IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 5, June 2025
Impact Factor: 7.67

Drishti: A Currency Detection Application for Visually Impaired People

Poonam Sadafal[1], Aayan Mundhekar[2], Snehal Kothawade[3], Hibah Momin[4], Hamza Khan[5]
Assistant Professor, Dr. D. Y. Patil College of Engineering and Innovation, Pune, India[1]
Students, Dr. D. Y. Patil College of Engineering and Innovation, Pune, India[2,3,4,5]

Abstract: *This introduces an image-processing-based mobile application that recognizes currency denominations and is sensitive to voice feedback, assisting visually impaired people. This research bridges a quite broad gap in the available assistive technology, as it is relatively fast and robust in providing a currency-handling solution.*

Keywords: Image processing, Visually impaired persons, Object recognition, Currency exchange, Accessibility

I. INTRODUCTION

This examine goals to fill the hole within the monetary inclusion of the predicted 285 million people with visible impairments at some stage in the world. Through our pro- gressive technique, together with TensorFlow and deep gaining knowledge of algorithms, we can create a transportable, green, and consumer-friendly forex detection system. using innovative image class strategies, the device identifies forex denominations and provides audio output allowing visually impaired customers to autonomously manage their account. through improved access to their economic independence, dignity, and quality of life, the project aims to significantly and meaningfully empower the community of the visually impaired.

II. MOTIVATION

Financial independence is a basic issue of human dignity and empowerment, however for the envisioned 285 million people worldwide who live with visual impairments, managing personal budget may turn out to be a very challenging task. Even simple tasks such as reading currency denominations of- ten require external help, thus further eroding the individual's sense of self-reliance. With an aim to create a more inclusive global village, this mission aims to tap into the energies of innovation to bridge that economic inclusion divide amongst the visually impaired community. We are looking forward to arming them with the tools in developing an on-hand, portable foreign currency detecting device to hold sway over their finances. This project is driven by the vision of making a world where every person, regardless of his or her physical condition, will fully participate in economic activities and take full control over their financial futures with confidence and dignity.

III. OBJECTIVES

1. Design a portable, user-friendly app the visually impaired can quickly use to see and control money denominations.
2. Deep learning knowledge Algorithms; Use TensorFlow and higher deep learning algorithms to correctly classify the denominations of the Indian currency based on their visible forms and characteristics.
3. Real-time audio output- the system needs to be able to produce audio output in real time so that the visually challenged person can identify the currency without visible supports.
4. Beautify Financial Independence Enable the visually challenged with a device that supports economic independency, which in turn minimizes their reliance on others.
5. Optimize for performance and Accuracy: Focus on ensuring that the machine performs well while maintaining very high accuracy in most environments, including low light or cluttered background.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 5, June 2025
Impact Factor: 7.67

IV. LITERATURE SURVEY

The literature review discovers three significant researches on currency reputation systems between 2020 to 2024. In 2020, Kalpna Gautam presented a MATLAB-based method for Indian currency reputation, although it was limited to high- resolution images and had some hidden features such as water- marks. Latest, Harinakshi C. Nehal et al. introduced a camera- on-glasses wearable device for the visually challenged. The MobileNet ANN and OCR were used for currency popularities and reading textual content in a real-global environment. However, it required guide initiation of photo capture. Each of these studies contributed to moving the development of currency recognition systems forward, but also pointed out areas of potential improvement as well as research.

V. SCOPE

The objective of this project would be to come up with an intuitive mobile application that allows blind or visually impaired people to interpret and interact with a foreign currency by giving real-time audio feedback. Major areas include:

1. Software development: - Use TensorFlow and deep learning to come up with an image classification machine for the purpose of identification of currencies. - Real-time audio feedback on identification of currency.
2. User Interface and Accessibility: -Develop an intuitive, accessible app from anywhere and has user friendly interface.
3. Platform Support: The application should be compatible with iOS and Android devices and also reportedly provide its offline version to let the facility in no-network areas.
4. Model Training and Test: Train the deep learning model on various datasets for different currencies, then validate its precision by conducting a test in real-time with impaired users.
5. Deployment and Outreach: The app will be installed in major application stores and partnered with businesses to sell its use, thereby improving the economic independence of visually impaired customers worldwide.

