Overall, image classification using Teachable Machine is a powerful and accessible tool for creating custom machine learning models for a currency detector project. With itsintuitive interface and powerful pre-built models, Teachable Machine makes it easy to train and test a machine learning model for currency recognition.

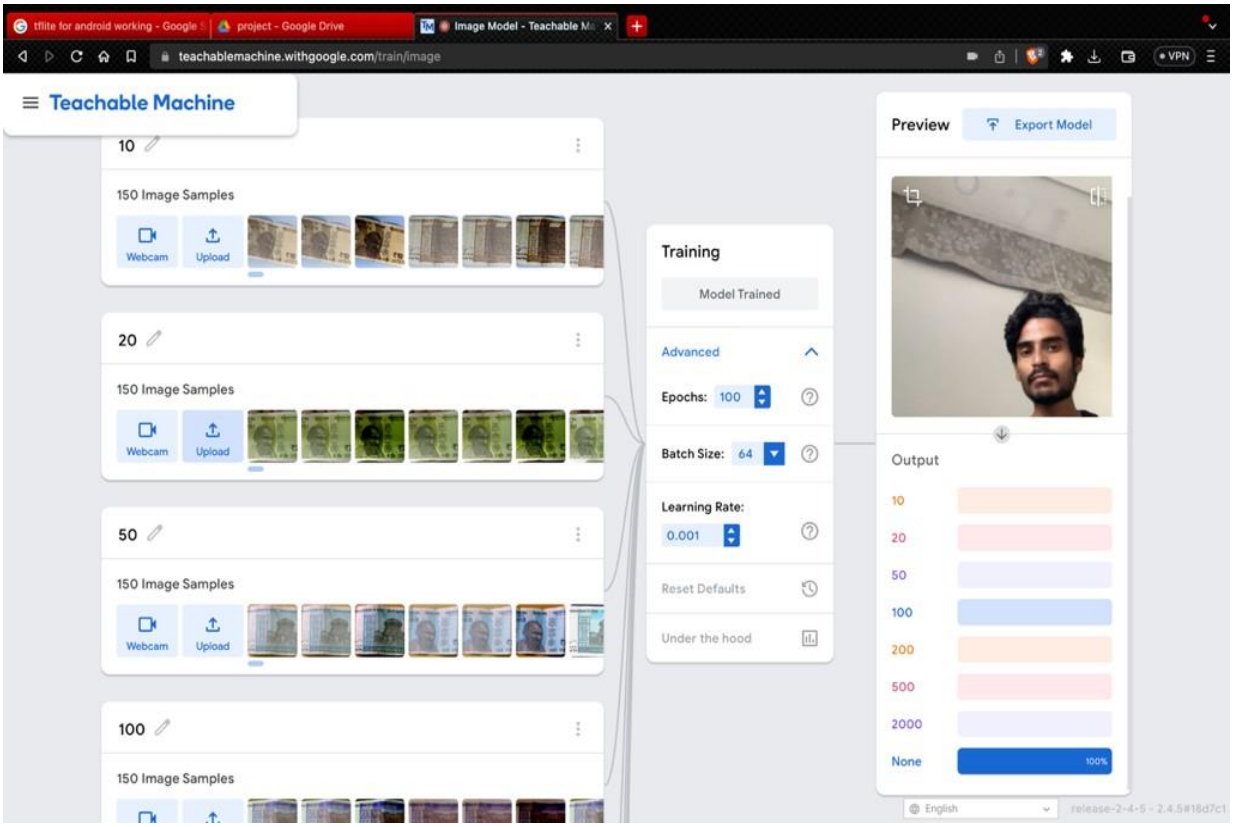


Figure 2.5.1: Screenshot of Teachable machine giving result as none.

NONE: When no currency is detected app shows the output as none

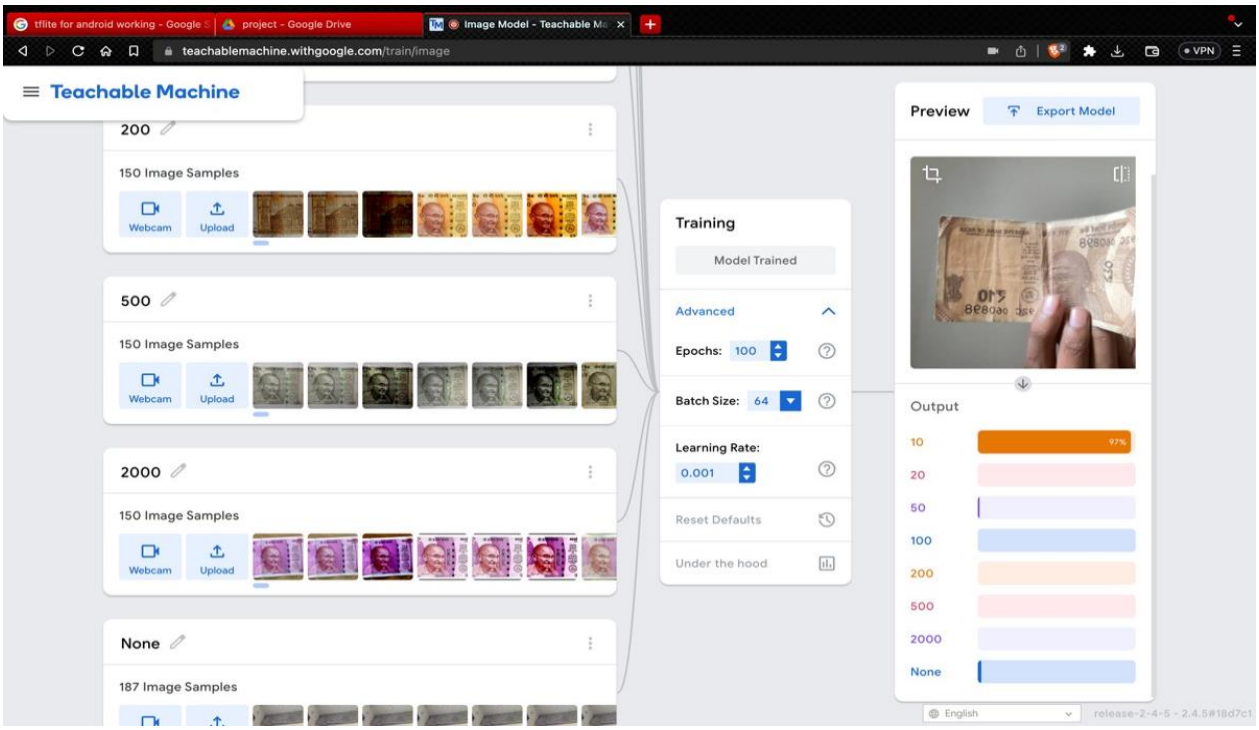


Figure 2.5.2: Screenshot of Teachable machine detecting 10 rupees note.

10: when user shows 10 rupees denomination it shows the output as 10.

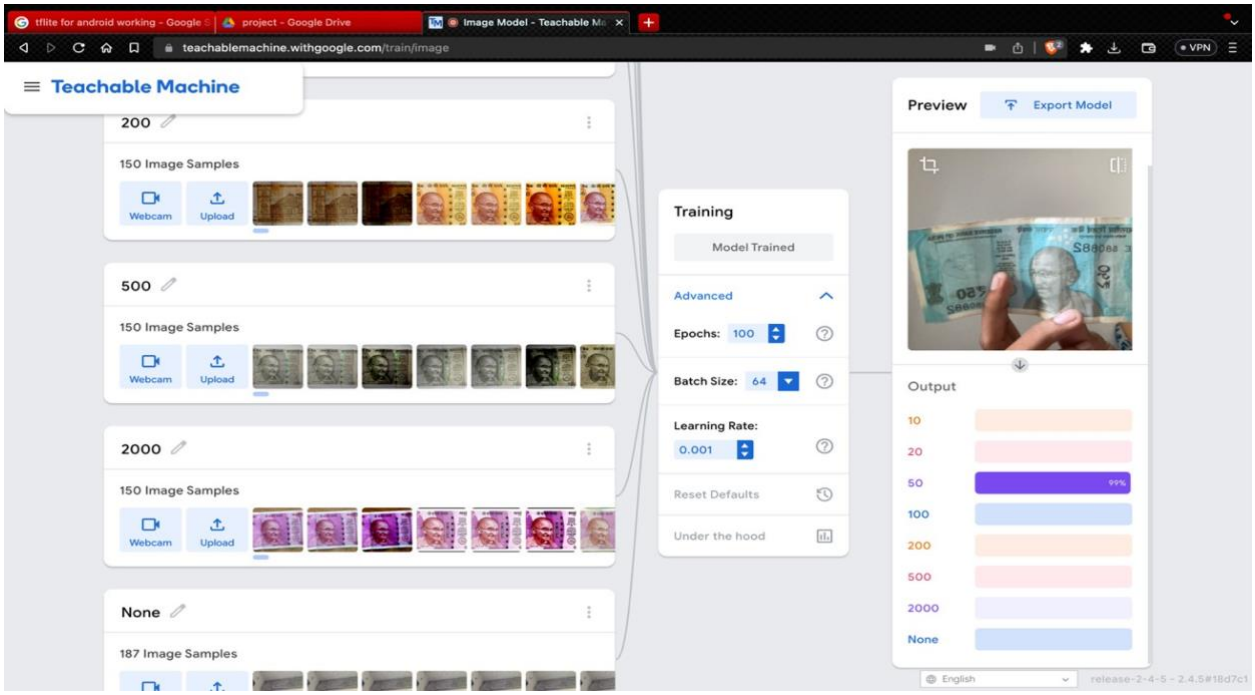


Figure 2.5.3: Screenshot of Teachable machine detecting 50 rupees note.

50: when user shows 50 rupees denomination it shows the output as 50.

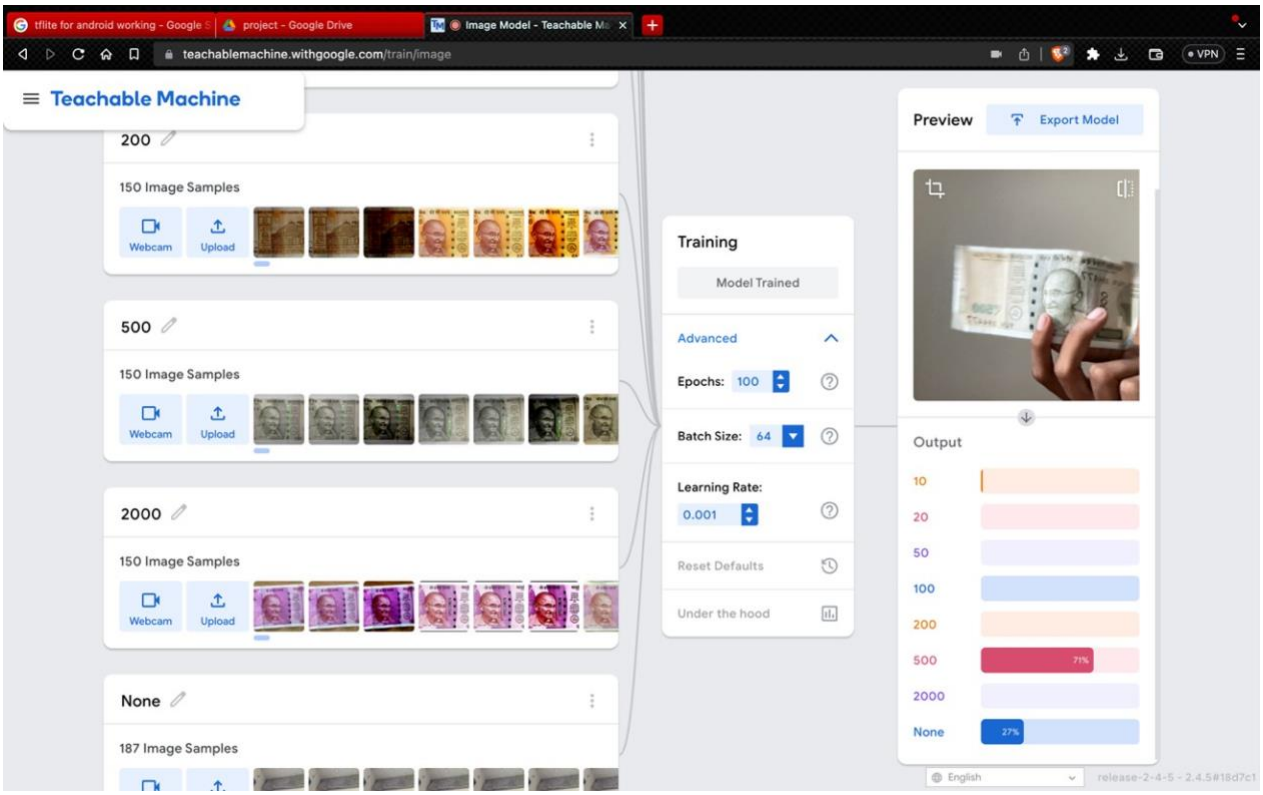


Figure 2.5.4: Screenshot of Teachable machine detecting 500 rupees note.

500: when user shows 500 rupees denomination it shows the output as 500.

2.6 TensorFlow.js

TensorFlow.js is a popular library for training and deploying machine learning models in web applications. In the context of a currency detector app, TensorFlow.js can be used to recognize different currencies based on images of banknotes.

Here's how TensorFlow.js might be used in a currency detector app:

1. **Collect and pre-process training data:** The first step in building a currency detector app is to collect a large dataset of labelled images of banknotes. These images should be pre-processed and transformed into a format that can be used for training a machine-learning model.

2. **Train a machine learning model:** Once the training data is prepared, the next step is to train a machine learning model using TensorFlow.js. The model can be trained to recognize different currencies based on features such as color, texture, and patterns.

