PEOPLE COUNTING AND FACE RECOGNITION IN VIDEO BASED for Retail Analytic with YOLOv8-V10

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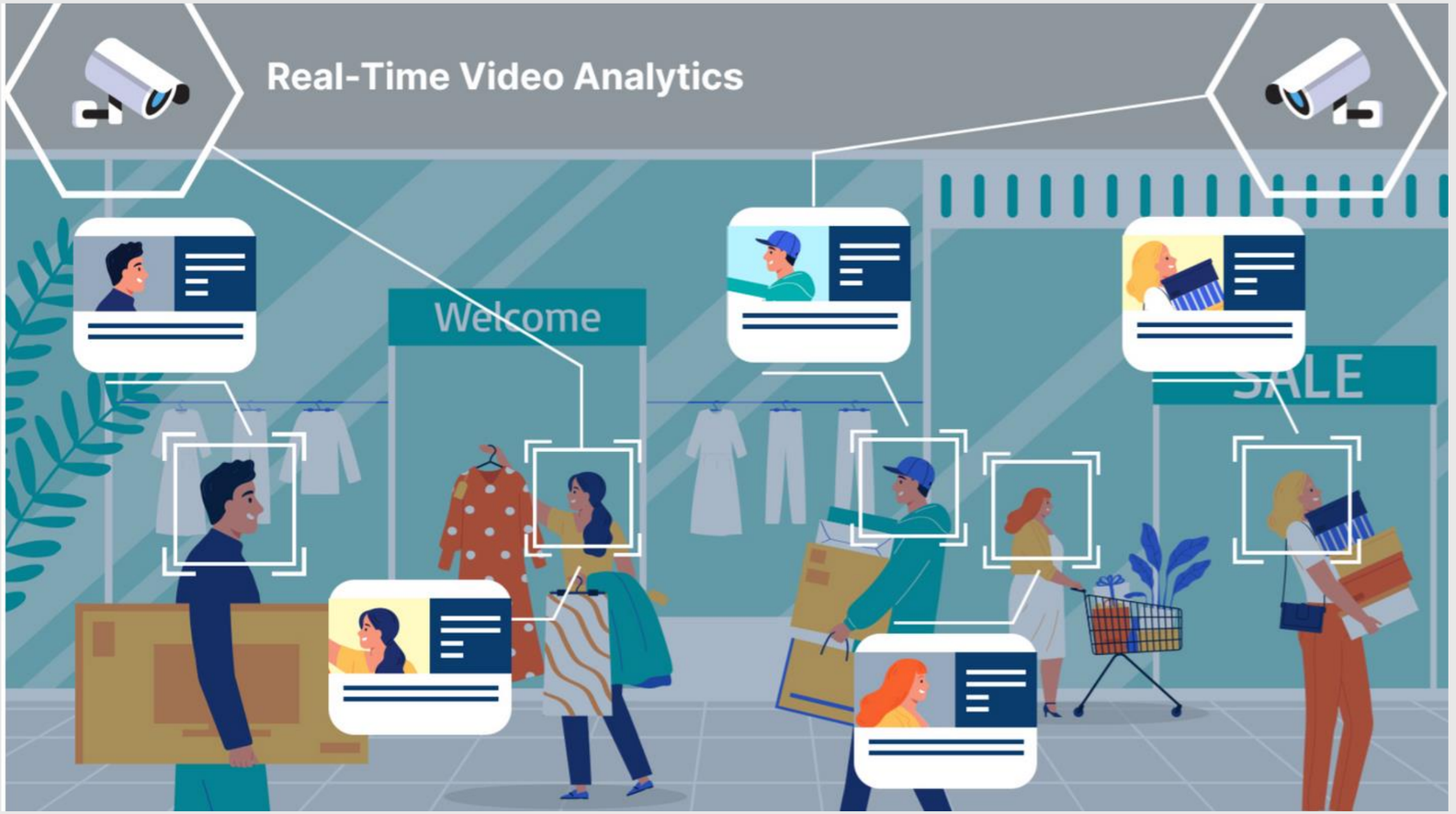
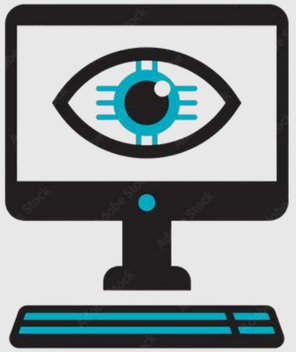
01: PROBLEM & SOLUTION AND OBJECTIVE WITH CHALLENGE IN PAPER RESEARCH

