Object Classification and Direction Announcement Using YOLO for Visually Impaired Persons

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Abstract—**This project focuses on implementing a real-time object detection and direction announcement system using the YOLO (You Only Look Once) deep learning model. The system is designed to assist visually impaired individuals by identifying objects in their surroundings and providing directional audio feedback. The proposed model leverages YOLO for object detection and a custom audio system for announcement. Evaluation results demonstrate the effectiveness of the system in real-time scenarios.**

This document presents a comprehensive report on the development of a real-time object detection and direction announcement system using the YOLO (You Only Look Once) deep learning model. The system is designed to aid visually impaired individuals by identifying objects in their surroundings and providing directional audio feedback. The model integrates YOLO for object detection and a custom audio system for directional announcements. Evaluation metrics indicate significant accuracy and responsiveness in real-time scenarios.

Index Terms—**Objection detection, YOLO, visually impaired, Real-time systems, Python, Deep learning**

I. INTRODUCTION

Object detection and classification are integral components of computer vision, enabling machines to interpret visual data. These capabilities have far-reaching applications in autonomous driving, healthcare, and retail. In the realm of object detection, the YOLO algorithm has gained prominence due to its unique approach. Unlike traditional two-stage methods that are computationally intensive, YOLO treats detection as a single regression problem, dividing an image into a grid to predict bounding boxes and class probabilities simultaneously

The aim of this project is to develop a system using YOLO to classify objects and announce their direction, assisting blind people in navigating surroundings independently. The primary objectives include implementing the YOLO algorithm, training the model, and providing real-time directional announcements to enhance the navigation experience Ease of Use

II. LITERATURE SURVEY

Recent studies have explored various YOLO versions for assistive technology. He and Saha (2023) found that YOLOv8 outperformed other models in outdoor obstacle detection with 80% precision. Pratap et al. (2025) identified YOLO as the most viable choice for indoor navigation aids due to its speed and accuracy compared to SSD or Faster R-CNN. Other research has focused on specialized applications, such as real-time pill identification and bus detection.

III. METHOLOGY

The methodology follows a systematic approach to integrate real-time detection with audio feedback

A. System Architecture

The system utilizes a live camera feed as the input source. Frames are passed through a pre-trained YOLO (v5 or v8) model for object identification. The spatial positioning (left, center, right) is determined by analyzing bounding box coordinates relative to the frame division.

B. Voice Announcement & GUI

Detected objects and their positions are formatted into descriptive statements (e.g., "Bottle detected on the right") . These are converted to speech using a Text-to-Speech (TTS) engine. A Tkinter-based GUI facilitates user interaction with "Start" and "Stop" controls

IV. UNITS

The methodology follows a systematic approach to integrate real-time detection with
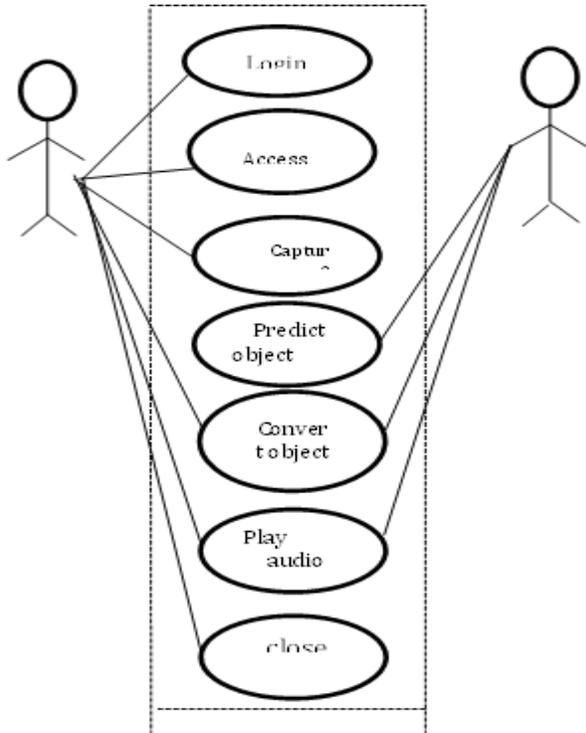

Fig No: 1 Use Case Diagram

V. DATA FLOW DIAGRAM

The methodology follows a systematic approach to integrate real-time detection with
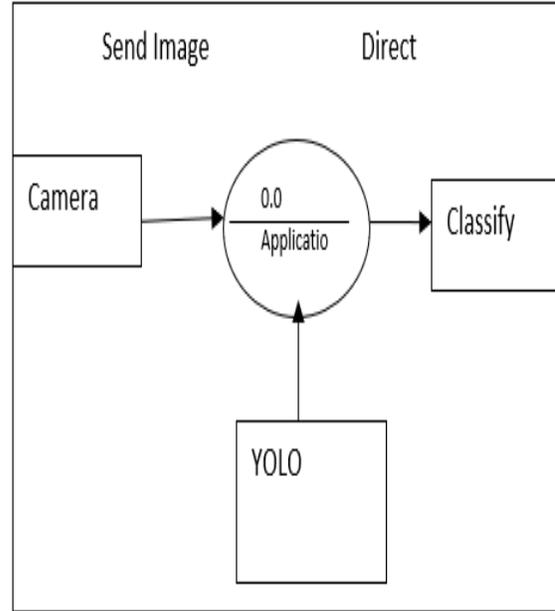

Fig No: 2 Data Flow Level 0

VI. IMPLEMENTATION & TESTING

The methodology follows a systematic approach to integrate real-time detection with

Test Case No	Input	Expected Output	Actual Output	Remarks
1	Show objects in front of camera	Detect object and classify object	Object detected and classified	Pass
2	Move object to right	Detect object and classify say object to right side	Object detected and classified as right side position	Pass
3	Move object to the left	Detect object and classify say object to left side	Object detected and classified as left side position	Pass
4	Move object to top	Detect object and classify object to top	Object detected and classified as up position	Pass
5	Move object to bottom	Detect object and Classify object to bottom	Object detected and classified as bottom position	Pass

VII. FUTURE ENHANCEMENT

Further project can be enhanced with more featured like book reading, pot hole identifications, steps identifications and lot more

VIII. CONCLUSION

A vision-based guidance module will be proposed to help visually impaired people using YOLO library which can be successfully applied for multiscale approach with great results for indoor applications.

The accuracy of the vision module could be improved by considering the parameter adaptation to the changing illumination conditions for real life environment

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