3. **Deploy the model in a web app:** Once the model is trained, it can be deployed in a web app using TensorFlow.js. The app can use the model to recognize the currency based on a user-uploaded image.

4. **User interface and experience:** The user interface and experience are crucial in any web app. The currency detector app should have a simple and intuitive interface that allows the user to upload an image and get the result of the recognition process.

5. **Continuous learning**: To improve the accuracy of the model, it's important to continue to collect data and retrain the model periodically. This can be done using a process called "continuous learning."

In summary, TensorFlow.js is a powerful tool for building machine learning models for web applications. In the context of a currency detector app, TensorFlow.js can be used to recognize different currencies based on images of banknotes.

2.6.1 TF Lite (TensorFlow Lite)

TF Lite (TensorFlow Lite) is a popular open-source deep-learning framework designed for mobile and embedded devices. It is used to deploy machine learning models on Android and iOS devices, allowing developers to create intelligent apps that run locally on the device, without requiring a network connection.

To use TF Lite in a currency detector app, you would first need to train a deep learning model using a dataset of currency images. This model would be designed to detect and classify different types of currencies based on their visual features, such as color, texture, and shape.

Once you have trained your model, you would then need to convert it to the TFLite format using the TF Lite Converter tool. This would optimize the model for mobile devices and reduce its size, making it easier to deploy on a currency detector app.

In our currency detector app, you would use the TF Lite Interpreter API to load the converted model and make predictions on currency images captured by the user. This would involve preprocessing the images, such as resizing and normalization, before passing them through the model and getting a prediction of the detected currency type.

The TF Lite Interpreter API provides efficient inference on mobile devices, allowing you to detect currencies in real-time, even without an internet connection. With TF Lite, you can create a powerful and accurate currency detector app that runs locally on the user's device, making it easy and convenient to use.

2.6.2 TF Lite quantized model

A TF Lite quantized model is a type of model that has been optimized for deployment on mobile devices with limited computational resources. It achieves this by using lower precision data types to represent model weights and activations, resulting in a smaller model size and faster inference times.

A currency detector app is an application that can recognize different types of currencies from an image captured by a mobile device's camera. To use a TF Lite quantized model in a currency detector app, the following steps can be taken:

1. Develop and train a deep learning model using TensorFlow.
2. Convert the trained model to a TF Lite quantized format using the TF Lite converter.
3. Integrate the TF Lite model into the currency detector app, either by incorporating it into the app code directly or by packaging it with the app.
4. Capture an image of the currency using the mobile device's camera and pass the image to the TF Lite model for inference.
5. The TF Lite model will process the image and output a prediction of the currency type.
6. The app can then display the predicted currency type to the user.

It's important to note that the accuracy of the currency detection will depend on the quality of the TF Lite model and the training data used to create it. Additionally, the app may need to handle various image pre-processing steps, such as resizing or normalization, toensure the input to the model is suitable for inference.

2.6.3 TF Lite floating model

The TF Lite floating model is a machine-learning model format that is optimized for running on mobile and embedded devices. In the context of a currency detector app, this model can be used to detect the currency denomination from an image captured by the user.

To use the TF Lite floating model in a currency detector app, the app would typically follow these steps:

1. Image capture: The app would use the device's camera to capture an image of the currency note.

2. Pre-processing: The captured image would be pre-processed to prepare it for input to the TF Lite model. This might involve resizing the image to a fixed size, converting it tograyscale or RGB, and applying any necessary image enhancements such as contrast adjustment or noise reduction.

3. Model loading: The TF Lite floating model would be loaded into memory. This model would have been trained on a dataset of currency images, and would have learned to identify the denomination of a currency note from its features.

4. Inference: The loaded model would be used to perform inference on the preprocessed image. The app would feed the image into the model as input, and the model would output a probability distribution over the possible currency denominations.

5. Postprocessing: The probability distribution output by the model would be postprocessed to obtain a final prediction of the currency denomination. This might involve selecting the denomination with the highest probability, or applying additional heuristics or rules to refine the prediction.

6. User feedback: The app would display the predicted currency denomination to the user, along with any additional information or feedback that is relevant, such as confidence score or instructions for how to improve the image if the prediction was inaccurate.

2.7 Android Studio

Android Studio is an Integrated Development Environment (IDE) used for developing Android applications. It is the official IDE for Android app development, provided by,it is based on the IntelliJ IDEA, which is a popular Java IDE. It offers a rich set of tools and features that enable developers to create high-quality, feature-rich, and visually appealing Android application

To build a currency detector app in Android Studio, you would typically follow these steps:

1. Create a new Android Studio project: Open Android Studio and create a new project. Choose a name and a package name for your app.

2. Set up the user interface: Use the layout editor in Android Studio to create the user interface for your app. You can use various widgets, such as Text Views, Buttons, and Image Views, to display the currency information and images.

3. Set up the camera: To detect the currency, you need to access the camera on the user's device. Use the CameraX library, which is part of Android Jetpack, to set up the camera in your app.

4. Implement the currency detection logic: You can use various machine learning libraries and APIs to detect the currency from the camera feed. One popular option is Google's ML Kit, which provides pre-trained models for object detection and text recognition.

5. Display the detected currency: Once you have detected the currency, you can display the corresponding information and image on the user interface. You can use APIs like Open Exchange Rates or Fixer.io to get the latest currency conversion rates.

6. Test and deploy: Finally, test your app thoroughly to ensure it works as expected, and deploy it to the Google Play Store or other app stores.

2.8 Java

Java is one of the primary programming languages used in Android Studio to develop Android applications, including currency detector apps. Here are some of the ways in which Java can be used in the development of a currency detector app in Android Studio:

1. User Interface: Java is used to design the user interface of the app. Android Studio provides various tools and frameworks to create a visually appealing and user-friendly UI. Developers use Java to define the layout, widgets, and functionality of the UI elements in the app.

2. Image processing Algorithm: To detect currencies, developers can use image processing techniques, such as edge detection, feature detection, and template matching. Java is a versatile language and can be used to implement complex algorithms to identify different currencies and denominations.

3. Integration with APIs: To fetch the latest exchange rates and currency conversion rates, developers can integrate the app with third-party APIs. Java can be used to make HTTP requests and parse the JSON or XML response from the API to extract the relevant data.

4. Database Connectivity: we are using Java to connect the app to a database to store the user's preferences and settings, transaction history, and other data related to currency recognition.

5. Testing and Debugging: Android Studio comes with a built-in testing and debugging environment. Developers can use Java to write unit tests, integration tests, and end-to-end tests to ensure that the app works as intended and is free of bugs and errors.

Overall, Java is a versatile language that plays a crucial role in developing a currency detector app in Android Studio. Its rich set of libraries and frameworks, along with the development environment provided by Android Studio, make it an ideal choice for building robust and feature-rich Android applications.

2.9 MobileNetV2

MobileNetV2 is a neural network architecture designed for efficient image classification and object detection tasks on mobile devices. In order to use MobileNetV2 for currency detection in an Android app, you will need to perform the following steps:

1. Import the MobileNetV2 model into your Android Studio project. You can find pre-trained MobileNetV2 models for image classification and object detection tasks on websites such as TensorFlow Hub.

2. Convert the MobileNetV2 model to a format that is compatible with TensorFlow Lite, which is a lightweight version of the TensorFlow framework designed for mobile and embedded devices. You can use the TensorFlow Lite Converter to convert the model.

3. Integrate the TensorFlow Lite model into your Android app by adding the appropriate dependencies to your Gradle file and loading the model in your Java code. You can use the TensorFlow Lite interpreter to run inference on the model and classify images or detect objects.

4. Collect images of different currencies that you want to detect, and use them to train and test your MobileNetV2 model. You can use a tool like LabelImg to annotate the images and create a dataset for training the model.

5. Fine-tune the MobileNetV2 model on your currency dataset by using techniques such as transfer learning. This will allow the model to learn to classify or detect currencies more accurately.

6. Integrate the currency detection functionality into your Android app by using the trained MobileNetV2 model. You can capture an image of a currency note using the device's camera, and then use the model to detect the currency and display its value on the screen.

Overall, using MobileNetV2 in Android Studio for currency detection requires a combination of machine learning and Android development skills. However, by following these steps and experimenting with different techniques, an accurate currency detection app.

CHAPTER -3

SYSTEM ANALYSIS

3. SYSTEM ANALYSIS

3.1 Existing System

The existing system which is available for the recognition of currency are mostly hardware methods and are not feasible for the common masses. The novelty of the system isthat it is cheap and easily accessible to visually impaired people in India. Using the application should be simple for a person who is visually impaired.

In the existing system, an image processing-based currency recognition system uses different algorithms (SIFT, FAST, ORB and SURF). These algorithms are used in feature extraction and matching, The project specifically focuses on Indian Currency notes. After studying algorithms, it is observed that each algorithm has its advantages and disadvantages. As the existing system is mathematically complicated and computationally heavy, we have proposed a new system to overcome the following drawbacks.

When a comparison is done it is proved that SIFT is several times slower than SURF. Against different image transformations, SURF is more robust than SIFT. It also has low dimensionality as compared to SIFT. The low computational cost of SURF makes it a preferable method over SIFT. But we also have some disadvantages of the SURF algorithm. SURF is not stable to the rotations and also it doesn't work properly with illumination.

3.1.1 Drawbacks of an existing system

1. The application requires an active internet connection
2. It is a scanner-based application where the user needs to provide a complete currency note in order to get desired output
3. It is quite slow and not effective for low-power devices
4. The system produced an accuracy 71% for paper currency by using (SIFT) algorithm.

3.2 Proposed System

The Android application uses Teachable Machine online software which helps to train our dataset and use it with the TF-lite quantized, floating point module in the asset folder of the Application.

A dataset of images of different notes (Rs. 5, Rs. 10, Rs. 20, Rs. 50, Rs. 100, Rs. 500, Rs.2000) was gathered. The dataset consisted of almost 200 notes. Images for the dataset were collected in different situations like scaling, rotation, different illuminations and different viewpoints. Reference images considered were images of the obverse (front) and reverse (back) of Indian Rupee notes. Therefore, the dataset had approximately every denominationof (150) reference images.

Through this model, 1050 images are classified into 128 as a training dataset and 22 for testing purposes for each denomination, and each image is checked according to its accuracy of matching with the denomination.

In it, multiple classes are created with each currency value. By uploading the image size and setting an accurate epoch value.or applications like Currency Recognition, we want to run the models locally, so the application can always be used even when the internet connection is unavailable or poor.

This project uses TensorFlow Lite for image classification tasks in our Android app. It is an open-source deep-learning framework optimized for on-device inference. The trainedmodel is exported as a Tflite file and used for inference in a TensorFlow lite-based Android app to recognize currency.

3.2.1 Advantages of a proposed system

1. Increased independence: A currency detector app can help visually impaired individuals to identify different types of currency notes independently, without the need for assistance from others.

2. Improved accuracy: The app can accurately identify different types of currency notes, eliminating the risk of confusion and potential financial loss.

3. Convenient and portable: The app can be installed on a smartphone, making it easy to carry around and use anywhere.

4. Cost-effective: Compared to dedicated currency detector devices, a currency detector app is usually more cost-effective, as it eliminates the need to purchase a separate device.

5. Customizable feedback: The app can be customized to provide audio or tactile feedback, depending on the user's preferences.

6. Easy to use: Currency detector apps are usually designed with a user-friendly interface, making them easy to use for visually impaired individuals.

3.3 Applications of currency detector app

1. Personal use: The app can be used by visually impaired individuals to identify different types of currency notes and carry out financial transactions independently.

2. Banking and financial institutions: Currency detector apps can be integrated into the banking and financial systems to assist visually impaired customers in carrying out transactions at bank branches or ATMs.

3. Retail and hospitality: Retailers and hospitality establishments can use currency detector apps to assist visually impaired customers in making payments and providing change.

4. Government agencies: Government agencies can use currency detector apps to assist visually impaired individuals in accessing public services, such as paying fines, taxes, and fees.

5. Education: Schools and universities can use currency detector apps to assist visually impaired students in managing their finances and making payments for educational expenses.

6. Travel: Currency detector apps can be used by visually impaired individuals to identify different currencies when travelling to different countries.

Overall, the currency detector app can be a useful tool to enhance the independence and quality of life of visually impaired individuals in various settings.

3.4 Software requirement specification

SRS	Description
Purpose	The purpose of the currency detector app is to accurately recognize the denomination of various types of currency using a mobile device's camera.
Scope	The app should be able to recognize the currency denomination of bills and coins from different countries.
User Classes	The app is designed for users who need assistance in identifying the denomination of currency, including visually impaired individuals, travelers, and currency traders.
Features	The app should have the following features: currency recognition, camera integration, image processing, currency database, currency updates, user interface, audio feedback, security, localization, offline functionality, and user feedback.
Compatibility	The app should be compatible with all types of Android devices
Usability	The app should have an easy-to-use and intuitive interface that allows users to capture images of currency and receive accurate results quickly.
Maintenance	The app should be regularly updated to include new currencies and changes in existing currency designs. The app should also undergo regular maintenance to ensure optimal performance and security.
Performance	The app should be able to accurately recognize the currency denomination of bills and coins in different lighting conditions and at various angles. The app should also have fast processing times and low error rates

3.4.2 Software Requirements

Operating System: Windows 7,8,10,11 or Mac OS

Technologies: Java, teachable machine learning, Tflite, mobilenetV2, android studio, Gradle

Hardware Requirements

Hardware : intel i5 10 gen+ processor or Mac m1

RAM : 16GB

Hard Disk : 500 Gb

3.4.3 Technical specifications

The technical specification of currency detector app is a mobile application that uses a device's camera to recognize and identify the denomination of various types of currency. The app should be capable of processing images quickly and accurately using advanced image processing algorithms, including edge detection, feature extraction, and machine learning models.