PROBLEM STATEMENT IN RETAIL ANALYSIS

- Record of cash register
- Credit Card

SOLUTION : REAL-TIME VIDEO ANALYSIS





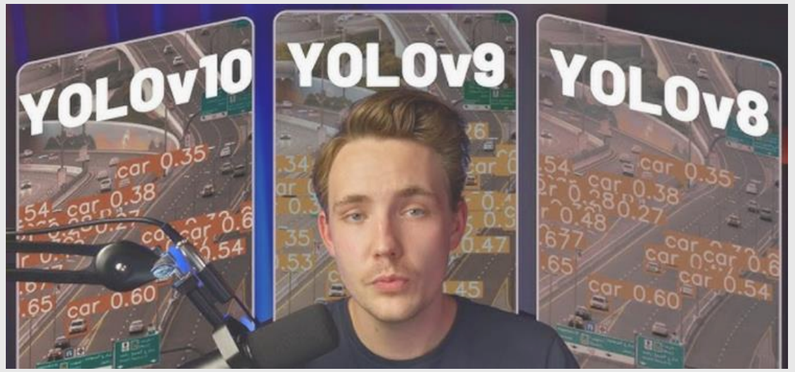
Computer vision

THIS PAPER RESEARCH ANALYSIS

- Customer’s gender and age group have different preferences
- Video analytics is
  - Age Estimation
  - Gender Recognition
  - Tracking customer counts at entrance and exit

OBJECTIVES

- Classify by age group and gender with computer vision
- Tracking count customers in entrance and exit
- Comparison performance accuracy of the YOLOv8, VOLOv9, VOLOv10
- Data visualisation



