

VISUAL ASSIST - INTELLIGENT ASSISTIVE ANDROID APPLICATION FOR VISUALLY IMPAIRED

Abstract:

There are approximately 285 million visually impaired people all over the world, and this impairment hinders a lot of day-to-day activities. Several electronic assistive devices have been developed for the visually impaired in the past few decades. However, relatively few solutions have been devised to aid them in recognizing generic objects in their environment, particularly indoors. Nevertheless, research in this area is gaining momentum. Among the various technologies being utilized for this purpose, computer vision-based solutions are emerging as one of the most promising options mainly due to their affordability and accessibility. In this project, a mobile application is created which can be accessed through voice with the help of google assistant. This application can be used to identify common day-to-day objects (fed as datasets) around the user through the camera feed from an android mobile phone. The object along with its location is determined and can help the user to navigate to the object through voice output from the application with the help of Text-to-Speech synthesis. The datasets (containing more than 100 unique tags) are trained with more than 75,000 images with the help of Azure Custom Vision to yield highly accurate results (93.3% average precision). An image classifier is an AI service that sorts images into classes (tags) according to certain characteristics. Custom Vision allows you to create your classifications allowing you to specify the labels and train custom models to detect them. It is based on Deep Neural Nets and uses the ResNet, AlexNet, and Resnet-152 algorithms on image classification. The trained datasets are converted into a model and utilized to build the application. The application requires no additional space for storing the captured item's data (name and location) since the information is conveyed through voice in real-time. This application can be accessed through voice and requires no internet connectivity thus making it very systematic in the absence of light since it supports google assistant. Overall, the application is easily accessible making it a very efficient tool.

Pros:

- People with visual impairment can recognize the object in front of them.
- They can able tom control the basic application and feature with the help of the voice command feature.
- User interface and feature of this application make the user to access to it very easy.

Cons:

- Smartphones do not have a hardware keyboard that enables the user to input correctly with tactile cues. Without them, selected keys are likely to be incorrect and extra time will be required to confirm their correctness with visual or auditory feedback.
- The second largest problem was inaccessibility to and difficulty in using some apps and functions, which was reported by blind and low vision users.
- Inaccessible apps do not allocate alternative text to controls so that blind users cannot know their purposes.
- The third largest problem was poor quality and incorrect speech output of the screen reader, which was mentioned by blind and low vision users.
- A different question on smartphone use difficulties due to visual disability brought mostly the same answers, except some low vision users complained about difficulties in reading.