It should also include a currency database with high-quality images of currency and relevant information about the denomination, country of origin, and other relevant data. Theapp should prioritize accuracy, ease of use, and accessibility, with features such as audio feedback for visually impaired users, language support for users in different regions, and the ability to function offline in case of limited connectivity.

Requirement	Description
Currency Recognition	Our app is be able to recognize the denomination of various types of currency accurately.
Camera Integration	Our app can be able to access the device's camera to capture images of the currency.
Image Processing	Our app is having a robust image processing algorithm to analyze the captured images and identify the currency denomination.
Currency Datasets	Our app is having a dataset of all the currency denominations that it can recognize, along with their images.
User Interface	Our app is an easy-to-use and intuitive interface that allows users to capture images of currency and receive results.
Audio Feedback	Our app provides audio feedback for visually impaired users to aid in currency identification.
Offline Functionality	Our app can be able to function offline in case of limited connectivity.

CHAPTER -4

DESIGN ANALYSIS

4.DESIGN ANALYSIS

Design analysis of our currency detector app typically consists of three main components: the user interface, the image processing engine, and the currency database. Hereis a design analysis of each component:

1. **User Interface:** The user interface is the component that enables users to interact with the app. It should be intuitive, easy to use, and visually appealing. The user interface should allow users to capture images of currency easily and display the results of the currency detection process in a clear and concise manner. It should also include features such as audio feedback for visually impaired users, language support for users in differentregions, and the ability to provide user feedback.

2. **Image Processing Engine:** The image processing engine is the component that performs the currency recognition process. It should be capable of processing the captured images of currency quickly and accurately. The engine should include advanced algorithms for image processing, such as edge detection, feature extraction, and machine learning models, to enable accurate detection of the currency denomination.

3. **Currency Dataset:** The currency database is the component that stores information about the currency denominations that the app can recognize. It should include high-quality images of the currency and information about the denomination, country of origin, and other relevant data. The database should be regularly updated to include new currencies and changes in existing currency designs. The design of our currency detector app is to prioritize accuracy, ease of use, and accessibility.

4.1 System Architecture

The architecture diagram of a currency detector app consists of both the online phase and the offline phase. This app is capable of processing images quickly and accurately using advanced image processing algorithms, including edge detection, feature extraction, and machine learning models. It should also include a currency dataset with high-quality images of currency and relevant information about the denomination of Indian rupees and other relevant data. prioritize accuracy, ease of use, and accessibility, with features such as audio feedback for visually impaired users.

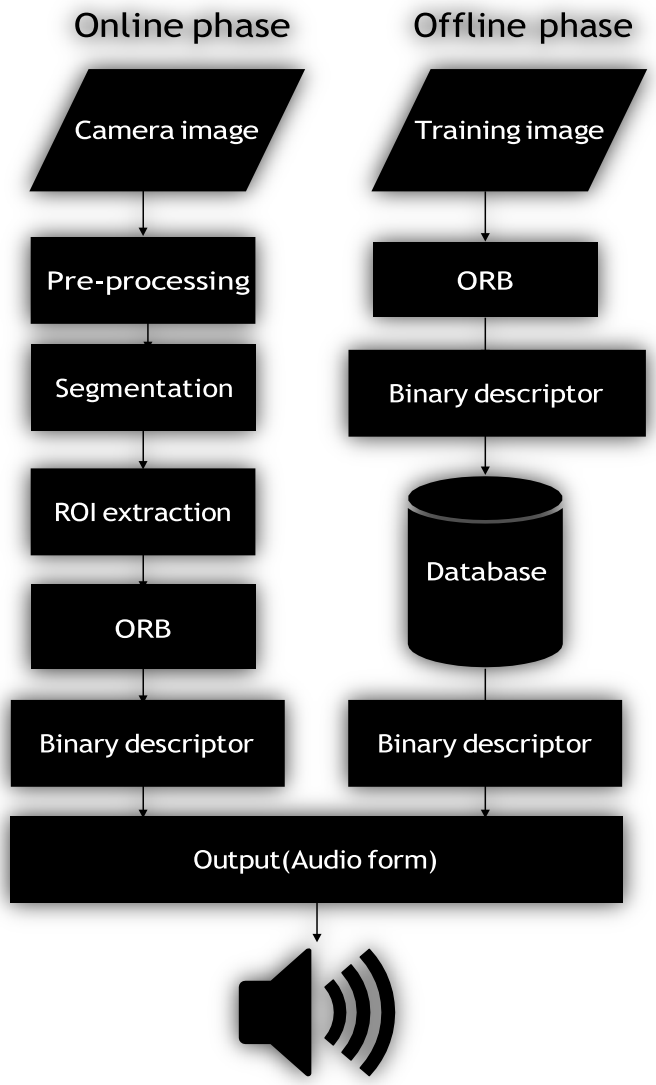


Figure 4.1: System Architechture

4.1.1 Online phase

The online phase of a currency detector app refers to the period when the app is connected to the internet and able to access external resources, such as a currency database or cloud-based processing resources. During this phase, the app can perform a variety of functions, including

1. **Camera image:** When a user launches the currency detector app and accesses the camera feature, the camera will capture an image of the currency. The image will typically show the full or partial view of the currency, including the denomination of Indian currency.

2. **Pre-processing:** is an improvement of the image data that suppresses unwilling distortions or enhances some image features important for further processing, although geometric transformations of images (e.g. rotation, scaling, translation) are classified among pre-processing

3. **Image segmentation:** is a commonly used technique in digital image processing and analysis to partition an image into multiple parts or regions, often based on the characteristics of the pixels in the image.

4. **Region of interest (ROI):** is a portion of an image that you want to filter or operate on in some way. You can represent an ROI as a binary mask image. In the mask image, pixels that belong to the ROI are set to 1 and pixels outside the ROI are set to 0 .

5. **ORB:** Oriented rotation and brief is a technique used in image processing to align an image to a specific orientation. In a currency detector app, oriented rotation can be usedto adjust the orientation of the captured image to ensure accurate recognition of the currency denomination.

6. **Binary descriptor**: is a compact representation of an image that can be used for fast and efficient image matching. In a currency detector app, binary descriptors can be used for feature extraction and image matching in the image processing engine.

7. **Output (Audio form):** is an important feature of a currency detector app, especially for visually impaired users. The app can provide audio feedback to users to indicate whether the currency denomination has been recognized or not.

4.1.2 Offline phase

The offline phase of a currency detector app refers to the app's ability to function without an internet connection. This means that the app can still recognize currency denominations even if the device is not connected to the internet.

1. **Training images:** in a currency detector app, a large dataset of images of various denominations of currency is required. The images should be high-quality and clear,showing the front and back of the currency in different lighting conditions and angles. The dataset should include a wide range of currencies in Indian denominations.

2. **Binary descriptor:** a compact representation of an image that can be used for fast and efficient image matching. In a currency detector app, binary descriptors can be used for feature extraction and image matching in the image processing engine.

3. **Database:** The currency detector app is responsible for storing information about the currency denominations that the app can recognize. It typically includes high-qualityimages of the currency, information about the denomination, country of origin, and other relevant data.

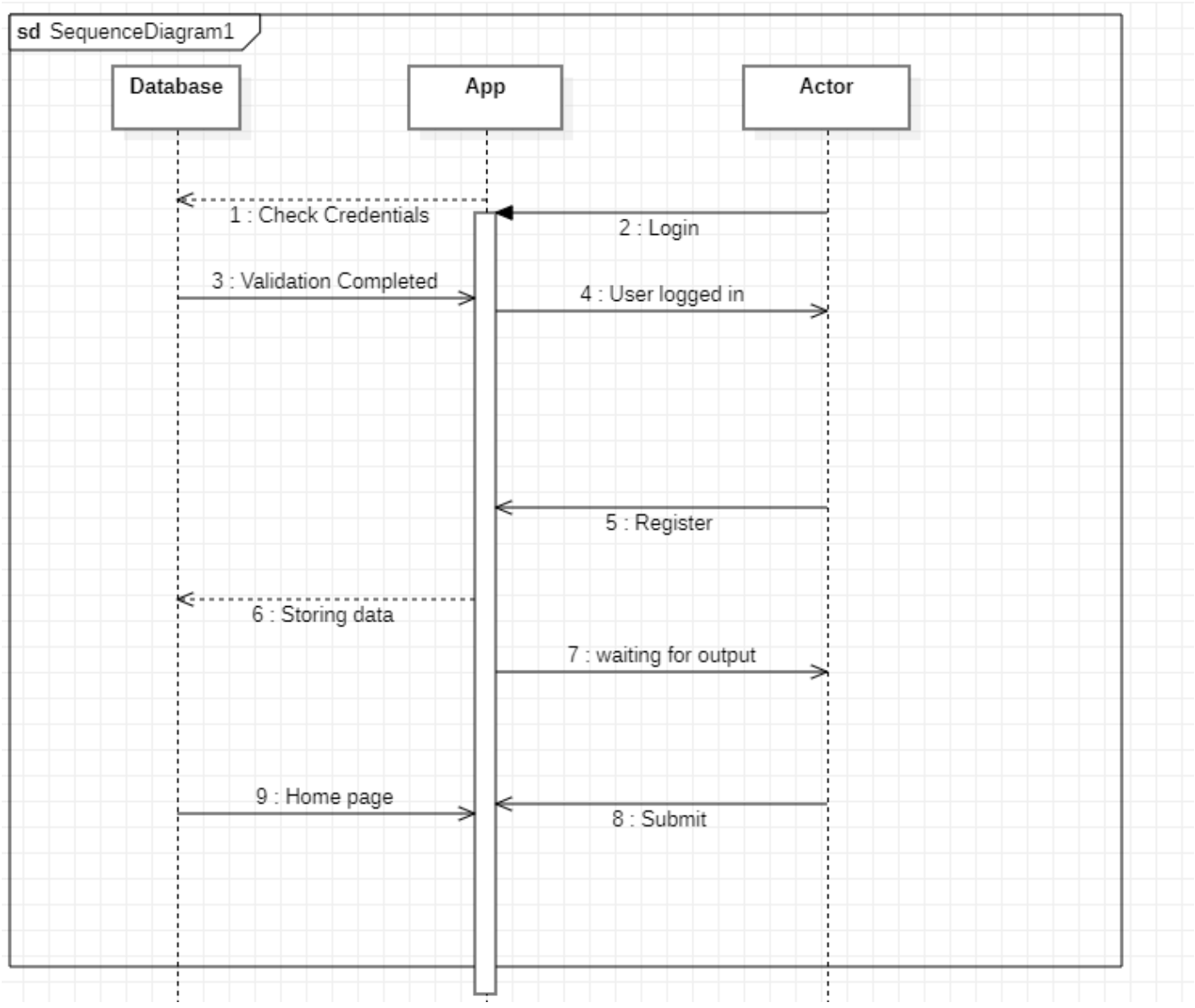
4. **Binary descriptor:** a compact representation of an image that can be used for fast and efficient image matching. In a currency detector app, binary descriptors are again used to make use of similarities of database denominations and shown input images of note

5. **Output (Audio form):** this is an important feature of a currency detector app, especially for visually impaired users. The app can provide audio feedback to users to indicate whether the currency denomination has been recognized or not.

4.2 UML DIAGRAMS

4.2.1 SEQUENCE DIAGRAM

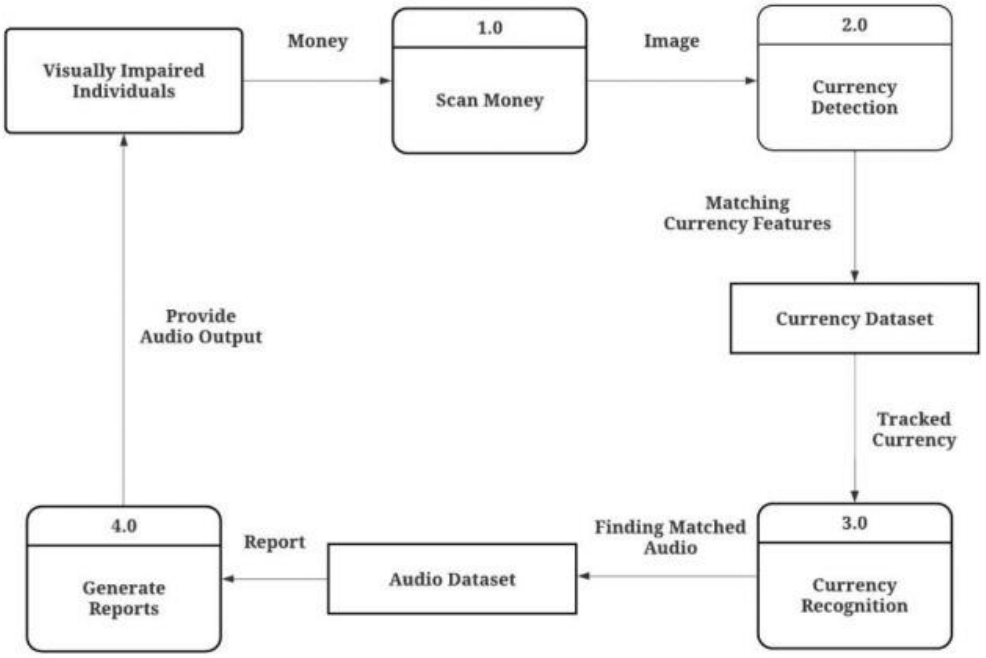
A sequence diagram is a type of interaction diagram because it describes how—and in what order—a group of objects works together. These diagrams are used by software developers and business professionals to understand requirements for a new system or to document an existing process. Sequence diagrams.



rams or event scenarios.

4.3 COLLABORATION DIAGRAM

The collaboration diagram is used to show the relationship between the objects in a system. Both the sequence and the collaboration diagrams represent the same information but differently. Instead of showing the flow of messages, it depicts the architecture of the object residing in the system as it is based on object-oriented programming. An object consists of several features. Multiple objects present in the system are connected to each other. The collaboration diagram, which is also known as a communication diagram, is used to portray the object's architecture in the system.