CHALLENGES AND GAP IN PAPER RESEARCH

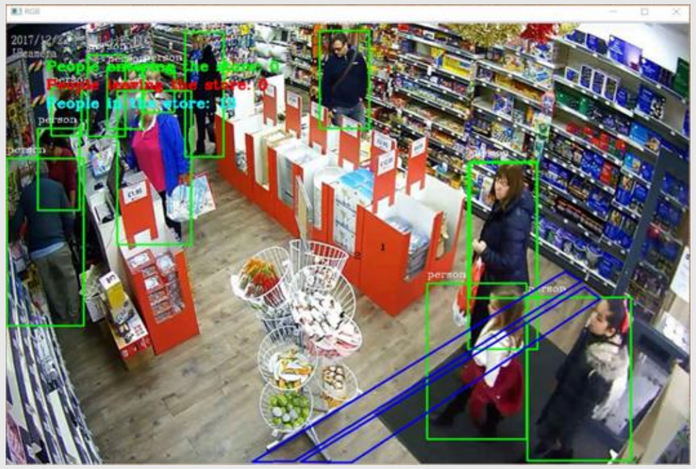
02: METHODOLOGY AND IMPLEMENTATION

METHODOLOGY

Datasets

1. The Adience dataset

2. The actual test video footage
   from hdcctvcameras.net



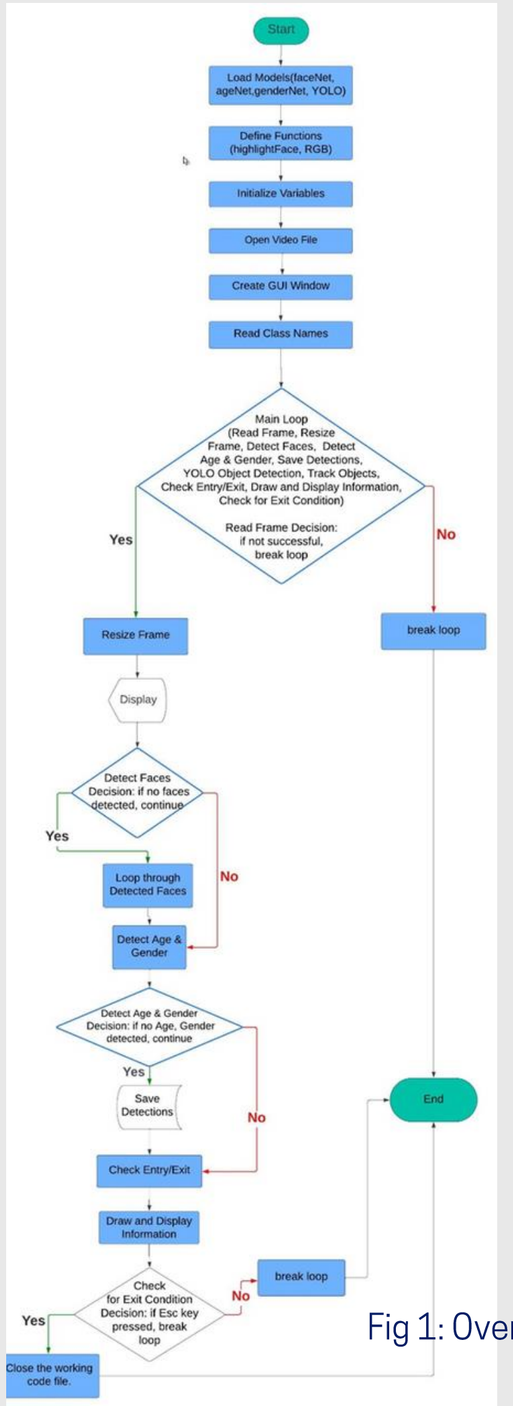


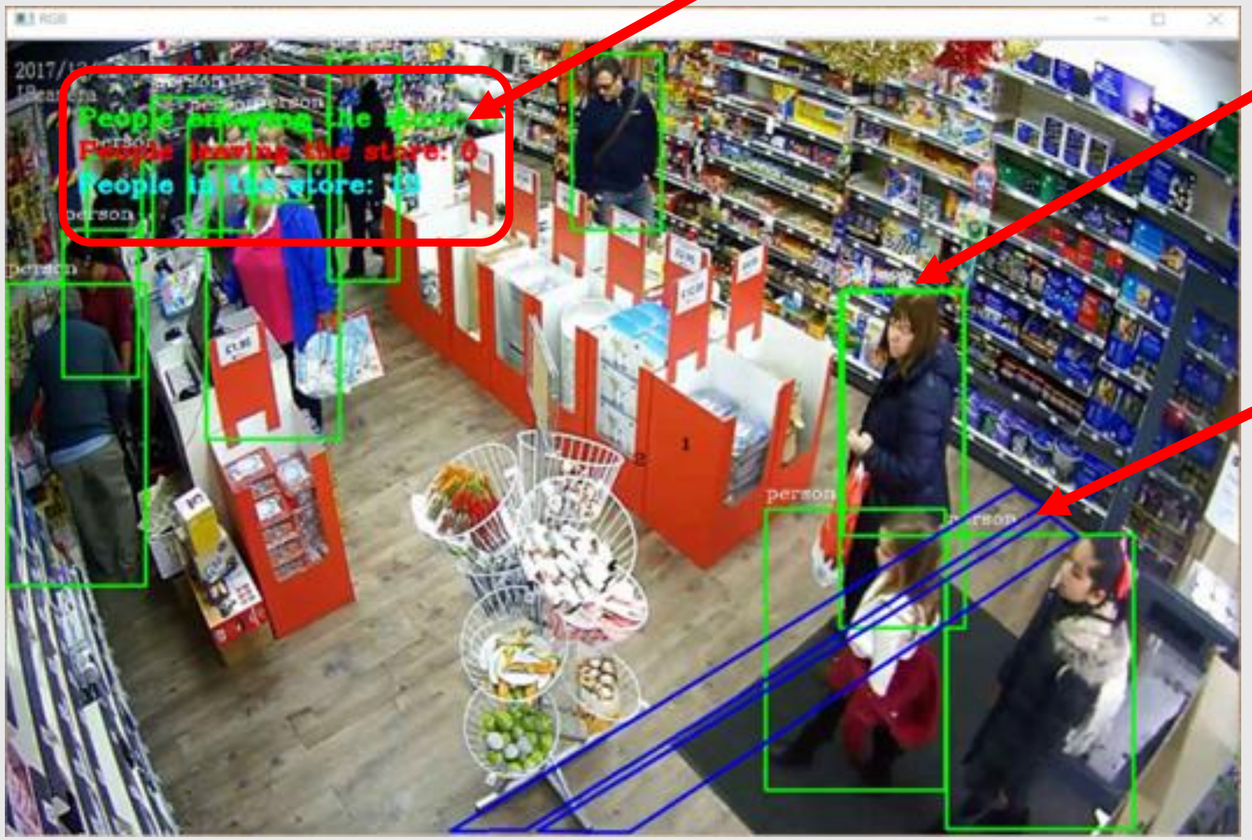
Fig 1: Overall flow diagram of face detection and people counting


```
{
    "id": 1,
    "gender": "Male",
    "age": "(60-100)",
    "position": {
        "x1": 725,
        "y1": 314,
        "x2": 780,
        "y2": 382
    }
```