VI. METHODOLOGY

This study describes a mobile-based currency detection sys- tem for a visually impaired person. The real-time classification is based on MobileNet V2. The following are the steps taken in developing this system:

1. Data Collection and Preprocessing Now, the collection of various currency note images with several denominations and conditions was conducted. The resized image of 224x224 pixels is normalized and also augmented through transformation like rotation and adjustments in brightness. This would ensure uniformity and robustness in the training of the models.

2. Model Selection and Training Using the MobileNet V2 CNN optimized specifically for use on mobile, this model was used for currency classification. The code implemented transfer learning from weights pre-trained from ImageNet. Fine-tuning of a model resulted in an 80-10-10 split on the currency dataset. Model training utilizes Adam optimizer and categorical cross-entropy. A confidence threshold was set to request recapture of image when predictions made are unsure.

3. System Integration The system was combined into the mobile app, which had the following:

- Camera Module: Where the currency images were to be captured.
- Image Preprocessing: This is used to resize and normalize the inputs to the CNN. CNN Inference: This was employed for real-time currency classification with MobileNet V2.
- Text-to-Speech Engine: This was for announcing the detected currency denomination to the user. In case the level of confidence was low, it would solicit the user for recapture of the image .
- Performance Evaluation The accuracy of the system has been checked in conjunction with processing on mobile devices in real-time, and the resulting balance between performance and usability.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 5, June 2025
Impact Factor: 7.67

VII. ALGORITHM

It uses MobileNet V2. That is a light weighted CNN which has been optimized to run efficiently on mobile devices by using depthwise separable convolutions with reduced compu- tational complexity without sacrifice of accuracy.

- Transfer Learning: Its weights are initialized from Im- ageNet dataset, and later adapted into customised currency images to learn to recognize specific features of currencies.
- Training Process: This model uses the Adam optimizer and categorical cross-entropy as the loss function to optimize and classify correctly. The dataset is then further split into sets of training, validation, and testing for finetuning the model for currency classification.
- Currency Classification: Image Preprocessing: The cap- tured images resized to 224×224 pixels and normalized. Fea- ture Extraction: Using MobileNet V2, features are extracted using depthwise separable convolutions. Classification and Confidence Score: The model classifies the currency based on output probabilities, and a confidence score is computed. If such a score is above the threshold, then the system would say it out through text-to-speech; otherwise, it would request recapture.