4.4 USE-CASE DIAGRAM

A use case diagram is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.

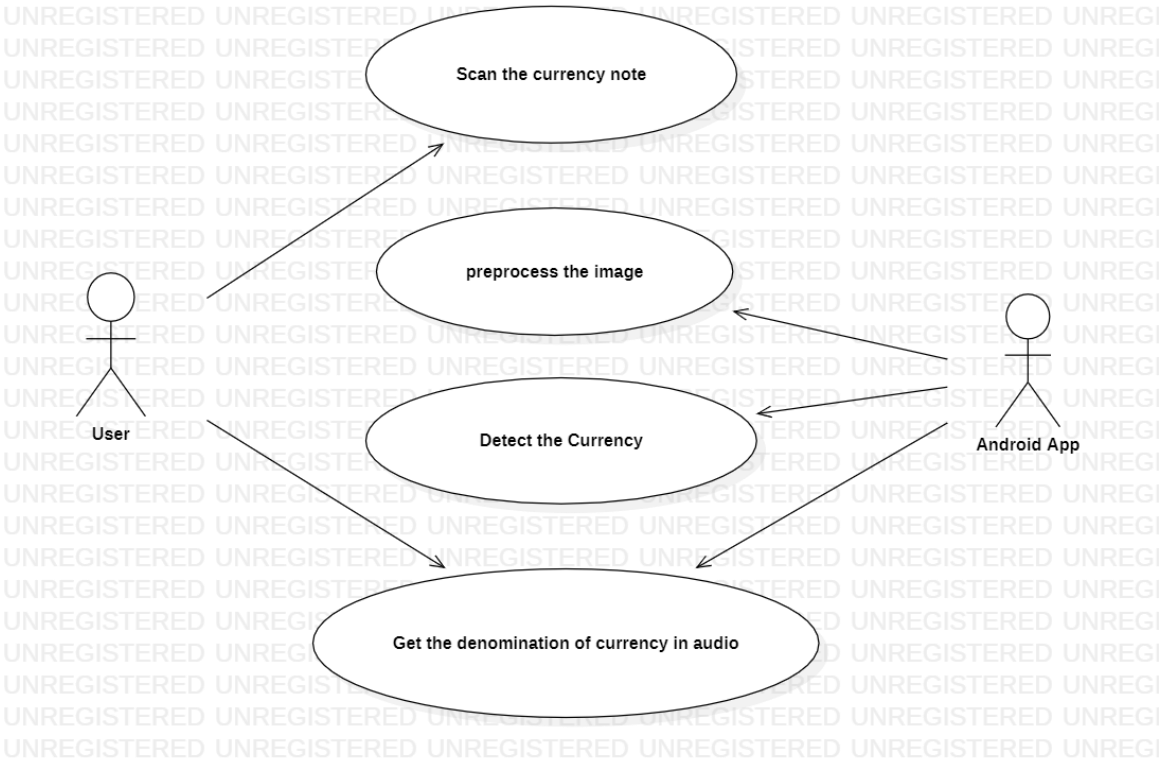


Figure 4.4: Use-case diagram

ACTORS

Actors represent the external entities that interact with the system. Actors include roles the system needs to deal with.

1. The user is the primary actor.
2. The currency detector app provides common services to blind people whichinclude: Capture Image, Currency Identification, Audio Generation and Audio Output services.

ROLES

1. User captures image of the currency and uploads the same.
2. Image is processed by the app in the back-end
3. Value of the currency is predicted
4. The label given to the currency is then sent as an audio output to the user from the audio dataset.

4.5 CLASS DIAGRAM

A class diagram in the Unified Modeling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, attributes, operations, and relationships among objects.

In our Problem, we have two classes named ‘User’ and ‘Currency’ whose multiplicity is many-to-many, and an Association Class named ‘Predict’.

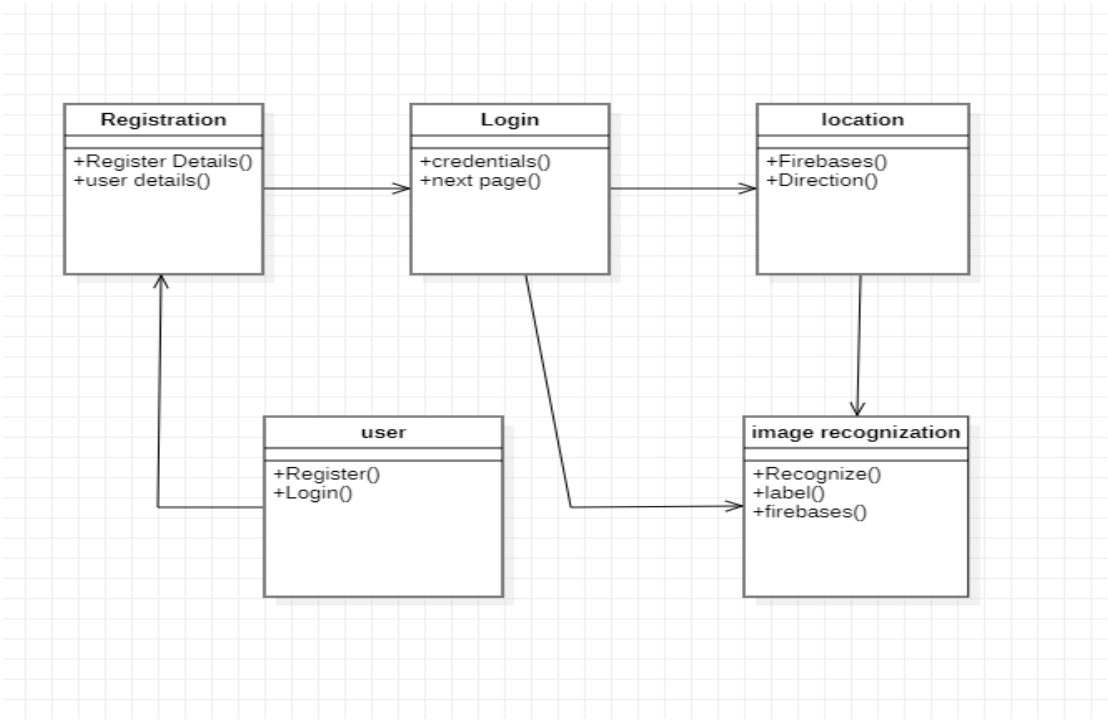


Figure 4.5: Class diagram

4.6 ACTIVITY DIAGRAM

An activity diagram for a currency detector app typically depicts the flow of activities or processes that occur when a user interacts with the app. The diagram may include activities such as launching the app, capturing an image of currency, processing the image to recognize the denomination, and providing feedback to the user. The First activity in the currency detection app for the visually impaired is to open an android application.

1. Then the user has to scan the currency of which the denomination is to be recognized and given out in the audio format.
2. By using the methodology of image classification and all other software requirement specifications the input currency will be recognized.
3. Finally, after the completion of all the activities the denomination of the currency is given output an audio format.

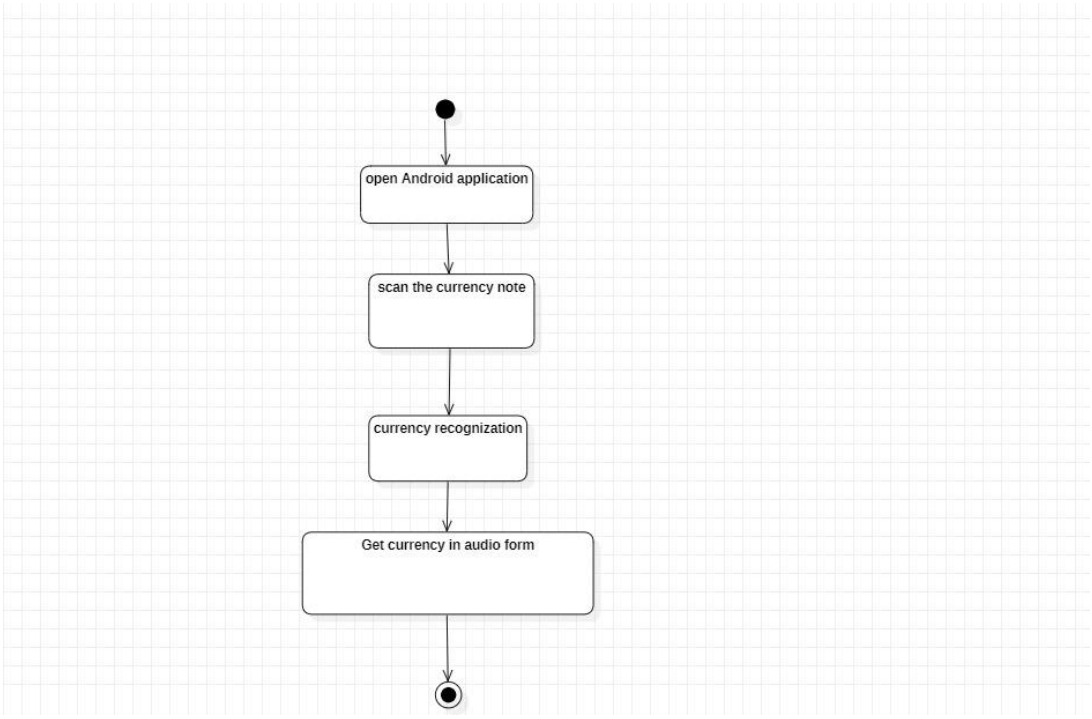


Figure 4.6: Activity diagram

CHAPTER-5

IMPLEMENTATION

5. IMPLEMENTATION

The implementation of a currency detector for the visually impaired generally consists of several steps, including Collect images, Train the model to learn from the images, Optimize the model, Import the model into the Android application, Test the trained model in the application

Step 1 - Collect images: A lot of images need to be collected so that comparison becomes easier and the system becomes more accurate. In the case of the Currency Recognition System, various notes of 10, 20, 50, 100, 200, 500, and 2000 are to be captured in different light conditions and at various angles to attain. Flowchart of the TensorFlow system efficient results. A dataset needs to be created taking these images into consideration and this dataset should be kept secure.

Step 2 - Train the model to learn from the images: After collecting enough images, the next step is to train the model. A docker container can be used to get an already set up TensorFlow environment. This operation can take several minutes depending on the number of images present and the number of training steps specified.

Step 3 - Optimize the model: Now, the model is ready. To use the trained model on a mobile device, it needs to be optimized first, using a tool named optimize for inference, which removes all nodes that are not needed, among other optimizations.

Step 4 - Import the model into the Android application: The optimized model is now to be installed in the Android application. After the Android application is ready, it can execute the Currency Recognition System efficiently.

Step 5 -Audio generation: Audio output generation script files contain the document codes that have been accepted. The text-to-speech converter is then used to load these files and show the audio performance of text content. Users who are blind can customize their speech rate, speed, and vocabulary

Step 6 - Test the trained model in the application developed: Install the developed Android Package Kit (APK) on the user's phone. Test its working for currency notes in different conditions. This step is necessary because it helps in testing the system that has been implemented. If any inaccuracies are found in this step, they need to be solved by checking the training data or increasing it for better results.

The implementation process also involves rigorous testing and debugging to ensure that the app functions as intended and has low error rates. Security features should also beimplemented to prevent fraudulent use and misuse of the app.

Finally, the app should be regularly updated to include new currencies and changes in existing currency designs. Maintenance tasks, such as bug fixes and performance optimizations, should also be performed regularly to ensure the app functions optimally.

5.1 MODULES

This project consists of the following modules:

A currency detector app typically uses image processing and recognition algorithms to identify different currencies from their visual characteristics. The following are some of the modules that may be included in a currency detector app:

1. Image processing module
2. Currency recognition module
3. Currency dataset module
4. User interface module
5. Audio feedback module
6. Update and maintenance module

5.2 MODULES DESCRIPTION

5.2.1. Image processing module:

Image processing module in a currency detector app is responsible for preprocessing the input image captured by the camera or loaded from the user's gallery. This module performs several operations to enhance the image quality, remove any noise or artifacts, and prepare the image for further analysis by the currency recognition module. Here are some of the common operations that can be performed by the image processing module:

1. Image cropping: The currency detector app may allow the user to crop the image manually to focus on the currency portion of the image.

2. Image resizing: The input image may be resized to a standard size to ensure that the currency recognition algorithm can work efficiently.

3. Image rotation: The app may detect the orientation of the image and rotate it to ensure that the currency appears in the correct orientation for recognition.

4. Image normalization: The app may normalize the image to adjust the brightness and contrast of the image to bring out the details of the currency.

5. Image filtering: The app may apply filters to the image to remove noise or artifacts that may affect the accuracy of the currency recognition algorithm.

6. Image segmentation: The app may use image segmentation techniques to separate the currency from the background or other objects in the image.

7. Edge detection: The app may use edge detection algorithms to highlight the edges of the currency notes and to distinguish them from the background.

8. Feature extraction: The app may use feature extraction techniques to extract relevant features from the image, such as texture, color, and patterns, that are important for currency recognition.

By performing these operations, the image processing module enhances the quality of the input image and prepares it for currency recognition. The preprocessed image is then passed to the currency recognition module, where it is analyzed using machine learning and computer vision algorithms to identify the currency.