Fig 2: Example a Json file

IMPLEMENTATION &TOOLS

People counting system



Function highlight : tracking face recognition

Draw Polygon for area 1 and area 2:

Counting people entering, exiting and currently in the store

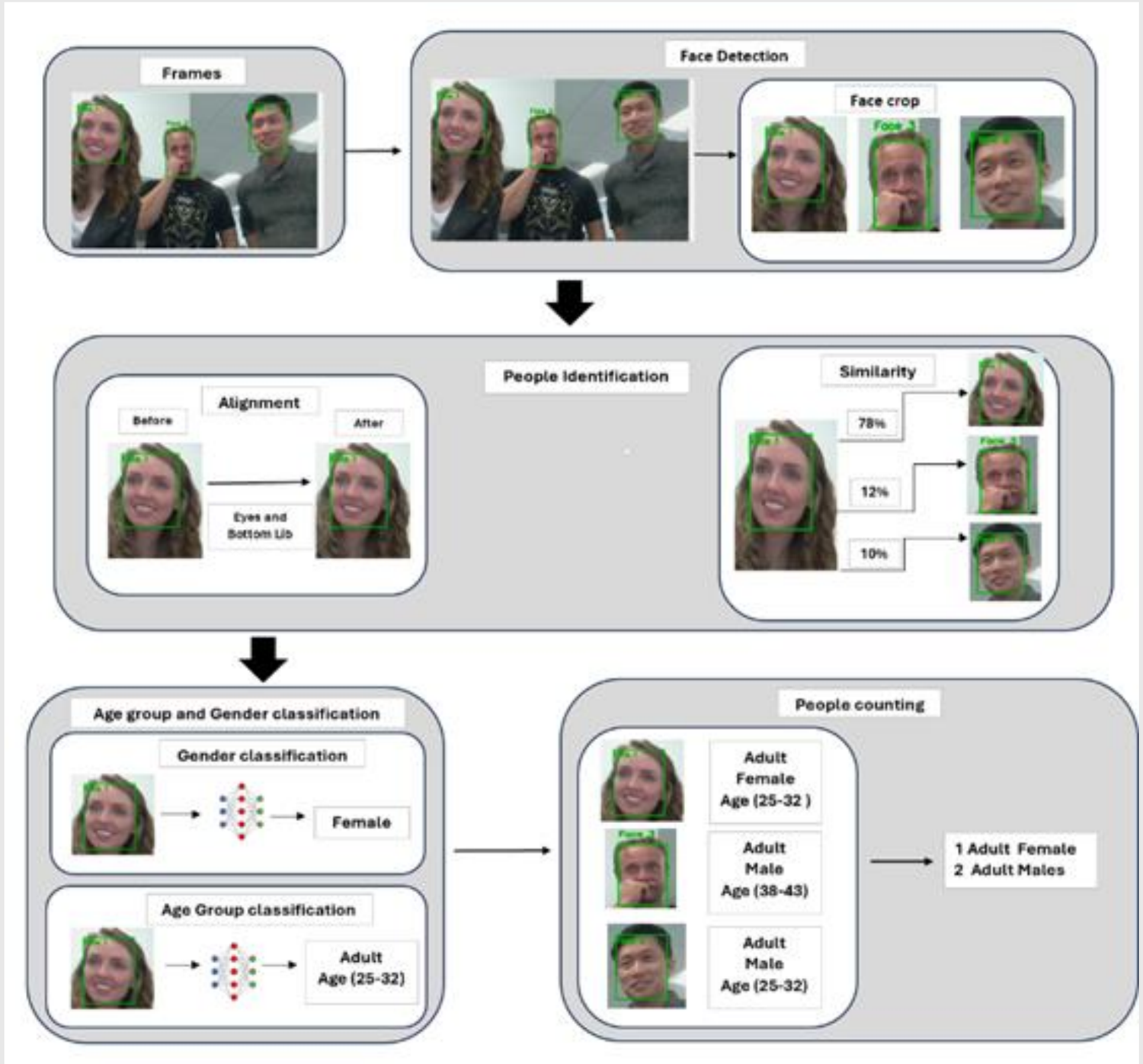
If the object (person) area 2 to area 1 “Entered”