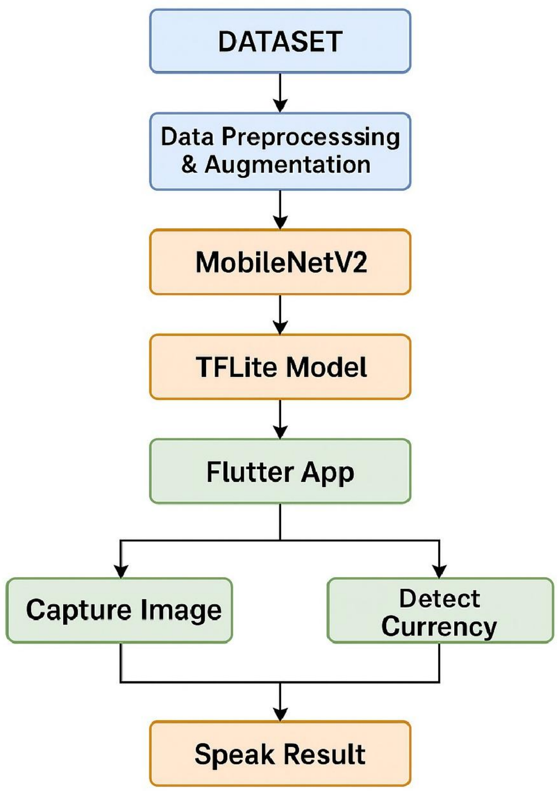


Fig. 1. Flowchart of Currency Detection System

VIII. ARCHITECTURE

The system is developed to assist visually challenged in- dividuals in identifying various denomination currency notes using a mobile device. Currency detection for a visually im- paired person using CNN (MobileNet V2) architecture utilizes MobileNet V2, which is a lightweight and efficient CNN model optimized for deployment on mobile. The currency image will be captured through a mobile application and then preprocessed to send it into a CNN. MobileNet V2 is applied to classify the currencies by matching the features to a pre- built currency database. Once the note is specified, the output will be communicated to the user through the Text-to-Speech Engine. This architecture provides an easy, portable solution to empower visually impaired users in handling currency confidently.

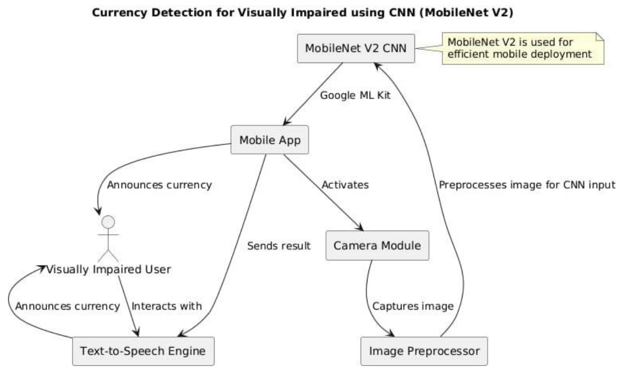


Fig. 2. Architecture of Currency Detection System

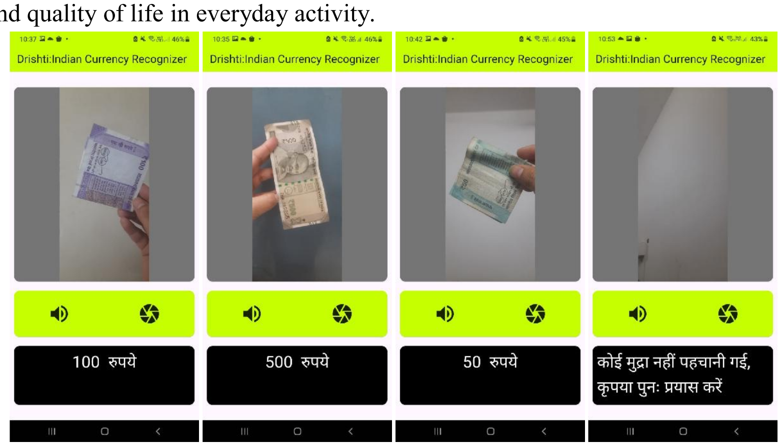
• Image Capture: Capture the photograph of the note ob- tained through the smartphone camera.
• Image Preprocessing: Resizes and normalized the image before using it in the CNN.
• Currency Classification: This preprocessed image was categorized by MobileNet V2 to compare features with that of the database of currency.
• Result Announcement: The noted one is announced through Text-to-Speech engine, which further lets the visually impaired user identify the note.

IX. RESULTS

Using transfer learning and the MobileNetV2 architecture, the implemented model was able to successfully recognize Indian currency notes. The final trained model's high accuracy on the validation set demonstrated its efficacy in differentiating between denominations. When the system was converted to TensorFlow Lite and incorporated into a mobile application, it demonstrated strong performance in real-time testing, offer- ing dependable predictions and Hindi audio feedback. These outcomes satisfy the requirements for developing a quick, portable, and precise assistive tool for people with visual impairments.

