

3D - Driver Distraction Detection

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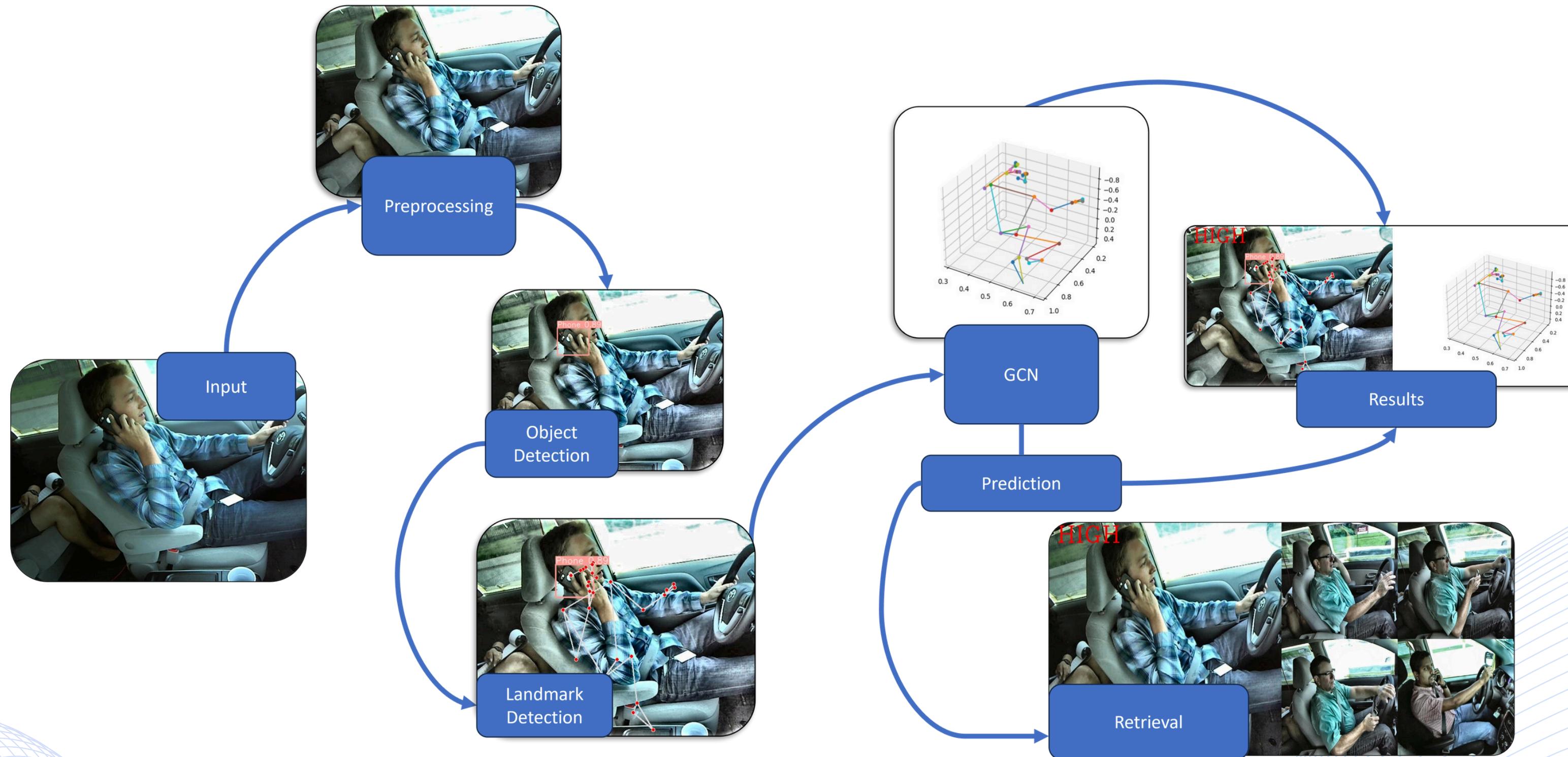
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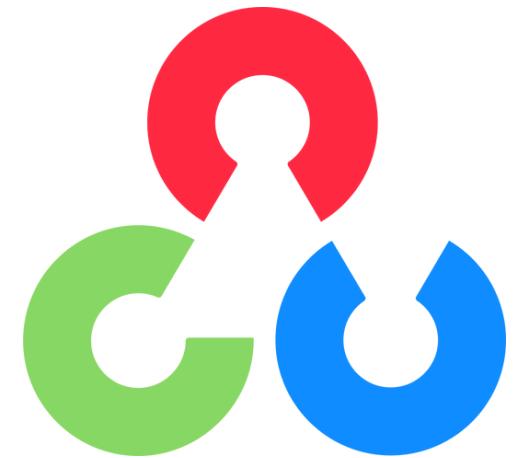
INTRODUCTION