If the object (person) area 1 to area 2 “Exited”

Fig3: Frame from CCTV camera in retail store with YOLO10

Link available from:

https://drive.google.com/file/d/1QmVaHyjcOCoIFm5kZ6iPdPCogo-Bqbgw/view?usp=sharing:



FLOW CHART FOR FACE RECOGNITON AND PEOPLE COUNTING

03: RESULTS AND FINDING

COMPARISION PERFORMANCE YOLOV10 AND OTHERS

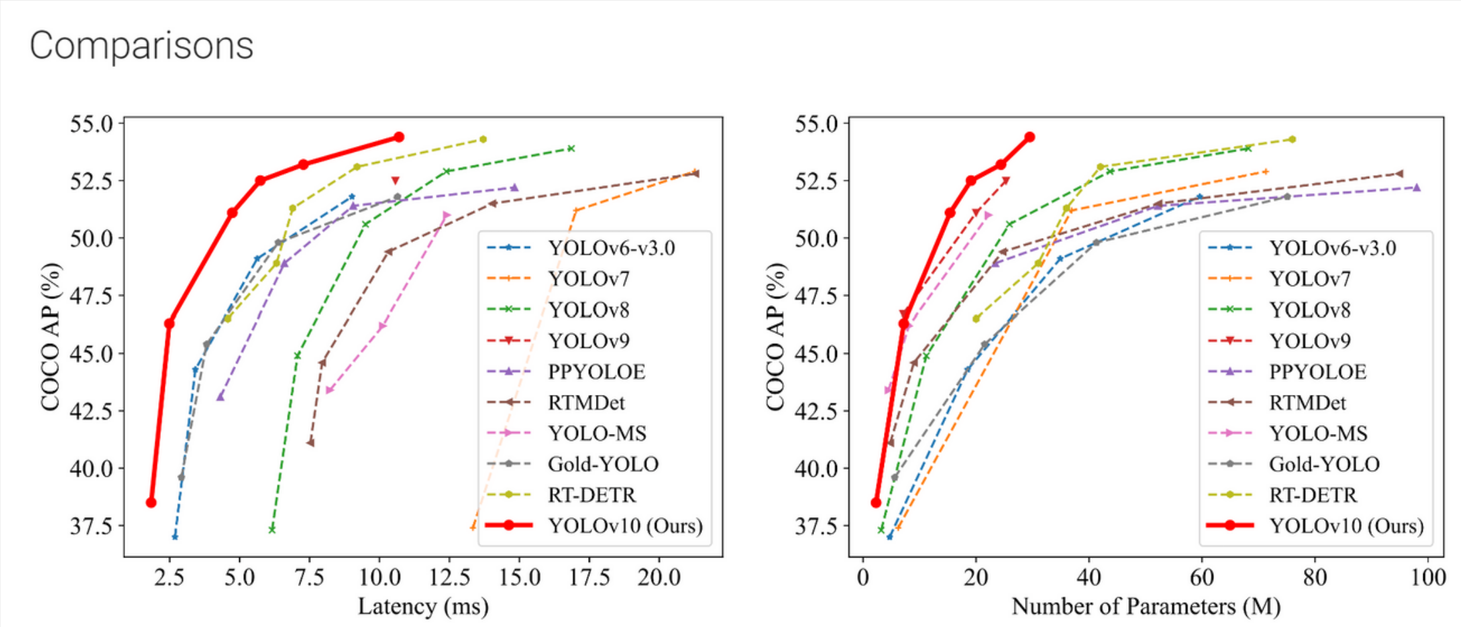


Fig 5 : Comparisons with others in terms of latency-accuracy (left) and size-accuracy (right) trade-offs

