TITLE: Mobile Application For Environmental Recognition and Navigation for Blind People.

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Abstract

In the pursuit of creating an inclusive environment for visually impaired individuals, a novel mobile application has been developed, leveraging the synergy of voice detection, image processing, and speech output technologies. This application, designed with the Flutter framework, integrates YOLOv5 model from Kaggle for real-time object and price identification, providing a tactile sense of the market environment through auditory feedback .

This system stands as a testament to technological innovation aimed at improving the quality of life for the visually impaired. It not only offers a practical solution to daily challenges but also embodies a commitment to accessibility and empowerment, paving the way for a more inclusive society.
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Introduction

Imagine a world where the barriers faced by individuals with visual impairments are significantly reduced, especially when it comes to something as essential as shopping.

The system I propose is called EchoNav and it's an innovative mobile application, crafted with the elegance of Flutter, designed to transform the shopping experience for the visually impaired. This isn't just an app it's a companion that speaks in the language of care and accessibility.

Through the seamless integration of voice detection, cutting-edge image processing with YOLOv5 from Kaggle for object and recognition, this app becomes the eyes for those who need it most. The journey doesn't end there—our Text-to-Speech engines ensure that every detail is conveyed in clear, audible speech, making shopping an enjoyable and independent adventure.

Envision a tool that not only identifies items but also empowers its users with the confidence to navigate markets with ease. This mobile application is more than a technological innovation; it's a heartfelt embrace, a step towards an inclusive society where quality of life is uplifted, and the world becomes a friendlier place for everyone.

This introduction aims to encapsulate the essence of the mobile application, highlighting its purpose and the positive impact it intends to have on its users' lives.

Aims and Objectives

Aim: Our goal is to enhance the independence and safety of visually impaired individuals by creating a navigation system that recognizes common indoor items like furniture and provides auditory guidance to avoid obstacles.

Specific Objectives:

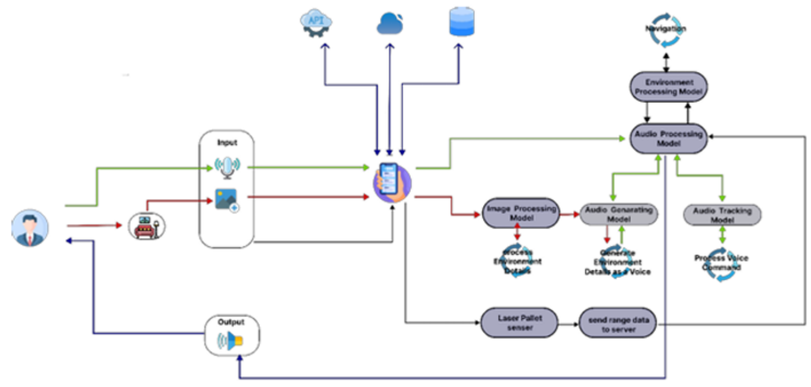
Image Recognition: Develop a function using the camera to identify and classify images, with machine learning to interpret photos and extract information, aiming to complete the app within one month.
Audio Feedback: Integrate text-to-speech technology for environmental and object descriptions, ensuring users receive clear auditory information, with a goal to finish integration in one month.
Text Recognition: Create algorithms for object and price recognition in markets, especially in crowded or dimly lit conditions, with a target to finalize within one month.
Smartphone Application: Develop a user-friendly smartphone app with image recognition and natural language processing, planning to launch within two months.
Indoor Navigation Assistance: Build a feature within the app for indoor navigation, using image processing to detect items like tables and chairs, aiming for a prototype ready for testing in one month.

Methodology

The technique provided for the system developed to aid visually impaired persons with market navigation offers an iterative and adaptable development strategy, which is closely related to the Agile methodology.

The usage of image processing and object identification technologies such as YOLOv5, as well as a TTS engine for voice output, suggests a project based on quick development and frequent testing. This is compatible with Agile techniques, which require frequent delivery of functioning software and allow for modifications at any stage of the development process.

The proposed system aims to improve market accessibility for those with visual impairments by integrating speech recognition and image processing technology. The system includes a camera, computer or mobile device, and software YOLOv5.

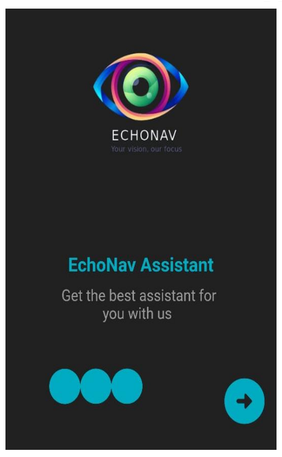


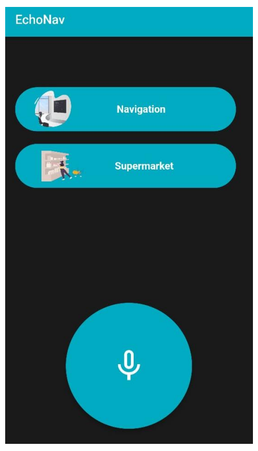
Results

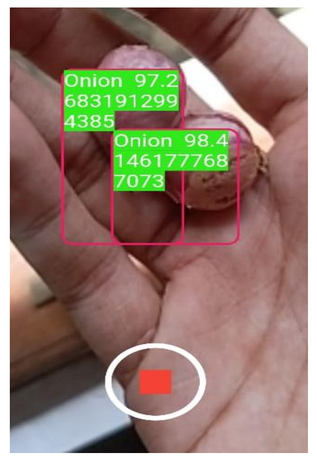
The technology uses a camera or a smartphone to take photographs of the items and processes them. Yolov5 is an open-source computer vision library. Various tasks, including picture filtering and object identification. and image recognition may be done using YoloV8 . The library is an excellent choice for this application since it provides a user-friendly interface for image processing. The YOLOv5 approach is utilized for object detection, which is the system's next component. Modern objects YOLOv5, an identification algorithm, can detect objects in real time. The software computes the By dividing the image into grid cells, you may determine the odds of a product appearing in each one. YOLOv5 is fantastic. This application benefits from its high accuracy and processing speed.

Yolov5 Pre-trained Models can be downloaded from Kaggle official website. TensorFlow Lite is an ML model format made by converting Yolov5 models into a smaller implementation model. You can use pre-trained models with TensorFlow Lite, tweak existing models, or develop your TensorFlow models and then convert the same to TensorFlow Lite format. TensorFlow Lite models can perform almost any task that regular TensorFlow models can: Object detection, NLP, pattern identification, and other operations on input data such as images, video, audio, or text. Finally, a text-to-speech (TTS) engine reads out the recognized objects in market place and also for easy navigation. The TTS engine translates text into speech, allowing blind people to hear product names. Then the algorithm will be transferred into the flatter application that I proposed. This TTS engine model also can be downloaded from TensorFlow. I downloaded all the models for my project from Kaggle

This isn't just an app it's a companion that speaks in the language of care and accessibility. This is an overview of the application.







Conclusions

In conclusion, the suggested system may change how people with visual impairments access markets. It combines voice detection and image processing technologies utilizing YOLOv5 from Kaggle for object and price identification, respectively. The method may assist to eliminate some of the challenges that people who are visually impaired encounter while going shopping and improve their quality of life overall by offering a practical and dependable alternative.

The Justification for this project aims comes from the necessity to fill these gaps. The project aims to construct a comprehensive system that incorporates image processing and speech detection for environmental recognition and navigation, resulting in a more smooth and intuitive experience for users. The goals are defined with the idea of creating a solution that is not only technologically advanced, but also accessible, user-friendly, and attentive to the various demands of the visually impaired community.

References

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