- Driver distraction is a significant road safety concern
- Our system employs advanced Computer Vision and Machine Learning techniques to detect and mitigate distraction
- Our system offers precise driver behavior classification for enhanced safety
- Preliminary results show the potential for significant road safety improvements

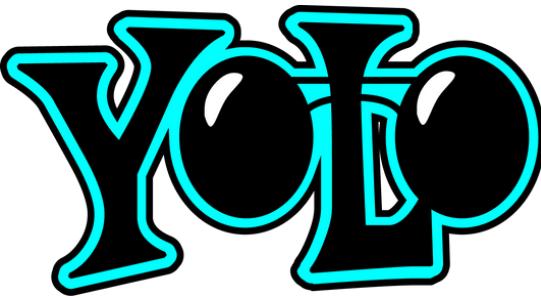
OVERVIEW



TECHNOLOGIES



OpenCV



YOLOv7



Mediapipe



PyG

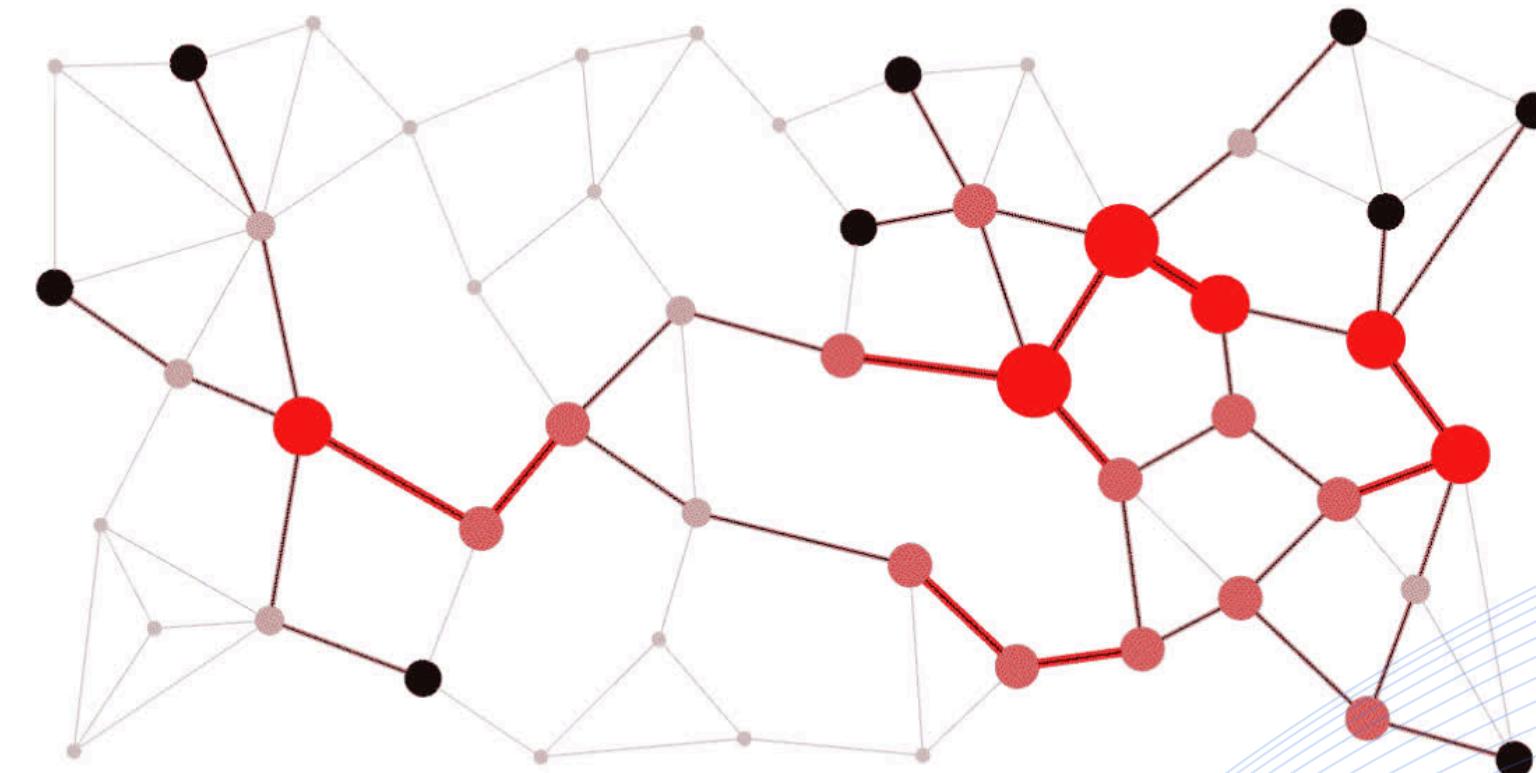


Faiss

GCN

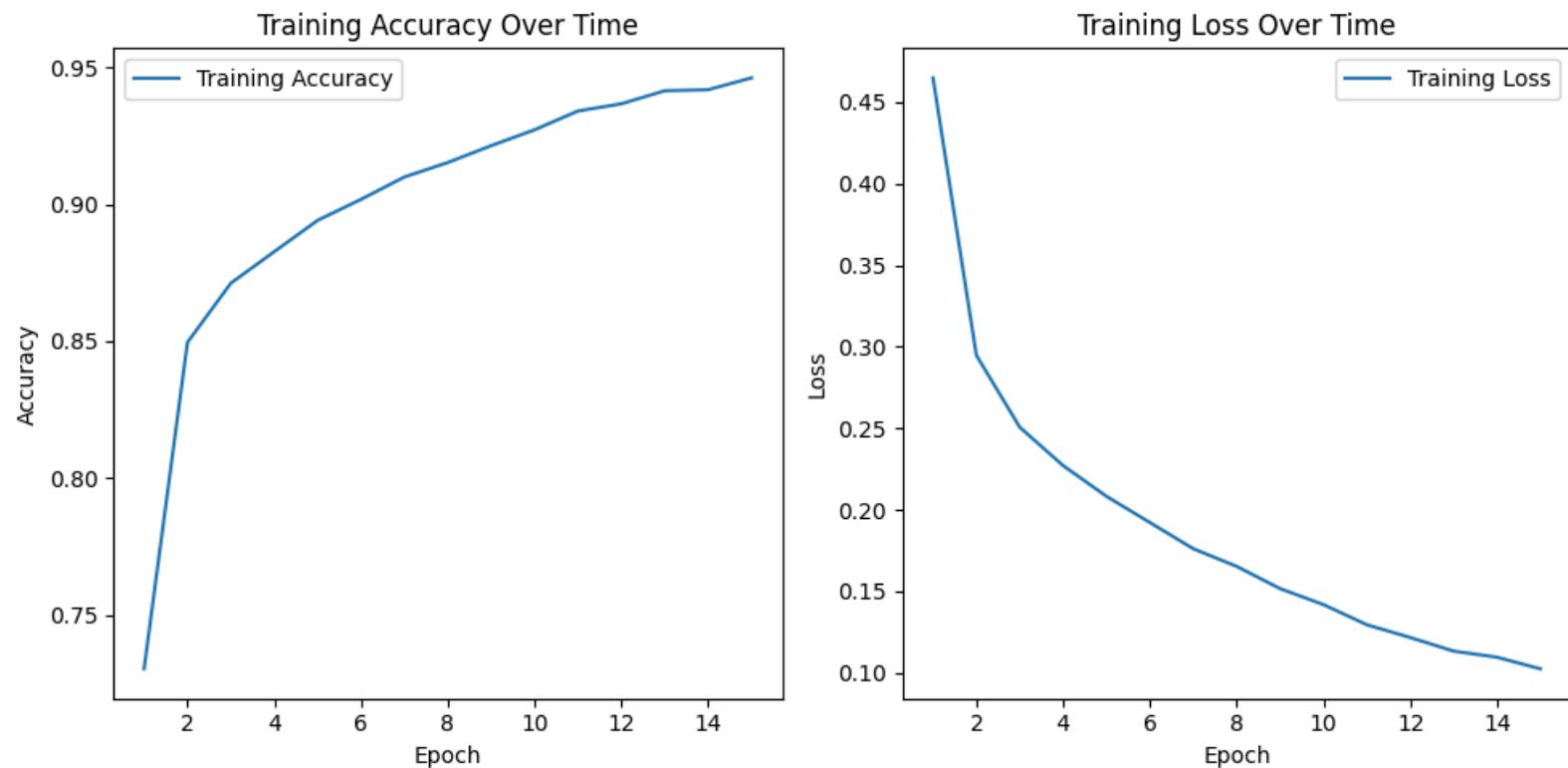
Graph Convolutional Network

- Goal: driver behaviour analysis
- Why a GCN?
- Architecture
 - GATConv Layer
 - Skip connections
 - Dropout Layers
 - Global mean pool