5.2.2 Currency recognition module

The currency recognition module is one of the most important modules in a currency detector app. It is responsible for identifying the currency from the image captured by the camera, The module uses teachable machine learning and computer vision algorithms to recognize the currency based on its visual characteristics such as color, size, patterns, and security features.

```
runInBackground(
    new Runnable() {
      @Override
      public void run() {
        if (classifier != null) {
          final long startTime = SystemClock.uptimeMillis();
          final List<Classifier.Recognition> results = classifier.recognizeImage(croppedBitmap);
          lastProcessingTimeMs = SystemClock.uptimeMillis() - startTime;
          LOGGER.v("Detect: %s", results);
          cropCopyBitmap = Bitmap.createBitmap(croppedBitmap);

          runOnUiThread(
              new Runnable() {
                @Override
                public void run() {
                  showResultsInBottomSheet(results);
                  showFrameInfo(previewWidth + "x" + previewHeight);
                  showCropInfo(cropCopyBitmap.getWidth() + "x" + cropCopyBitmap.getHeight());
                  showCameraResolution( cameraInfo: canvas.getWidth() + "x" + canvas.getHeight());
                  showRotationInfo(String.valueOf(sensorOrientation));
                  showInference( inferenceTime: lastProcessingTimeMs + "ms");
                }
              });
        }
        readyForNextImage();
      }
    });
}
```

Figure 5.2.2.1: Screenshot of code for currency recognition

The process of currency recognition involves several steps:

1. **Pre-processing the image:** The first step in the currency recognition module is to pre-process the image to remove noise and enhance its quality. This is done using varioustechniques such as blurring, sharpening, and contrast adjustment.

2. **Feature extraction:** In this step, the module extracts relevant features from the pre-processed image, such as the color, size, and patterns of the currency. These features are used to identify the currency and distinguish it from other currencies.

3. **Classification:** After the relevant features have been extracted, the module uses a classification algorithm to determine which currency the image belongs to. The classification algorithm compares the features of the image with the features of the currencies in the database and assigns a probability score to each currency.

4. **Post-processing:** In this final step, the module performs some post-processing operations on the classified currency to improve its accuracy. This includes applying geometric transformations, such as rotation and scaling, to align the detected currency with the template in the database

```
/** An {@link ImageReader} that handles preview frame capture. */
private ImageReader previewReader;
/** {@link CaptureRequest.Builder} for the camera preview */
private CaptureRequest.Builder previewRequestBuilder;
/** {@link CaptureRequest} generated by {@link #previewRequestBuilder} */
private CaptureRequest previewRequest;
/** {@link CameraDevice.StateCallback} is called when {@link CameraDevice} changes its state. */
private final CameraDevice.StateCallback stateCallback =
    new CameraDevice.StateCallback() {
      @Override
      public void onOpened(final CameraDevice cd) {
        // This method is called when the camera is opened.  We start camera preview here.
        cameraOpenCloseLock.release();
        cameraDevice = cd;
        createCameraPreviewSession();
      }

      @Override
      public void onDisconnected(final CameraDevice cd) {
        cameraOpenCloseLock.release();
        cd.close();
        cameraDevice = null;
      }

      @Override
      public void onError(final CameraDevice cd, final int error) {
        cameraOpenCloseLock.release();
        cd.close();
        cameraDevice = null;
        final Activity activity = getActivity();
        if (null != activity) {
          activity.finish();
        }
      }
    };
```

Figure 5.2.2.3: Screenshot of code for camera activity

The currency recognition module requires a large database of currencies with their visual characteristics, such as color, size, patterns, and security features. This database is usually built using supervised learning algorithms, where the module is trained on a large dataset of images of different currencies. The module learns to recognize the currency by adjusting the weights of the neural network during training.

5.2.3 Currency datasets module

The currency dataset module in a currency detector app is a crucial component that enables the app to recognize different currencies accurately. This module typically consists of a database of currency images and their corresponding labels, which are used to train the machine learning models that perform the currency recognition task.

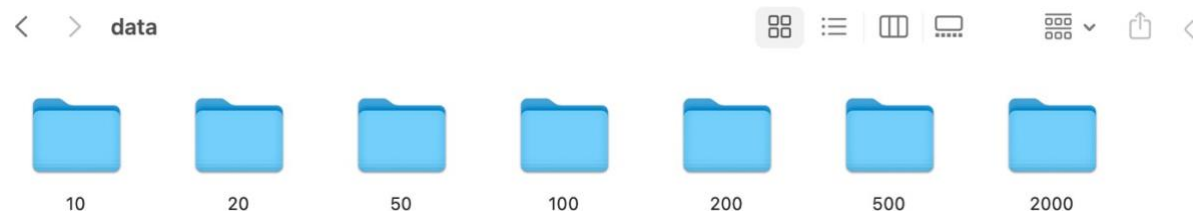


Figure 5.2.3: Figure of currency dataset module.

Here are some details about the currency dataset module in a currency detector app:

1. Currency image datasets: The currency image assets folder contains a collection of high-quality images of different currency types. These images are typically obtained from various sources, such as central banks, currency exchange offices, or online image repositories.

2. Currency labels: Each image in the currency image database is labelled with the corresponding currency type, such as the Indian rupees. These labels are used to train the machine learning models that recognize the currency types.

3. Data preprocessing: The currency dataset module typically includes data preprocessing steps that prepare the currency images for training the machine learning models. These steps may include image resizing, normalization, and augmentation, which help to improve the robustness and accuracy of the models.

4. Model evaluation: The currency dataset module includes a model evaluation process that assesses the performance of the machine learning models. This process typically involves splitting the currency image dataset into training and testing sets and measuring the accuracy, precision, and recall of the models.

5. Model update and maintenance: The currency dataset module requires periodic updates and maintenance to keep up with changes in currency designs, security features, and denominations. The module should also incorporate new currency types and remove outdated ones to ensure the app's accuracy and relevance.

In summary, the currency dataset module in a currency detector app is an essential component that enables the app to recognize different currencies accurately.

5.2.4.User interface module

The user interface module in a currency detector app is responsible for providing a user-friendly and intuitive interface for the user to interact with the app. It typically includes the following components:

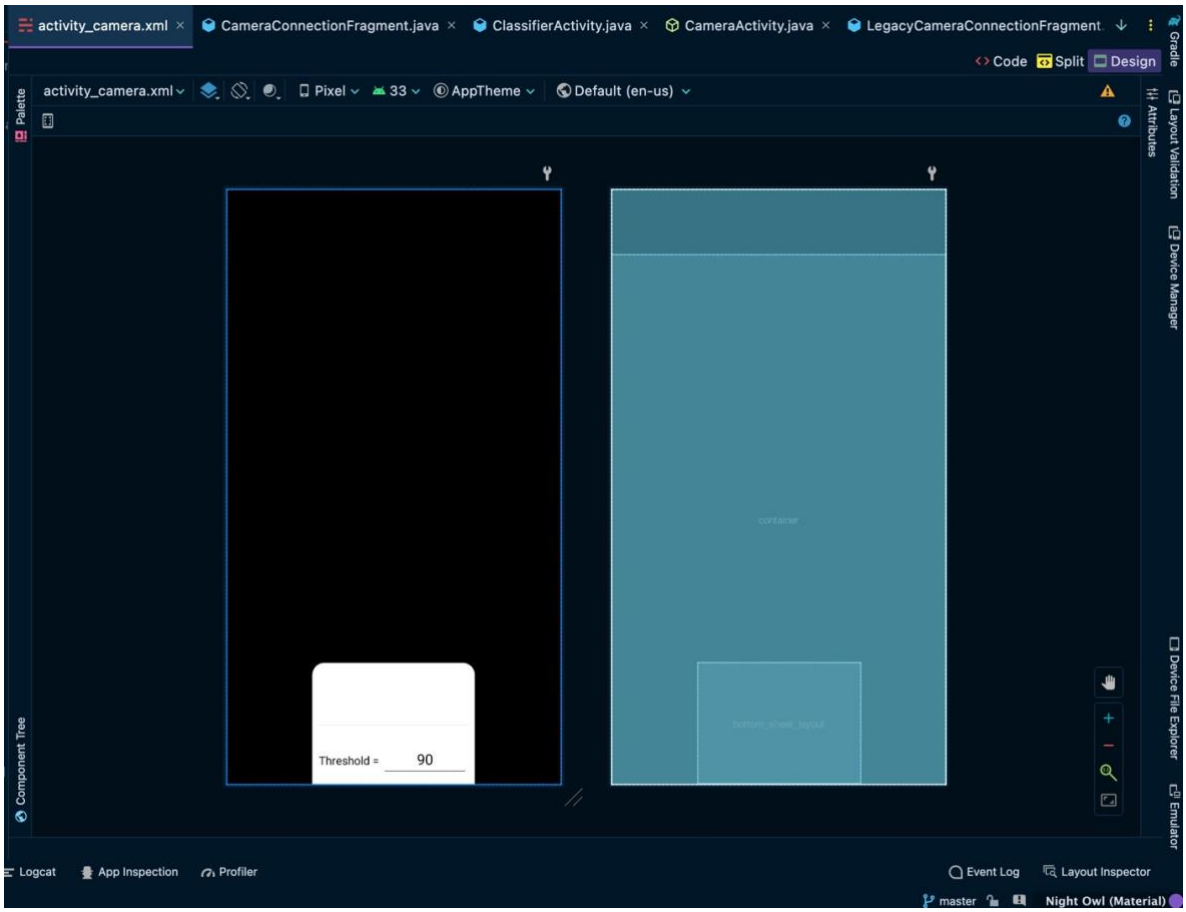


Figure 5.2.4: Screenshot of user interface module.

1. Camera access: This component allows the user to access the device camera to capture an image of the currency that they want to detect.

2. Image processing: This component processes the image captured by the camera, performs pre-processing to optimize it for currency recognition, and displays the processed image to the user.

3. Currency detection: This component performs the currency recognition algorithm to identify the type and denomination of the currency.

4. Voice feedback and results: This component provides voice feedback to the user on the success or failure of the currency detection, and displays the results, including the detected currency type, and denomination value as voice.

5.2.5 Audio feedback module

Audio output is an important feature in a currency detector app, as it allows users with visual impairments to use the app and receive feedback on the authenticity of banknotes. Audio output in a currency detector app can take several forms, including voice alerts

Voice alerts are the most common form of audio output in a currency detector app. The app uses text-to-speech technology to provide spoken feedback to the user about the denomination and authenticity of the banknote

In addition to voice alerts, the app may also voice to indicate the authenticity of the banknote from given input image

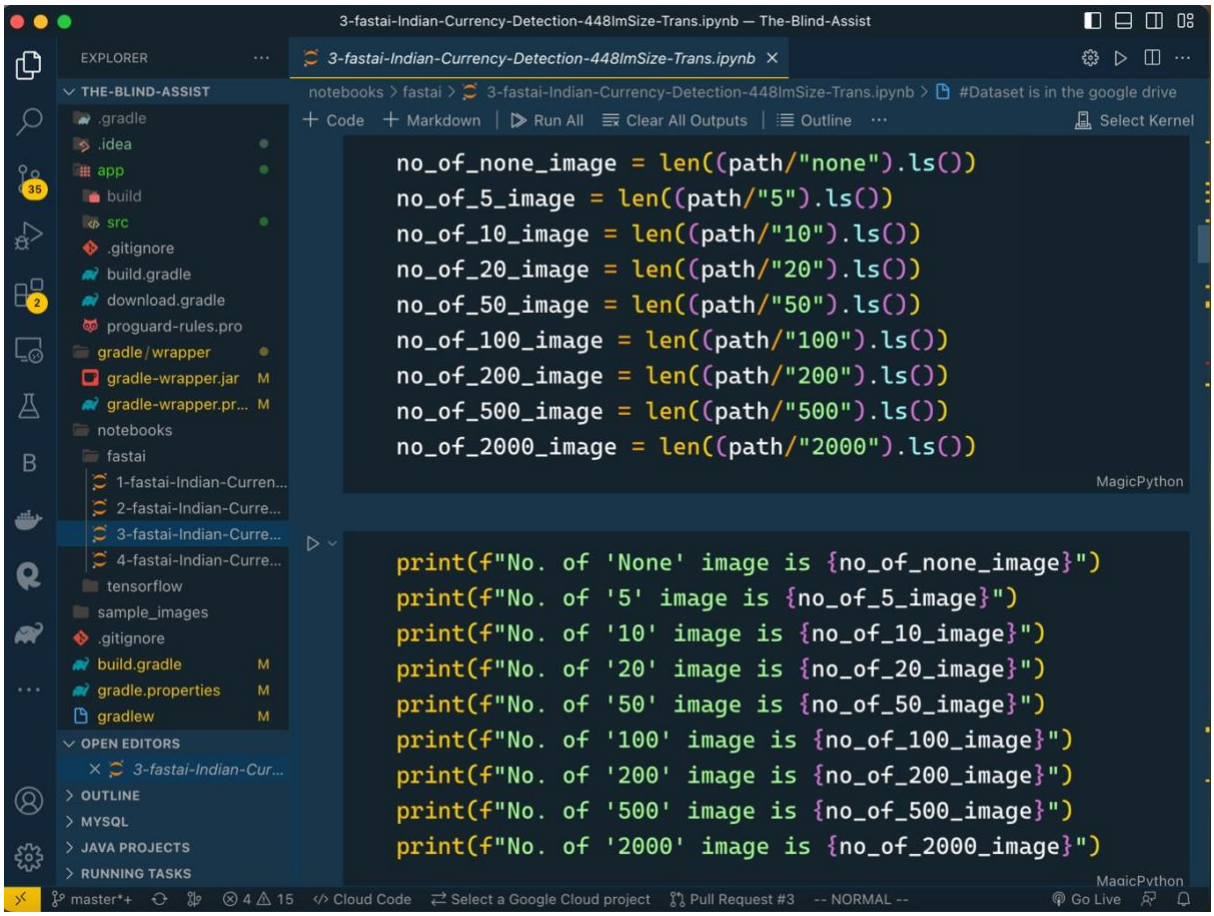


Figure 5.2.5: Screenshot of code audio frequency module.

