

AI Powered Visual Assistance for Visually Challenged using YOLOv3 Algorithm

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Abstract: *Visual impairment significantly limits independent access to information and daily activities for millions of individuals worldwide. Traditional assistive tools such as Braille are gradually becoming less practical, while commercial screen-reading software remains costly and inaccessible to many users. To address these challenges, this research presents an AI-based vision and voice assistant designed specifically to support visually impaired individuals through real-time, voice-driven interaction.*

The proposed system integrates machine learning, computer vision, and natural language processing to deliver intelligent assistance using a camera and microphone for environmental perception. Core functionalities include object detection, scene understanding, obstacle awareness, text-to-speech conversion, and personalized voice guidance. Visual data captured by the camera is processed through a structured pipeline consisting of image acquisition, pre-processing, object detection, and classification, followed by natural language generation for meaningful auditory feedback. Pre-trained deep learning models such as YOLO, SSD, or Faster R-CNN are employed and fine-tuned to enhance accuracy and performance in diverse real-world environments.

Speech synthesis enables clear and natural feedback, while optional speech recognition allows users to issue voice commands for seamless interaction. The system is designed with an emphasis on accuracy, speed, affordability, and ease of use, making it suitable for everyday navigation and smartphone-based applications. By improving situational awareness and accessibility, the proposed AI vision assistant aims to enhance independence, safety, and overall quality of life for visually impaired individuals.

Keywords: Visual Impairment, AI Vision Assistant, Assistive Technology, Computer Vision, Object Detection, Voice Assistant, Speech-to-Text, Text-to-Speech, Deep Learning, YOLO, Scene Understanding, Obstacle Detection, Natural Language Processing, Accessibility Technology