RESULT AND DISCUSSION

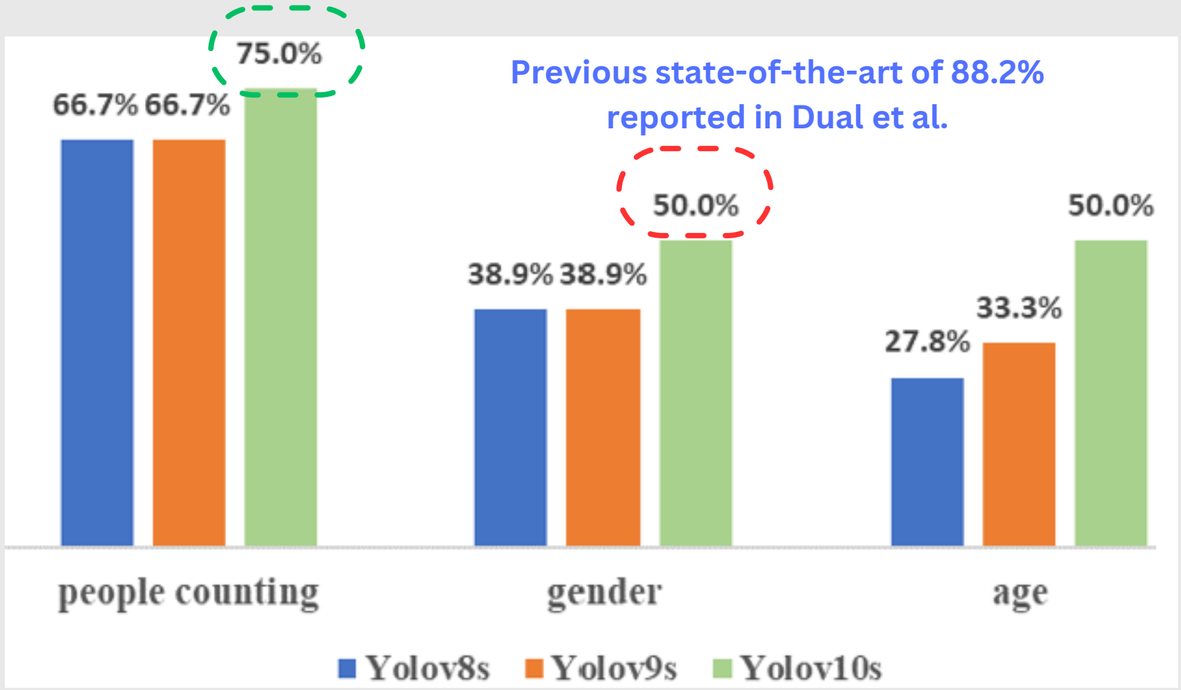


Fig 6 Comparison YOLO Model Accuracy

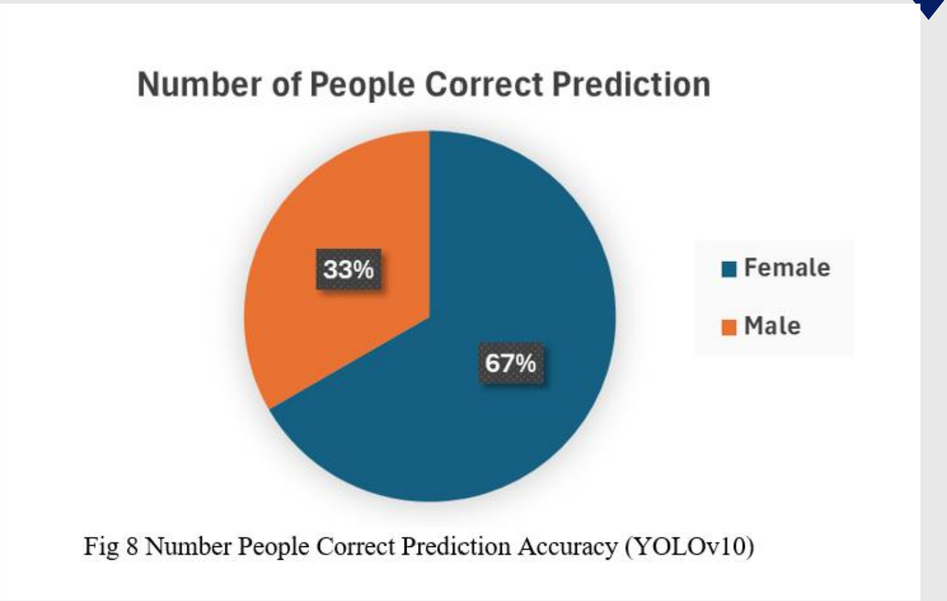


Fig 8 Number People Correct Prediction Accuracy (YOLOv10)

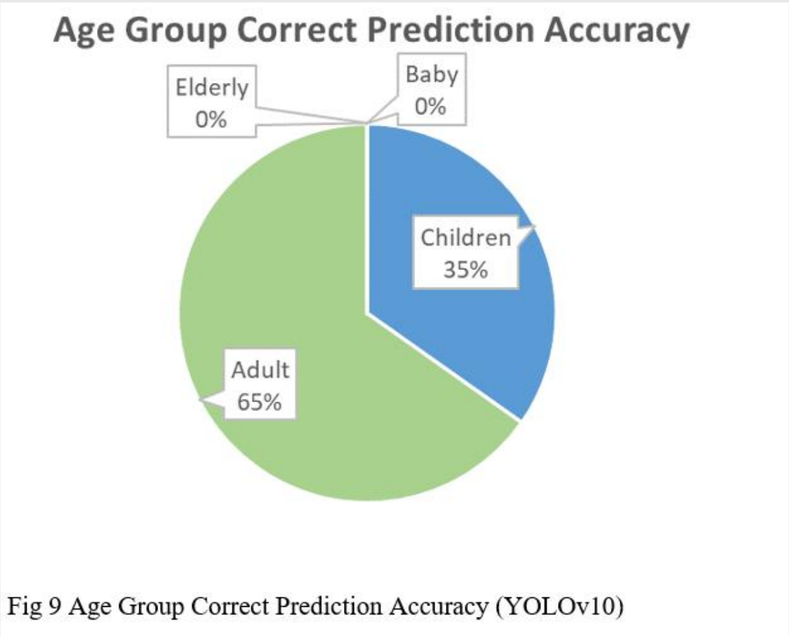
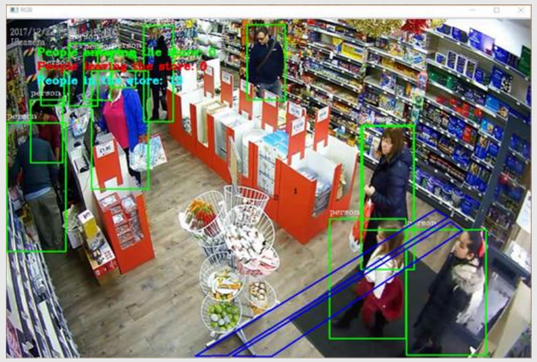


Fig 9 Age Group Correct Prediction Accuracy (YOLOv10)



Camera Shots Angles

Lights, Camera,

DATA VISUALIZATION

Total Entries 656

Total Exits 590

Busiest Hours
18.00 PM- 19.00 PM

Busiest Day
Saturday

Average Stay
00: 10:28

AUDIENCE SPLIT

Summary | DETAIL

52.35%	38.25%	9.40%
Male	Female	Unknown
Frequents Sorting Area	Frequents Entrance	
Highest visits every Sunday at 2.00 PM-3.00PM	Highest visit every Friday 5.00 PM-6.00 PM	

