Hand Gesture Tracking in Videos using YOLO_V8

Student Names: Mian Wang, MSDS @ Portland campus

Professor Names: Jeongkyu Lee, Supervisor name: Mohammad Toutiaee

N Northeastern University
Khoury College of Computer Sciences

Introduction

In the "Guess Which Hand" game, a player hides an object in one hand, and another guesses its location. This project trains an AI to recognize hand positions and postures using 20 videos with annotated landmarks. The goal is to advance posture recognition for applications in gaming and human-computer interaction.

PROBLEM Definition

The task is to predict which hand holds the object in the "Guess Which Hand" game using video data. The AI must track hand gestures, detect landmarks (e.g., wrist, fingers), and handle challenges like occlusions and lighting variations. The output is a prediction of the object's likely hand location.

APPROCHES (or Methods)

Dataset Preparation: Preprocessed a dataset of 20 videos, including annotation and augmentation to ensure robust model performance across different scenarios.

Model Selection: Employed the YOLO (You Only Look Once) model for pose estimation and hand gesture tracking, leveraging its real-time object detection capabilities. Tried different versions like V10, V11, and V8 is best on metric.

Landmark Generation: Generated hand landmarks (e.g., wrist, thumb, index finger) and predicted results, which were saved as CSV files for analysis.

OUTCOME (or Results)

Accuracy: 85%

Conclusions

The YOLO model effectively tracked hand gestures and predicted the presence of the right hand in the "Guess Which Hand" game, demonstrating its potential for posture recognition tasks.

The generated CSV files provided valuable insights into hand landmark positions, enabling precise analysis of hand movements.

This project highlights the potential of AI in understanding human gestures, with applications in gaming, human-computer interaction, and motion analysis.

References

YOLO: Redmon, J., Divvala, S., Girshick, R., & Farhadi, A. (2016). *(CVPR)*.