Overall, audio output is an important accessibility feature in a currency detector app that can improve the user experience for people with visual impairments. The audio feedback can help users quickly and easily identify the denomination and authenticity of banknotes without relying on visual cues.

5.2.6 Update and maintenance module

The Update and Maintenance module is an essential component of any currency detector app, as it is responsible for ensuring that the app is up-to-date, fully functional, and secure. This module performs the following tasks:

1. **Update the Currency Database:** The currency database needs to be updated regularly to include new currency types, changes in security features, and modifications in design. The update module should retrieve the latest information from trusted sources and ensure that the currency database is accurate and up-to-date.

2. **Bug Fixes**: Bugs and issues can arise in any software application, including currencydetector apps. The update module should monitor the app for any bugs and issues and providepatches and fixes as needed.

3. **Performance Improvements**: The update module should also be responsible formonitoring the app's performance and making improvements to ensure that the app runs smoothly, quickly, and efficiently.

4. **Compatibility Updates:** The update module should also monitor the compatibility of the app with the latest versions of the operating system and other software dependencies. The module should provide updates and patches to ensure the app runs smoothly on the latest versions of the software.

5. **User Feedback:** The update module should also be responsible for collecting user feedback and suggestions for improving the app. The module should use this feedback to identify areas for improvement and provide updates and enhancements to address user concerns.

In summary, the update and maintenance module is responsible for ensuring that the currency detector app is up-to-date, fully functional, and secure. This module performs a wide range of tasks, including updating the currency database fixing bugs and issues, improving performance, providing security patches, ensuring compatibility, and incorporating user feedback.

5.3 SCREENSHOTS

currency detector app typically provides several voice outputs to the user. The primary output is the identification of the currency, which is typically displayed on the screen along with the currency's value in the user's preferred currency.

Figure5.3.1: Screenshot of output as none.

Figure5.3.2: Screenshot of output as 100

NOTE: **When no currency is detected, app show the output as none**

100: when user shows 100 rupees denomination it shows output as 100

Figure5.3.3: Screenshot of output as 50.

Figure5.3.4: Screenshot of output as 200.

50: when user shows 50 rupees denomination it shows the output as 50

200: when user shows 200 rupees denomination it shows the output as 200

. **Figure5.2.5: Screenshot of output as 10.**

Figure5.2.5: Screenshot of output as 500.

10: when user shows 10 rupees denomination it shows the output as 10

500: when user shows 200 rupees denomination it shows the output as 500

Figure5.2.6: Screenshot of output as 20.

20: when the user shows the 20 rupees denomination it shows the output as 20

6. TESTING

6.1 System Testing

System testing for a currency detector app would involve testing the entire system to ensure that it meets the functional and non-functional requirements. This would includeverifying that the app accurately identifies different currencies, including their denominations, and that it displays this information in a clear and user-friendly manner. Additionally, the system would need to be tested for stability, security, and performance

6.2 Unit Testing.

Unit testing for a currency detector app involves testing individual components or units of the app to ensure they work correctly in isolation. The main goal of unit testing is to identify and isolate any defects or bugs early in the development process, which can save time and reduce costs in the long run.

Test Case Description	Test Data	Expected Result	Actual Result	Pass /Fail
Test if the camera is working properly	App launched with camera access enabled	Camera captures image without error	Camera captures image without error	**Pass**
Test if currency recognition works correctly	Images of different currencies	Correct currency is identified with its value	Correct currency is identified with its value	**Pass**
Test if the app can handle different currencies	Images of currencies not in the database	App should not recognize the currency and provide an error message	App should not recognize the currency and provide an error message	**Pass**
Test if the app can handle different devices	App installed on different devices with different specifications	App should function correctly on all devices	App should function correctly on all devices	**Pass**
Test if the app can handle low-quality images	Images with low resolution or low lighting	App should not respond to input	App should not respond to input	**Pass**

6.3 Integration Testing.

Integration testing for a currency detector app involves testing the functionality of the app as a whole, rather than testing individual components or modules in isolation. Integration testing ensures that all the different components of the app are working correctly together, andthat the app as a whole meets its functional requirements. Integration testing for a currency detector app is tested and validated, ensuring that it meets the needs of its users and performs as intended.

Test Case ID	Test Case Description	Expected Result
IT001	Launch the currency detector app and ensure that the app is responsive to user inputs	The app is launching without any errors and should respond to user inputs in a timely manner
IT002	Test the currency detection functionality by presenting different currencies to the app	The app is be able to correctly identify the presented currency, display the name and voice as output of the currency
IT003	Test the app's ability to handle multiple currencies and rates	The app should be able to handle different currencies and exchange rates, and should be able to display the converted amount accurately
IT004	Test the app's ability to handle network connectivityissues	The app should be able to handlenetwork connectivity issues gracefully, and should provide appropriate error messages to the user
IT005	Test the app's user interface (UI) and user experience (UX)	The app should have a clean andintuitive UI, and should provide a seamless and user-friendly experience to the user

6.4 Ouput Testing.

The output test for a currency detector app aims to ensure that the app correctly detects the Indian Rupees denomination from 10 to 2000 and displays the appropriate output message. The test cases will check for valid denominations and display the detected amount in Rupees for denominations between 10 to 2000.

Input	Expected Output
10 INR	10 Rupees detected
20 INR	20 Rupees detected
50 INR	50 Rupees detected
100 INR	100 Rupees detected
200 INR	200 Rupees detected
500 INR	500 Rupees detected
2000 INR	2000 Rupees detected
NONE	Silent if no currency detected

The output test cases will verify that the currency detector app is functioning correctly and providing the correct output for various input scenarios.

CONCLUSION

In conclusion, the currency detector app for visually impaired individuals as a major project holds great potential to significantly enhance their financial independence, improve their quality of life, and promote inclusivity. By addressing a pressing need and leveraging technology, this project has the power to make a positive impact on the lives of visually impaired individuals around the world.

By leveraging advanced technologies such as image recognition, machine learning, and text-to-speech, the app can accurately identify and provide auditory feedback on different types of currency. This empowers visually impaired individuals to manage their finances, make accurate transactions, and participate more actively in economic activities.

Moreover, the app can promote financial inclusion by reducing the dependence on sighted assistance, allowing visually impaired users to handle their financial matters privately and securely. It can also mitigate the risk of falling victim to fraudulent practices or errors dueto the inability to identify different denominations.

The app's user-friendly interface and intuitive design make it accessible and easy to use for individuals with varying degrees of visual impairment. It leverages cutting-edge image recognition and machine learning technologies to deliver reliable and accurate currency identification results.

Overall, the development and implementation of a currency detector app for visually impaired individuals has the potential to greatly enhance their financial independence and quality of life.

FUTURE WORK

There are several potential directions for future work on currency Detector for Visually impaired is

1. **Improving accuracy:** One area for future work is to improve the accuracy of thecurrency detection algorithm. This can be achieved by using more advanced machine learning techniques, such as deep learning, and by expanding the dataset to include more variations of currency notes.
2. **Expanding to other countries and currencies:** Another direction is to expand the app tosupport other countries and currencies. This can be done by collecting and adding more currency images to the dataset and training the algorithm to recognize the differentcurrencies.
3. **Integrating with other apps and services:** The currency detector app can be integrated with other apps and services, such as mobile banking apps or shopping apps, to provide more convenience to visually impaired users.
4. **Real-time currency exchange rates:** The app can provide real-time currency exchange rates, allowing users to make informed decisions about currency conversions.
5. **Supporting multiple languages:** The app can support multiple languages, making it accessible to visually impaired users around the world.
6. **Improving accessibility:** The app can be further improved for accessibility by adding features such as voice commands, haptic feedback, and text-to-speech.
7. **Collaborating with organizations:** The app developers can
8. collaborate with organizations that support visually impaired individuals, such as blindness associations, to gather feedback and improve the app's usability and functionality.

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ORIGINAL RESEARCH PAPER

CURRENCY DETECTOR APP FOR VISUALLY IMPARED

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Abstract

The currency detector app, a software application utilizing a smartphone's camera, excels at identifying and distinguishing various currency notes. This proves invaluable for visually impaired individuals, granting them autonomy in managing financial transactions without external assistance. The primary challenge faced by those with visual disabilities lies in discerning paper currencies, as similar textures and sizes complicate differentiation between categories, causing obstacles in monetary dealings. This app serves as a solution by allowing blind users to verbally command the camera to capture an image of the currency note, subsequently utilizing speech-to-text technology to interpret their commands. The system employs the YoloV3 algorithm for currency recognition, processing RGB images. Furthermore, the app incorporates a text-tospeech mechanism to audibly communicate the identified value of the currency note. This comprehensive system on Android converges cutting-edge technologies to enhance accessibility and independence for visually impaired individuals in managing their finances. The primary issue that blind individuals encounter is that different categories of paper money have similar textures and sizes, making it difficult for them to distinguish between them. These folks find it very difficult to conduct financial transactions.

This programmer can assist those who are blind in identifying currency. With this software, visually impaired people can communicate by speaking and giving commands to activate the camera. The camera will then take a photo of the note and notify the user via

Keywords: Currency recoginition,YoloV3 algorithm, RGB image.

INTRODUCTION

A money detector app uses the camera on your smartphone to detect and identify different types of currency notes. This is especially useful for people who are blind or legally blind and may have difficulty identifying the denominations of bank notes by touch. The smartphone camera scans the currency note and the software analyzes the image to determine the note's denomination. The users are informed of this information through voice feedback. This allows them to manage financial transactions independently. According to the most recent research conducted by the World Health Organization, there are around 285 million visually impaired people in the world. In the Eastern Mediterranean Region, the estimated number of people with visual impairments is 12.6%, although they still need outside help. One of the main problems for people with visual impairments is their inability to discern between different types of paper money because of how similar the textures and sizes of the paper are. Thus, the purpose of our currency detector app is to solve this problem and provide blind individuals the confidence and security they need when interacting with money. All things considered, a currency detector software can be a useful resource for blind people who want to manage money transactions on their own. It is a

creative and useful approach that can raise their standard of living and provide them greater independence. For a number of applications, the capacity to recognize cash without human input is undesirable. Helping those who are blind or visually challenged is probably the most significant..

. There were about 165 visually impaired people for every lakh people. Eighty-two percent of them were blind, and eighteen percent had limited eyesight. The idea of using a laptop for money detection is interesting due to the recent advancements in laptop platforms. In this work, we create a straightforward template matching

method for the Windows platform using the SURF key point detector. We are providing a method where the camera recognizes currencies and sends the outcome through audio devices. One of the primary issues that those who are visually impaired resist is
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 There are two types in the currency recognition research field; Scanner-based and Camera-based. Scanner- based systems designed to scan the entire document. These kinds of systems are appropriate for currency counter equipment. Although camera-based devices do not capture the cash entirely, they may capture a portion of it. The majority of relevant studies in documentation are classified as scanner-based [2–5]. It is believed to allow visually impaired individuals to take a picture of any portion of the currency with their laptop, which the system will then use to identify and display the value. This article uses extremely basic image processing technology to teach camera-based Indian currency to be recognized, resulting in a very short processing time with acceptable authority. Current systems are capable of handling limited money capture and contrasting
illumination

LITERATURE REVIEW

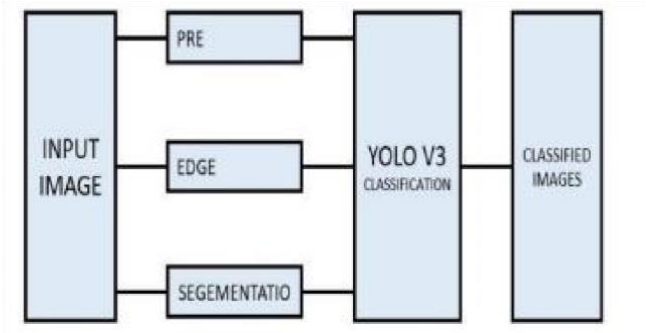
The ease of using cash for daily purchases persists despite the explosive rise of Master cards and other electronic payment methods. On the other side, those with visual impairments could find it challenging to tell apart various banknotes. For those who are blind or visually handicapped and find it difficult to conduct financial transactions, Currency Recognition Systems (CRS) can be of assistance. A money recognition system based on the YoloV3 and ORB (Oriented FAST and Rotated BRIEF) algorithms is proposed in this paper. Six types of Indian paper money are used to test the proposed method. As part of the suggested endeavor, we will develop a technique to recognize cash for Indian notes.**.** The first step is to preprocess the provided image input and convert it from an RGB to a grayscale image. After preprocessing, extract the inner and outer edges of the image using a Sobel method. We will cluster the data using the YOLO V3 approach. One feature at a time, it groups them to achieve this. Next, by comparing the image's properties, the YOLO V3 approach was used to classify the input image as 200, 500, or 2000, depending on whether it was 200z or not. The inability of people with visual impairments to discern between different paper money standards due to variations in paper size and surface is one of the main complaints they have with these standards. As a result, the purpose of this framework is to support a solution to address this issue so that people can feel secure and make financial decisions. In the subject of money acknowledgment study, there are two types: scanner-based and camera-based. Frameworks based on scanners are anticipated to review the full document. These kinds of frames are suitable for money counter equipment. While camera-based frameworks might capture a portion of the money, they do not actually catch the cash through a camera. The majority of relevant documentation works use the scanner-based sorting method. It is recognized to enable users who are physically incapable to seize any portion of the money using their PC, allow the system to identify it, and receive advice on its value in cash. For the purpose of prediction, the segment (short and longterm temporal patterns) is weighted appropriately for use in the regression model. As a result, the framework can incorporate pertinent long-term and short-term trends into the regression model, improving the accuracy of the predictions. A comprehensive experimental review has been carried out using an actual dataset that includes daily, weekly, monthly, and year data segments. The outcomes of experiment 5 demonstrate that prediction accuracy was enhanced by both short- and long-term temporal patterns. Furthermore, the suggested online dynamic camera-based Indian currency is ready for recognition with very little image processing hardware, meaning that the preparation time is incredibly low with the right placement. The existing frameworks can adjust to changing lighting conditions and handle money that is temporarily captured. As a solution to the common problem of blind users having trouble aiming, we provide in this project a mobile application for money identification that can identify Indian currency and help blind people in their daily lives. Region-specific audio is the project's end product. In terms of performance and recall value, the yoloV3 algorithm performs better. The use of the classification to contrast real and fake currency will be included to this project. There is room for additional foreign languages that are globally useful. creating a voice alert system for visually impaired

individuals that incorporates currency note detection on a low-end mobile phone. It may be expanded in the future to acknowledge foreign exchange offerings. Possibly the most important and fundamental foundation for helping someone who is unable to overcome obstacles is the assistive innovation. The reformist efforts to support an assistive innovation for people who are physically disabled are presented in this study. The framework is divided into two sections: the route part comes after the decision phase, which determines whether to choose cash or shade based on the client's request. The choice module will assist them in highlighting distinguishable evidence of various items surrounding the customer and cash division acknowledgement for installment payments. Lastly, an auditory yield is generated as standard language by employing the top-performing RPI camera to capture the money. The route section is used to identify obstacles and provide audio instruction using a text-to-speech converter module to help them free the route. Those who are physically challenged and use the braille script inserted into the new Indian currency notes can easily identify the note division. Therefore, we see this manual confirmation as the first approval, with the subsequent approval being tried based on the security string's HSV upsides. The creative turns that events and investigations have taken in our daily lives have made human-computer cooperation into an indispensable part of our routine. These developments will make it easier for those who are physically disabled to engage in some social activities. Thus, in order to assist those who are visually impaired in integrating into society and their environment, this project has been started as a respectable beginning for them.