FOUR PROBLEMS FINDING

- CCTV Camera cannot capture unqualify: lighting ,facial expression, makeup, genetics and lifestyle
- Object Tracking inaccuracy
- Performance of the YOLO model
- Data Limitation

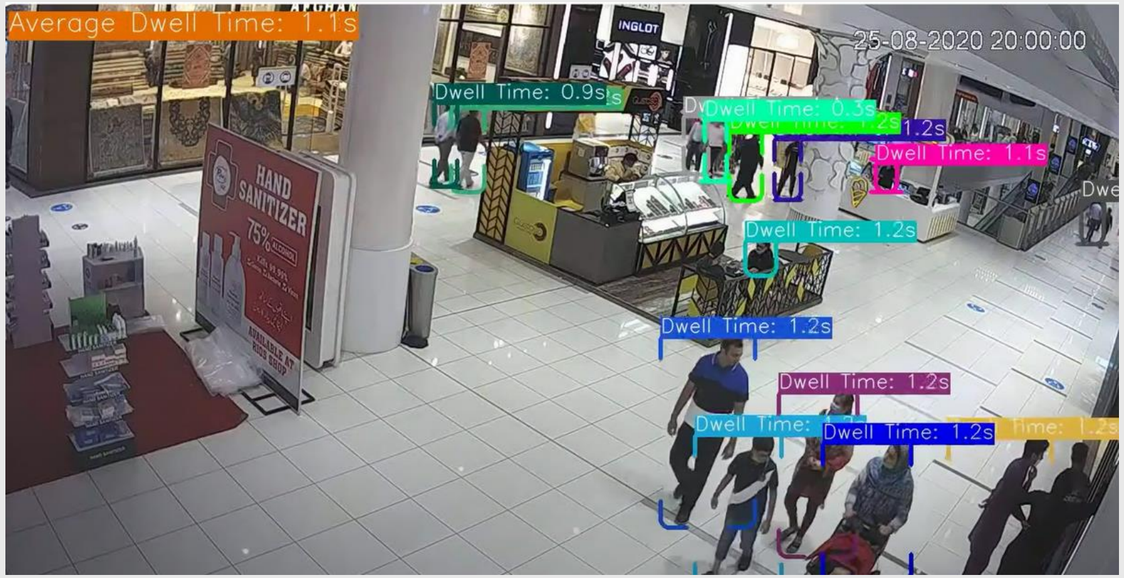
Data Set

04: CONCLUSION AND FUTURE WORK

CONCLUSION

YOLOv10 version is the best performance accuracy both of face recognition and people counting system whereas YOLOv8 and YOLOv9 performance accuracy results look similar.

FUTURE WORK


Average Dwell Time: 1.1s
25-08-2020 20:00:00
Dwell Time: 0.9s
Dwell Time: 0.3s
Dwell Time: 1.1s
Dwell Time: 1.2s
Dwell Time: 1.2s
Dwell Time: 1.2s
Dwell Time: 1.2s
Dwell Time: 1.2s
HAND SANITIZER
INGLOT


Increase Retail Foot Traffic

REFERENCE

[1] A S Kharchevnikova and A V Savchenko (2018). “Video -based age and gender recognition in mobile application”. International Conference on "Information Technology and Nanotechnology,Vol.-2210

[2] Val´ erio Nogueira,. et al. (2019). “RetailNet: A deep learning approach for people counting and hot spots detection in retail stores.” Conference on Graphics, Patterns and Images, IEEE.

[3] Yilin Song,. et al.(2017). “Online Cost Efficient Customer Recognition System For Retail Analytics.” Winter Application of Computer Vision Workshops, IEEE.

[4] Jingwen Liu,. et al.(2015). “Customer Behavior in Retail Store from Surveillance Camara” IEEE International Symposium on Multimedia, IEEE.

[5] Ahmed Hossam,. et al.(2024). “Revolutionizing Retail Analytics: Inventory and Customer Insight with AI” Computer Vision and Pattern Recognition.

THANK YOU