CLASSIFICATION

- Identification of five risk classes
- Best training run:
 - Average epoch accuracy: 0.90
 - Average epoch loss: 0.18



Class-specific metrics

CLASS	PRECISION	RECALL	F1 SCORE
ZERO	0.925	0.938	0.932
LOW	0.908	0.878	0.893
MEDIUM	0.891	0.889	0.890
HIGH	0.899	0.922	0.910
VERY HIGH	0.912	0.891	0.901

RETRIEVAL

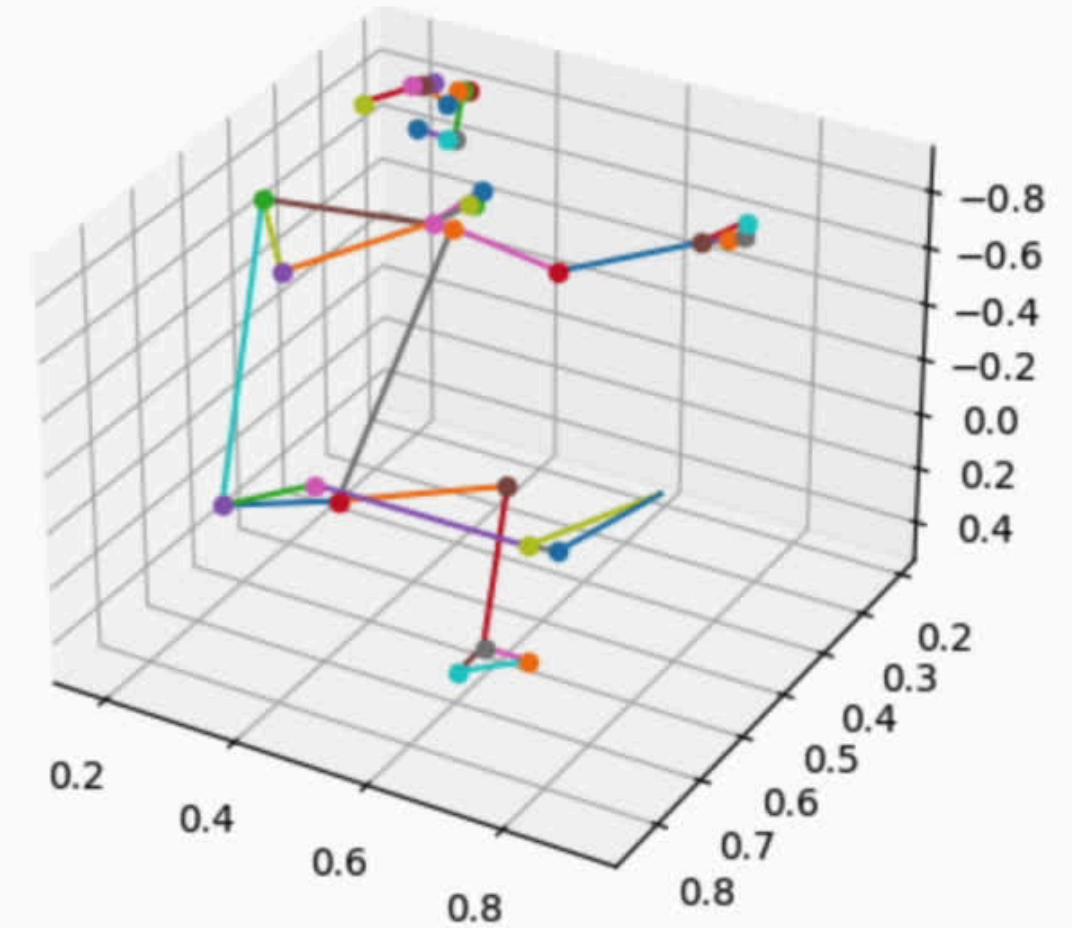
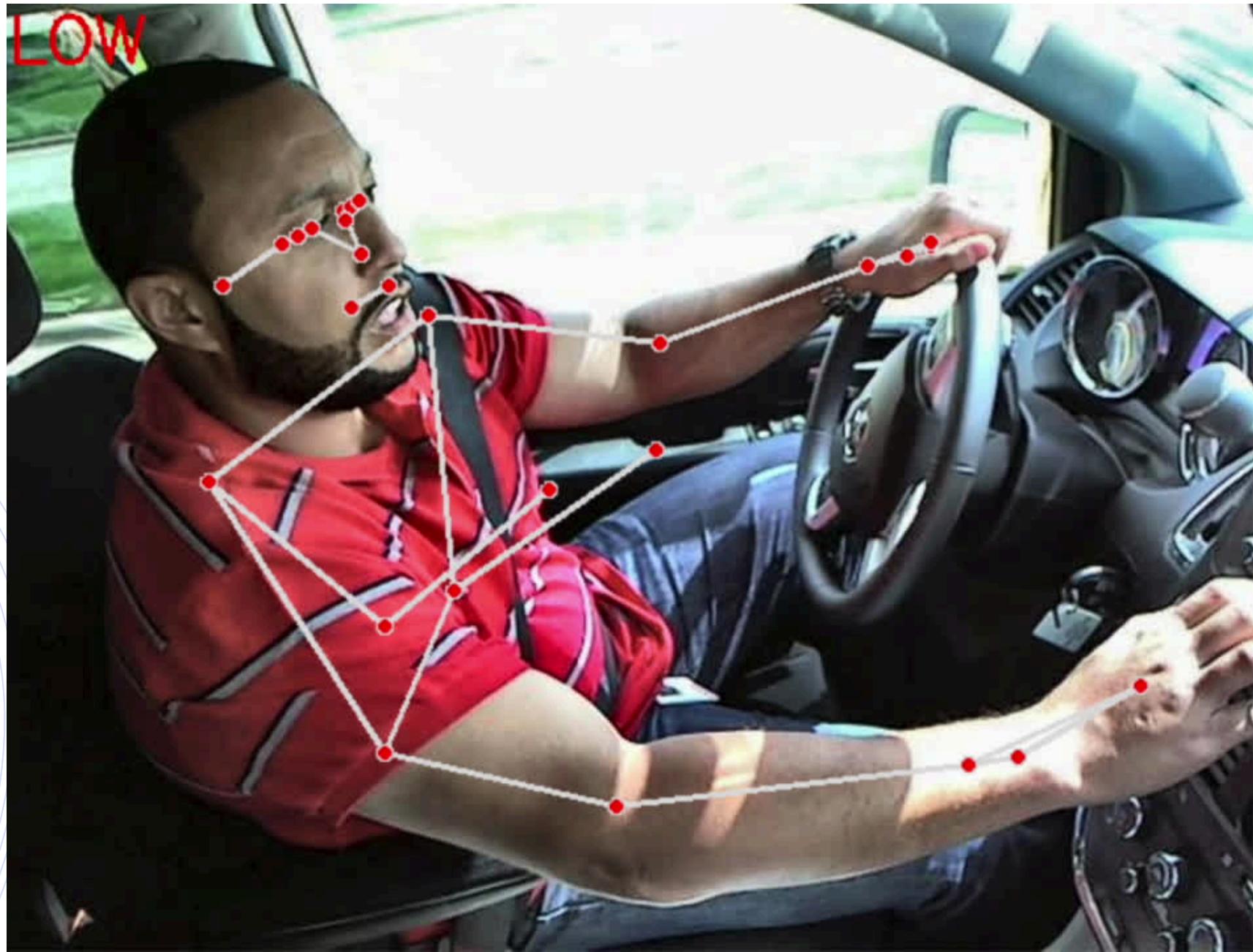
- Goal: cross-verification of KNN-based classification with GCN model classification.
- FAISS:
 - Dataset Embeddings
 - Query Embeddings
 - Index Matrix
 - Distance Matrix
 - IndexFlat2D



Query

K-neighbors

DEMO VIDEO - GCN



DEMO VIDEO - RETRIEVAL



CONCLUSION

- Effective Driver Distraction Mitigation
- GCN & YOLO Integrations
- Promising Performance
- Future Directions



THANK YOU
DRIVE SAFELY