RELATED WORK

Numerous ways for recognizing currencies have been proposed. The authors use computer vision to identify and categories four distinct currencies. The characteristics set the four distinct currencies apart in terms of texture, color, and shape. Artificial Neural Networks are used by them for classification. 93.84% was the average accuracy rate. Using a dataset of Jordanian cash, Iyad et al. created a mobile currency recognition system. Utilizing the Jordanian dataset and the scale-in variant feature transform (SIFT) algorithm, they implemented this technique on a smartphone. With paper money, the accuracy of the system was 71%, but with coin money, it was 25%. A mobile paper cash identification device that worked with Saudi Arabian papers was suggested by the author. The method for distinguishing paper money is predicated on a few fascinating details and commonalities between two images. For categorization, it makes use of the Radial Basis Function Network. It uses the Radial Basis Function Network for classification. With regards to Normal Non-Tilted Images, the system's recognition accuracy is 95.37%; for Noisy Non-Tilted Images, it is 91.65%; and for Tilted Images, it is 87.5%. Songbook plus other compositions. proposed a fast and efficient technique using metatemplate correlation matching and size data. Since banknotes vary in size, this information was considered a crucial characteristic. A total of fifty-five currencies from five distinct classes—EUR, KRW, RUB, CNY, and USD—were used to test this strategy. This method's results showed that it could classify normal banknotes with 100% accuracy and defiled banknotes with 99.8% accuracy It is suggested to use a non-parametric approach to identify paper currencies. The suggested approach is predicated on creating a non-parametric model for every category of paper money. By averaging every sample of a single banknote that is accessible, the model is created. By calculating the values of the coefficients between the tested banknote and the non-parametric models and matching on the basis of these values, the tested banknote can be identified. To obtain a nice image when capturing coin, the camera and currency must be positioned horizontally. This technique is tested on a variety of currencies and used on three different types of Saudi Arabian banknotes, with 100% recognition accuracy. Noiret al. employed the basic currency CRSF. This approach compares itself to the proposed method and makes use of the dataset that the proposed method used. The suggested method employs fundamental techniques such as image segmentation, equalization, extraction of regions of interest (ROI), and template matching based on correlations between the image that was obtained and the dataset stored in the database. The outcomes demonstrated that, after 12 seconds of operation, this approach can identify Egyptian paper money with a reasonable accuracy of 89%. Farid along with others. introduced a technique for recognition Mexican currency Susin synthetic eyesight [4]. This technique demonstrated that the texture, color, and characteristics of Mexican banknotes could be extracted for classification. For the purpose of identification, this technique makes use of the RGB color model and

local binary patterns. This approach has extremely poor accuracy. Jun fang teal. used the block LBP method, an enhanced LBP technique, to extract characteristics. The standard Local Binary Pattern (LBP) approach serves as its foundation. This approach is quick and very easy to use. The results of the trial shown that this enhanced method has an accuracy ratio of 92% to 98%, a high recognition rate, and robust light changes and noise. SUGGESTED



Technique The block diagram for the suggested

into two stages: online and offline. the offline stage, which builds the dataset from a pre-selected group of photos depicting Indian money. The suggested method is being used in the online phase to identify and detect the image of the unknown input money. The online phase consists of five steps: segmentation and ROI extraction procedures in steps two and three for removing the foreground currency from the background; ORB Algorithm application in step four; and, lastly, matching the outcomes with the dataset. The pre-processing techniques remove noise from the image and prepare it for the subsequent operations. The system uses the camera on any Android device as its input in the final stage, and it outputs a voice message informing the user of the currency's worth. We will provide a mechanism to identify

system is displayed in the figure. We are divided currencies for Indian Notes in the proposed work.

First, take the provided image as input, preprocess it, and then transform the RGB image to a greyscale image. Use the Sobel algorithm for the extraction of the image's inner and outer borders after preprocessing. YOLO V3 will be the algorithm used for clustering. wherein it creates a feature cluster one by one. The input image was then identified as being 200, 500, or 2000. Next, using the YOLO V3 method, the attributes of the image were compared to determine whether the image was actually 200, 500, or 2000. YOLO V3 technique: Convolutional neural networks are used in this object detection technique, which stands for "You Only Look Once." One of the most often used algorithms for object detection is you only look once, or YOLO. YOLO is a great option for real-time detection even though it isn't the most precise object detection technique. The accuracy loss is minimal when compared to other methods A detection method like YOLO finds objects' positions in addition to class labels, which sets it apart from other recognition systems. Therefore, in addition to categorizing the image, it will also identify several objects inside the image. The Full Image is processed by this algorithm using a single neural network. This implies that bounding boxes and probabilities are predicted by the network for each region that is created from an image. Next, we apply a weight to these bounding boxes based on the anticipated probability. The primary techniques, which serve as a foundation and are capable of

storage space. Segmentation is the process of dividing an image or text into sections that can be used for various image processing operations, like feature extraction, recognition, and so forth. Feature extraction: Feature extraction is the process of removing characteristics, such as text, symbols, and so on, that serve as necessary and vital elements Appreciation.

Problem Statement:

It is difficult for people who are visually impaired to tell different kinds of money notes apart, which makes it impossible for them to conduct independent financial transactions. Inconvenience, delays, and even possible financial loss could

result from this issue. As a result, a system or gadget that can reliably recognize various

handling the majority of the values under examination, were described and characterized as follows: image acquisition. Acquisition is the process of obtaining an image for processing from an external source, such as hardware-based systems. Binarization of an Image: Binarization is the process of converting a grayscale image to binary using a thresholding function. The image of the binary

document type will take up very little denominations of currency and give visually impaired people tactile or auditory feedback is required. To improve the quality of life for visually impaired people and allow them to conduct independent financial transactions, the money detector should be affordable, lightweight, and portable.

Existing System:

The majority of the hardware solutions used in the current system for cash recognition are impractical for the general public. The technology is unusual in that visually challenged individuals in India can simply and affordably use it. A visually challenged individual should find it easy to use the application Several algorithms are used in the current system, an image processing-based money recognition system (SIFT, FAST, ORB and SURF). Utilizing these algorithms for feature extraction and matching, the research focuses on Indian currency notes in particular. It is discovered that every algorithm has benefits and drawbacks after examining them. It is demonstrated through comparison that SIFT is significantly slower than SURF. SURF is more resilient than SIFT to many image modifications. In comparison to SIFT, it is also less dimensional. SURF's minimal computing cost makes it a better approach than SIFT. However, there are certain drawbacks to the SURF algorithm as well. In addition to being unstable under rotation, SURF exhibits improper operation when illuminated.

Drawbacks of an existing system:

1. A working internet connection is required for the application.
2. It's a scanner-based program that requires the user to input an entire currency note in order to obtain the intended results.
3. It is not efficient for low-power devices and is quite
4. The SIFT technique was used by the system to provide an accuracy of 71% for paper money.

PROPOSED SYSTEM:

In order to train our dataset and integrate it with the TF-lite quantized, floating point module in the programmer's asset folder, the Android application makes use of the Teachable Machine online software.

Images of various notes (Rs. 5, Rs. 10, Rs. 20, Rs. 50, Rs. 100, Rs. 500, and Rs. 2000) were collected and put into a dataset. There were roughly 200 notes in the dataset. The dataset's images were gathered under various conditions, including rotation, scaling, lighting, and views. The reference photos that were taken into consideration were the front and back of Indian Rupee notes. As a result, the collection included roughly 150 reference photos for each denomination.

Using this model, 1050 images are divided into 128 training images and 22 testing images for every denomination. Each image is then analyzed based on how well it matches the denomination. For every currency value, it creates numerous classes. by accurately determining the epoch value and uploading the image size. With programmers like Currency Recognition, we wish to execute the models locally so that the programmer is always usable—even in the event of a bad or unreliable internet connection. TensorFlow Lite is used in this project to classify images in our Android app. It's an open-source deep learning framework designed with inference on-device as its primary goal.

ADVANTAGES OF PROPOSED SYSTEM:

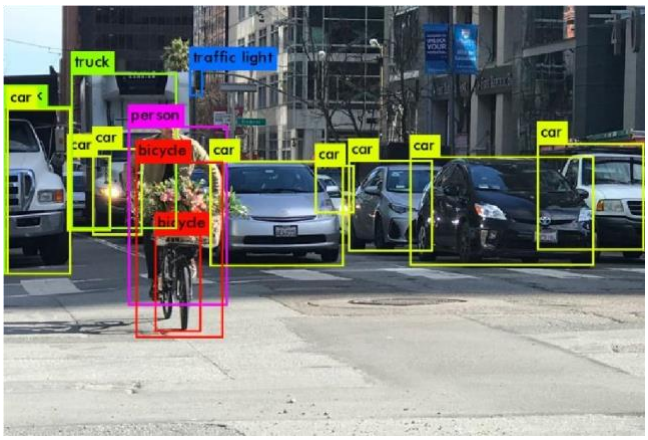
1. Greater independence: With the aid of a money detector app, people with vision impairments may recognize various denominations of currency on their own, without the assistance of others.
2. Increased accuracy: By correctly identifying various denominations of currency, the software reduces the possibility of misunderstanding and possible financial loss.
3. Easy to carry about and use anywhere: The application is portable and convenient, as it can be installed on a smartphone.
4. Cost-effective: Since a currency detector app removes the need to buy a separate equipment, it is typically less expensive than a dedicated currency detector device.
5. Customizable feedback: Depending on the user's preferences, the app may be made to deliver either tactile or aural feedback.
6. Easy to use: Most currency detector applications include an intuitive user interface that makes it simple for people with vision impairments to use t

YOLO V3 ALGORITHM:

An algorithm called "You Only Look Once" detects

objects by using convolutional neural networks. One of the most popular algorithms for object detection is you only look once, or YOLO. While it may not be the most precise object detection technique, Yolo is a great option for real-time detection. When compared to other algorithms, there isn't much accuracy loss. A detection method like YOLO finds objects' positions in addition to class labels, which
sets it apart from other recognition

Binarization of an Image: Binarization is the process of converting a grayscale image to binary using a thresholding function.
Very minimal storage space will be needed for the binary document type image.
Segmentation: The process of dividing a written document or picture into sections that are useful for image processing operations like recognition and feature extraction is called segmentation.
Feature extraction: Feature extraction is the process of removing characteristics, such as text, symbols, and so on, that serve as necessary and vital elements.
Recognition:



Teachable machine learning

An easy method for training machine learning models for object identification, sound classification, and image classification is offered by Teachable Machine, a browser-based platform. Teachable Machine's user-friendly interface and robust prebuilt models enable developers to construct unique machine-learning models for a variety of uses, such as currency recognition.
Teachable Machine image classification can be used to recognize and categories various cash denominations in the context of a currency detector project. The following are the procedures for developing a Teachable Machine image classification model for a money detector project:

1.Gather Information: Gathering an image dataset is the initial stage in developing an image classification model. This dataset would include pictures of various coin denominations in the context of a currency detector. The photos should ideally be of high caliber and display the cash in a variety of lighting conditions and orientations.
2. Upload Data to Teachable Machine: The picture categorization tool on the Teachable Machine site can be used to upload the dataset once it has been gathered. The pictures can be sorted into several groups, such $1 bills, $5 bills, $10 bills, and so on.
3.. Train the Model: The machine learning model can be trained following the organization and uploading of the dataset. Teachable Machine's default picture classifier is a deep learning model known as MobileNetV2. The programmer examines the dataset's photos during training to find characteristics shared by all currency categories.
. 4. Test the Model: A set of validation photos can be used to test the model once it has been trained. To guarantee that the model is able to generalize to new data, the validation images ought to differ from the training images. Teachable Machine is a useful instrument for evaluating the

the accuracy of the model and making changes to enhance its functionality

Android Studio

An Integrated Development Environment (IDE) for creating Android applications is called Android Studio. Based on the wellknown Java IDE IntelliJ IDEA, it is the official IDE for developing Android apps from. With its extensive feature set and toolkit, developers can easily produce feature-rich, aesthetically

pleasing, and high-caliber Android applications.

