VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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Bachelor of Engineering in Computer Science & Engineering

Third Year

Mini project Synopsis on

Smart vision

Submitted By

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Introduction:

Smart Vision is an Android app designed to assist visually impaired individuals by recognizing objects in their surroundings and providing immediate spoken feedback. By leveraging machine learning and text-to-speech technology, Smart Vision aims to enhance accessibility, making it easier for blind users to understand and interact with their environment. Through real-time object recognition and audio feedback, this app promotes independence and confidence, helping users navigate spaces with greater ease.

Problem Statement:

Visually impaired individuals face challenges in recognizing objects and navigating unfamiliar spaces. The solution offers a cost-effective, real-time approach to enhance spatial awareness and independence through object detection and spoken feedback.

Objective:

The objectives of Smart Vision are:

1. To provide real-time spoken descriptions of objects to visually impaired individuals.
2. To reduce reliance on external assistance for navigating and recognizing surroundings.
3. To enhance the daily mobility and independence of visually impaired users.
4. To create an affordable and user-friendly mobile application.

Scope of the Project:

Smart Vision aims to provide visually impaired users with an accessible, mobile solution for object recognition. The app will:

- Recognize and label a variety of everyday objects in real-time.
- Announce detected objects through audio feedback, allowing hands-free use.
- Offer a minimalist interface with a single-button activation for ease of use.
- Support customization options for spoken feedback, making it adaptable to user preferences.

This scope is focused on Android devices, with potential for expansion to other platforms. Future versions of the app could include additional object categories, language support, and expanded accessibility options.

Technical Requirements:

1. **Platform**: Android (using Flutter for potential cross-platform support).

2. **Object Detection Model**: TensorFlow Lite with MobileNet SSD model for efficient, on-device object detection.

3. **Programming Language**: Dart (using Flutter framework).

4. **Key Dependencies**:

   - `tflite_flutter`: TensorFlow Lite integration.

   - `camera`: For real-time video feed.

   - `flutter_tts`: For text-to-speech functionality.

5. **Device Requirements**: Android devices with camera and audio output capabilities.

Methodology:

1. **Model Selection and Configuration**: Build new MobileNet SSD model in TensorFlow Lite to detect common objects in real-time.

2. Flutter App Development: Build a simple user interface in Flutter that provides one-touch activation of object detection.

3. Camera Integration: Use the `camera` plugin to access real-time video feed.

4. Object Detection Processing: Pass frames to the TensorFlow Lite model to identify objects, applying preprocessing and filtering to ensure detection accuracy.

5. Audio Feedback Integration: Utilize `flutter_tts` to convert detected object labels into audio feedback.

6. Performance Optimization: Optimize frame capture and model inference to balance real-time detection with efficient battery usage.

7. Testing and Evaluation: Perform iterative testing with target users, gathering feedback to refine detection accuracy, audio clarity, and overall user experience.

Proposed Solution:

Smart Vision offers a practical solution to enhance the independence of visually impaired individuals through a mobile application that detects and speaks out objects in real-time. The app leverages TensorFlow Lite with the MobileNet SSD model for efficient, on-device object recognition, delivering accurate results without requiring an internet connection. By utilizing Flutter, Smart Vision ensures cross-platform compatibility, making it adaptable for future expansion. The app's minimalist, single-button interface and customizable audio feedback make it easy for users to operate without visual assistance, providing an accessible, hands-free experience that supports users in diverse environments, from home to public spaces.