X. CONCLUSION

This challenge engages TensorFlow, deep learning, Flutter, and Dart in the extension of an app designed specifically for Indian currency detection. It brings the possibility of an actual-time audio remark facility for the budget management of the visually impaired. As it is user-friendly and supported various Android devices, it works offline, ensuring access in various environments. Specializing in Indian foreign money, the initiative focuses on the economic inclusion gap for a visually impaired user base within the country. The app thus sells independence to these users and enhances their autonomy, dignity, and quality of life in everyday activity.



DOI: 10.48175/IJARSCT-27705

IJARSCT

International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

ISSN: 2581-9429

Volume 5, Issue 5, June 2025

Impact Factor: 7.67

REFERENCES

[1]. A. Bhowmik, ”A Comprehensive Survey on Banknote Recognition Systems for Visually Impaired People,” IEEE Access, vol. 10, pp. 19849-19872, Jan. 2022.

[2]. Y. Zhu, ”Deep learning-based banknote recognition for visually impaired people,” Pattern Recognition Letters, vol. 145, pp. 53-59, 2021.

[3]. S. Sharma, ”Indian currency detection and denomination using deep learning,” Journal of Information and Optimization Sciences, vol. 40, no. 7, pp. 1511-1525, 2019.

[4]. Parlocha, R. K., Makinano-Santillan, L. C. (2019). ”Banknote denomination recognition using deep convolutional neural network.” 2019 IEEE 11th International Confer- ence on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment, and Management (HNICEM), 1-6.

[5]. Karthikeyan, V. (2019). ”A novel approach for Indian currency denomination recognition and fake note detection.” Cluster Computing, 22(1), 57-66.

[6]. Agarwal, S. (2020). ”Currency recognition for visually impaired using deep learning.” 2020 International Conference on Emerging Trends in Information Technology and Engineer- ing (ic-ETITE), 1-4.

[7]. Rahman, M. A. (2020). ”An automated system for currency detection and recognition in Bangladeshi banknotes.” 2020 IEEE Region 10 Symposium (TENSYMP), 1491-1494.

[8]. Sreekanth, M., Sukumaran, B. (2020). ”A deep learning- based real-time system for visually impaired people to recog- nize currency.” 2020 4th International Conference on Trends in Electronics and Informatics (ICOEI), 993-997.

[9]. Tian, M. W. (2021). ”Recognition of banknotes for visually impaired people based on visible light positioning.” IEEE Access, 9, 131171-131182.

[10]. Ashraf, R. ”Banknote recognition for visually impaired people: A cost-effective and user-friendly mobile solution using deep learning.” IEEE Access, vol. 9, 2021, pp. 47751- 47762.

[11]. Sarker, M. I. H. ”A deep learning-based assistive system to classify Indian currency notes for visually impaired people.” Informatics in Medicine Unlocked, vol. 23, 2021, p. 100520.

[12]. Pham, T. D. (2022). ”A robust banknote recognition system for visually impaired people based on ensemble deep learning.” Expert Systems with Applications, 202, 117152.

[13]. Shukla, D. ”BanknoteNet: An efficient deep learning model for banknote recognition.” 2023 7th International Con- ference on Trends in Electronics and Informatics (ICOEI), 1139-1144.

[14]. Kumar, A. (2023). ”Currency recognition for visually impaired using transfer learning.” 2023 International Confer- ence on Computer Communication and Informatics (ICCCI), 1-6.

[15]. Nair, R. R. (2024). ”YOLO-based Indian currency detec- tion and recognition system for visually impaired.” Intelligent and Cloud Computing, 675-684.

[16]. P. V. Sadafal and R. H. Borhade(2013). ”Secure Cluster- ing Algorithm for WSN,” International Journal of Emerging Science and Engineering (IJESE), vol. X, no. X, pp. xx-xx, ISSN: 2319–6378.

DOI: 10.48175/IJARSCT-27705