Normally, you would take the following actions in Android Studio to create a currency detector app:

1. Start a fresh project in Android Studio: Launch Android Studio, then start a fresh project.

Give your app a name and a package name.

2. Configure the user interface: To construct the user interface for your app, utilize Android

Studio's layout editor. To show the currency information and images, you can use a variety of widgets, including Text Views, Buttons, and Image Views.

3. Set up the camera: You must have access to the user's device's camera in order to detect the cash. To configure the camera in your app, use the camera library included with Android Jetpack.

4. Put the currency identification logic into practice. You can extract the currency from the camera stream by using a variety of machine learning tools and APIs. Google's ML Kit is a well-liked choice that offers pre-trained models for text recognition and object detection.

5. Show the detected currency: After the currency has been identified, you can show the relevant data and graphic on the user interface. To obtain the most recent exchange rates, use APIs such as Open Exchange Rates or Fixer.io.

6. Evaluate and implement: Lastly, make sure your app functions as intended by extensively testing it before releasing it on the Google Play Store and other app shops.

IMAGE CLASSIFICATION

1.The core functionality of an app for finding cash is image categorization. To determine the denomination of the currency, photographs of the currency must be analyzed. Convolutional neural networks (CNNs) and other machine learning methods can be used in a money detector app to classify images.

2. Preparing the images for analysis through preprocessing is the initial stage in image categorization. This entails applying different filters, like contrast enhancement and noise reduction filters, and scaling the photographs to a standard size. It also involves normalizing the pixel values.

3. Next, a CNN with several layers of neurons is fed the previously processed pictures. The preprocessed image is entered into the input layer, and features are extracted from the image by the following layers using a sequence of convolutions and pooling processes.

4.A dataset of tagged images is needed in order to train the CNN. A representative sample of photos for every denomination of cash should be included in the dataset. Next, using a backpropagation algorithm to modify the weights of the network's neurons, the tagged images are used to train the CNN. Reducing the error between each image's expected and actual output is the main objective of the training process.

5. New photos of cash can be classified by the CNN once it has been taught. The new image is sent into CNN, which generates a probability distribution over the range of potential monetary denominations. The predicted denomination for the input image is then chosen based on whatever denomination has the highest likelihood.

6. Using CNNs for image classification in a currency detector software, one may rapidly and precisely determine the denomination of different kinds of money. However, the CNN's design, the pre-processing methods employed, and the caliber of the training dataset all affect how accurately the classification is made.

TensorFlow

A well-liked library for developing and implementing machine learning models in online applications is TensorFlow.js. TensorFlow.js can be used in a currency detector app to identify various currencies from pictures of banknotes. TensorFlow.js might be applied in the following ways to a currency detection app:

1. Gather and prepare training information: Building a currency detector software starts with gathering a sizable dataset of banknote photos that have been tagged. It is necessary to preprocess these photos and convert them into a format that can be utilized to train machine learning models.

1. Train a machine learning model: TensorFlow.js is used to train a machine learning model after the training data is ready. With the help of attributes like colour, texture, and pattern, the model may be trained to distinguish between various currencies.

3. Install the model in a web application: TensorFlow.js may be used to install the trained model in a web application. With the help of a photograph that the user uploads, the app can use the model to identify the cash.

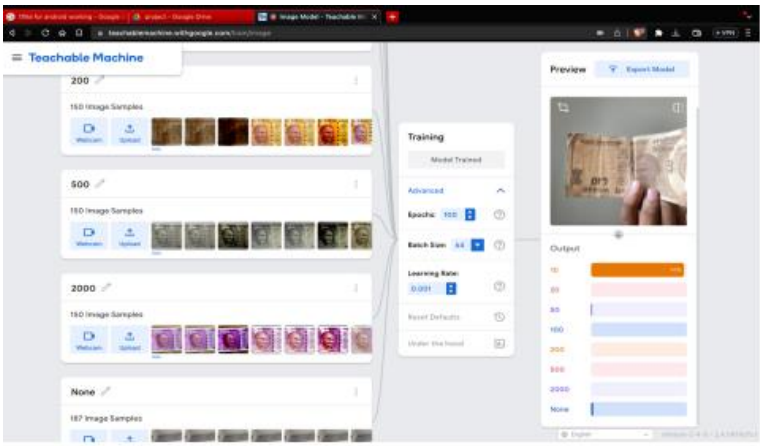
4.

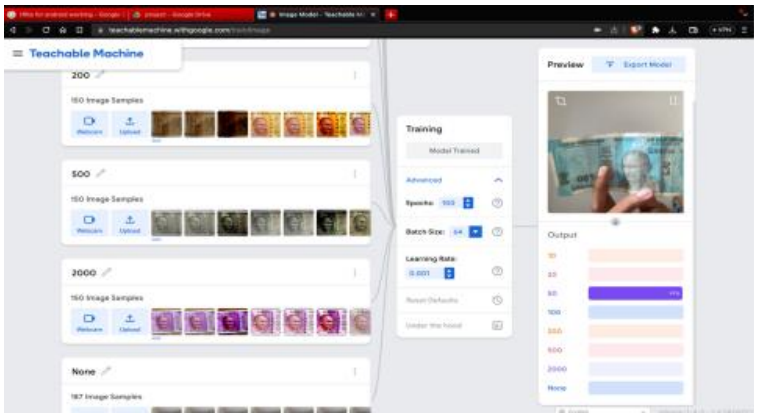
RESULT

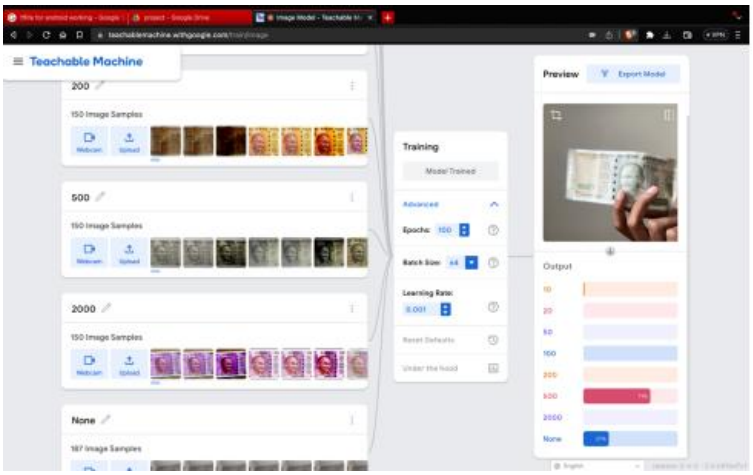
The proposed system detects the object through mobile camera and provide voice

output for currency. Warns against obstacles and detects the right currency. The project solves basic problems faced by the visually impaired. The Recognition System was designed with the concept that it should function well with just voice commands. This was easily developed with Tensorflow and Android Studio. With Google Assistant, voice commands can be used to launch the application. Text-to-speech tools can then be used to conduct other tasks using voice commands..

RESULT:







CONCLUSION

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. The yoloV3 algorithm has better performance and recall value. This work will be extended to apply the classification to compare the original or forgery currency. It is possible to add foreign languages that can be used worldwide. To develop recognition of currency notes on a low-end mobile phone for Visually Impaired persons and notify the user by voice note in regional language. In the future, it can be extended to recognize foreign currency

FUTURE SCOPE

Future research on the cash detector for visually impaired could go in a number of ways.

1. Accuracy improvement: Increasing the money detection algorithm's accuracy is one area that needs more effort. This can be accomplished by adding additional currency note variations to the dataset and utilizing more sophisticated machine learning methods, including deep learning.
2. Adding support for more currencies and countries: Adding support for more currencies and nations is another step in the app's expansion. This can be accomplished by gathering additional money photos, adding them to the dataset, and teaching the algorithm to distinguish between the various currencies.
3. Integrating with other apps and services: To give visually impaired customers greater convenience, the currency detector app can be combined with other apps and services, including mobile banking apps or shopping apps.
4. Real-time currency exchange rates: By offering users access to real-time currency exchange rates, the app enables them to make well-informed decisions when converting currencies
5. Multilingual support: The app is available to visually impaired users worldwide and supports a number of languages.
6. Enhancing accessibility: By include features like text-to-speech, haptic feedback, and voice commands, the software can be made even more accessible.

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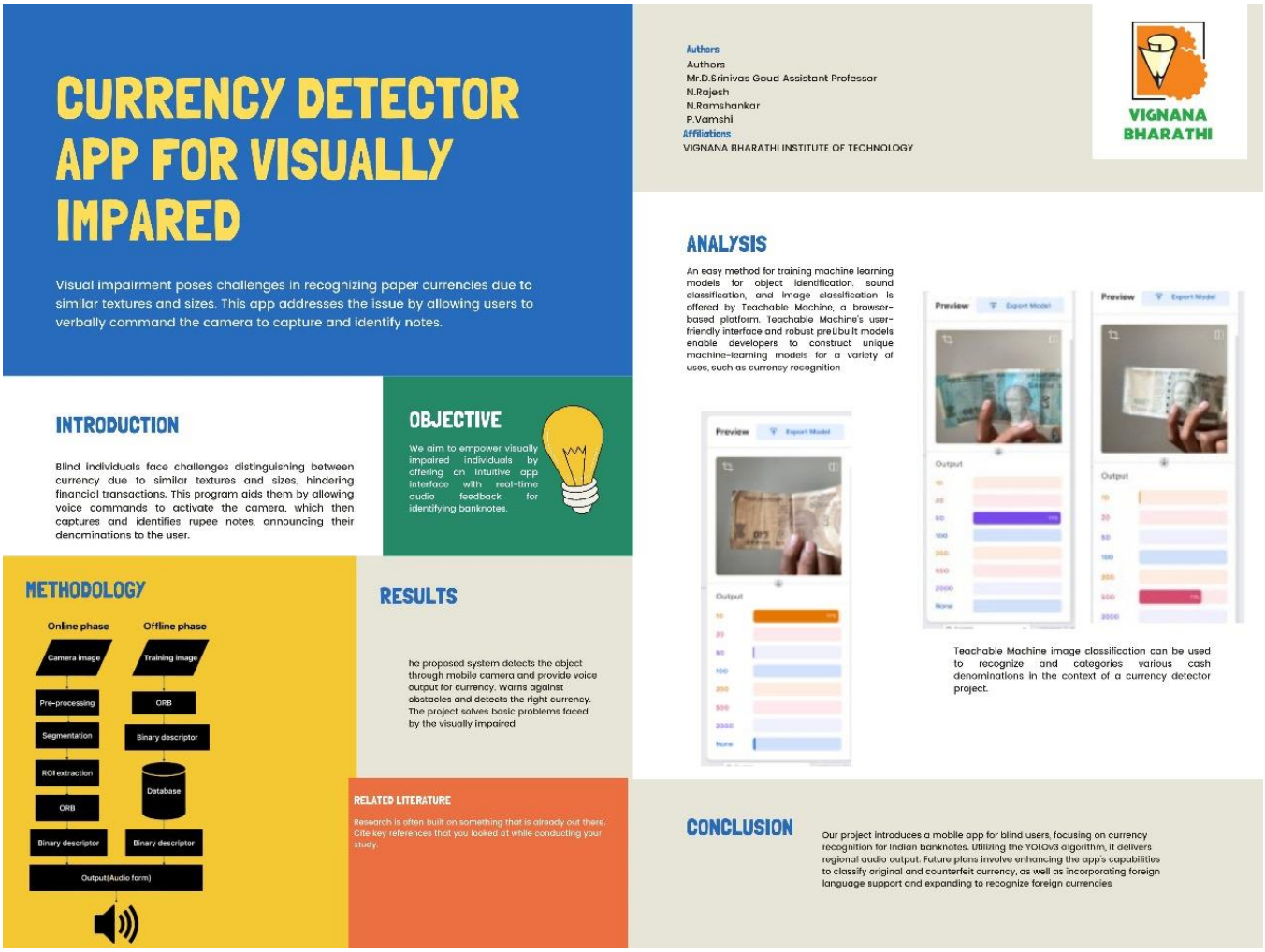
POSTER


CURRENCY DETECTOR APP FOR VISUALLY IMPARED
Visual impairment poses challenges in recognizing paper currencies due to similar textures and sizes. This app addresses the issue by allowing users to verbally command the camera to capture and identify notes.
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INTRODUCTION
Blind individuals face challenges distinguishing between currency due to similar textures and sizes, hindering financial transactions. This program aids them by allowing voice commands to activate the camera, which then captures and identifies rupee notes, announcing their denominations to the user.
OBJECTIVE
We aim to empower visually impaired individuals by offering an intuitive app interface with real-time audio feedback for identifying banknotes.
ANALYSIS
An easy method for training machine learning models for object identification, sound classification, and image classification is offered by Teachable Machine, a browser-based platform. Teachable Machine's user-friendly interface and robust preUbuilt models enable developers to construct unique machine-learning models for a variety of uses, such as currency recognition
Preview
Export Model
Output
Teachable Machine image classification can be used to recognize and categories various cash denominations in the context of a currency detector project.
METHODOLOGY
Online phase
Offline phase
Camera Image
Pre-processing
Segmentation
ROI extraction
ORB
Binary descriptor
Training Image
ORB
Binary descriptor
Database
Binary descriptor
Output(Audio form)
RESULTS
he proposed system detects the object through mobile camera and provide voice output for currency. Warns against obstacles and detects the right currency. The project solves basic problems faced by the visually impaired
RELATED LITERATURE
Research is often built on something that is already out there. Cite key references that you looked at while conducting your study.
CONCLUSION
Our project introduces a mobile app for blind users, focusing on currency recognition for Indian banknotes. Utilizing the YOLOv3 algorithm, it delivers regional audio output. Future plans involve enhancing the app's capabilities to classify original and counterfeit currency, as well as incorporating foreign language support and expanding to recognize foreign currencies