Goal

- Our goal is to create a low-cost option other than the guide dog for the blind and visually impaired people. We implement a mobile application that detects and classifies objects from cropping image frames using a camera while offering the voice feedback feature to improve the usability of our application for the blind. Additionally, with the real-time location sharing feature, friends and family members of the blind can also track his or her location for a better safety.

Motivations and Objectives

- **Motivations**
  - The costs for most of current blind people assistants are high. For example, a guide dog costs about $60,000 in the process of training, and this process takes 1 - 2 years on average.
  - Most of current blind people assistants have limitations on the capacity. A guide dog is only able to serve for about 8 - 10 years, and it cannot recognize a specific object for blind people.
  - Android smartphones now popularize among people. Most of applications on Android devices are free and easy to use.

- **Objectives**
  - Object detection and classification
  - Obstacle distance measurement
  - Real-Time location sharing
  - Clear and accurate voice feedback

Research Challenges

- For our specific scenario, we need to train new models for object detection because the existing pre-trained models do not include the classifiers for specific traffic signs, road signs, etc.
- In addition, we need to design a system for obstacle avoidance which requires the distance measurements, while we have to find a good threshold for the voice feedback time-interval-wise.
- Accurate and far enough distance measurement requires professional sensors. Multiple sensors are needed for direction detection.
- Merging four different modules into one Android application.

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Methods

- **Procedures**
  - Our goal is to create a low-cost option other than the guide dog for the blind and visually impaired people. We implement a mobile application that detects and classifies objects from cropping image frames using a camera while offering the voice feedback feature to improve the usability of our application for the blind. Additionally, with the real-time location sharing feature, friends and family members of the blind can also track his or her location for a better safety.

- **Distance Measurement unit**
  - Image of distance measurement unit
  - Image of parts in the box

- **User Interface**
  - Image of homepage
  - Image of sidebar
  - Image of the system detecting objects
  - Image of the system tracking user in real-time

- **Object Detection**
  - Image of YOLO real-time detection system
  - Image of SSD pretty similar as YOLO

- **Distance Measurement**
  - Image of training the model

References

1. Tensorflow Object Detection API: [https://github.com/tensorflow/models/tree/master/research/object_detection](https://github.com/tensorflow/models/tree/master/research/object_detection)
3. Google Firebase: [https://firebase.google.com](https://firebase.google.com)