On Road Phone Distraction

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ABSTRACT

With ever increasing increase in number of vehicles on Indian roads, pedestrian deaths have risen a whopping 66% from 12,330 in 2014 to 20,457 in 2017. One of the biggest reason accountable is usage of mobile phones on-road, either by drivers or by pedestrians. Though mobile usage during driving has been declared a criminal offence, the problem of pedestrians using hand-held devices being oblivious to the surrounding still remains.

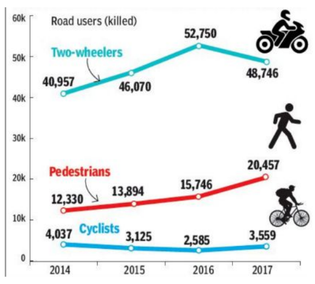


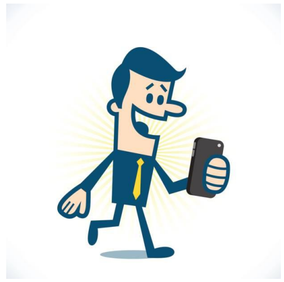
Fig. 1 Graph showing traffic related deaths in India

INTRODUCTION

Through our project, we aim to suggest a method to give a quantitative measure of how distracted a person is while walking on road. (Due to hand-held devices)

Our objectives for the lab-based project are

- Collecting relevant pedestrian footage using CCTV cameras inside IIT Roorkee.
- Converting the footage into usable frames for model training.
- Creating a model which gives a *Distraction Score/ Percentage* for a walking pedestrian.



METHOD

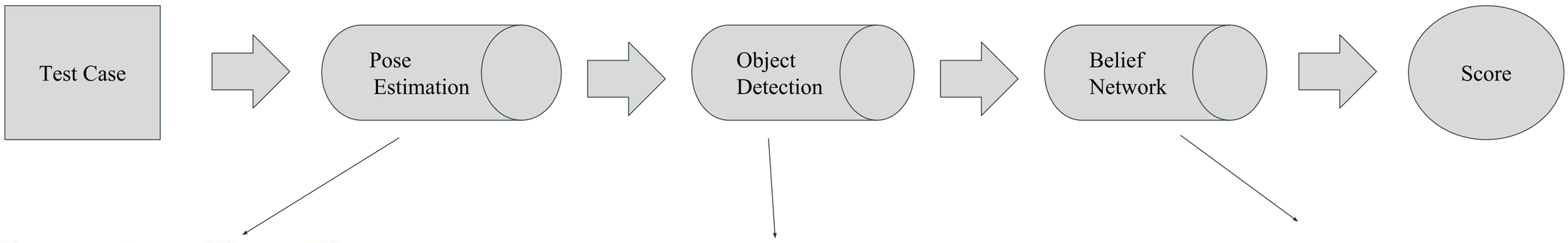


Fig. 1 Pose estimation, 12 joints

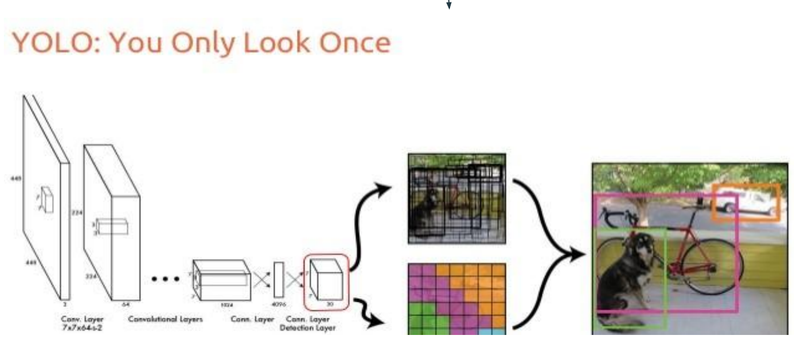


Fig.2 YOLO object detection

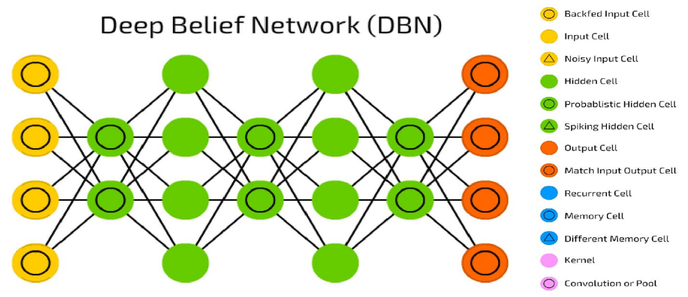


Fig.3 A Deep Belief Network

The test image will be passed through a 3-stage pipeline

1. Pose Detection using Stacked - Hourglass Implementation.
   a. Will give a 12 length vector for coordinates of joints.
   b. Will provide a probability score for the pose to be one of a person holding a hand-held device
2. Object detection (Detection of cell phone in hand)
   a. Will find a probable area for the mobile phone to be in and run YOLO object detector (Pre trained) on the area
   b. Will provide a probability score for the device to be in the hand of the pedestrian.
3. Belief Network (Combining results)
   a. Combining the above obtained probabiliy scores to provide a distraction score for the pedestrian

We are also researching the possibility of using GazeNet Prediction to get another probability score if the pedestrian is looking at the mobile device.

GazeNet, if properly implemented could be a very useful technique in calculating a better rounded distraction level

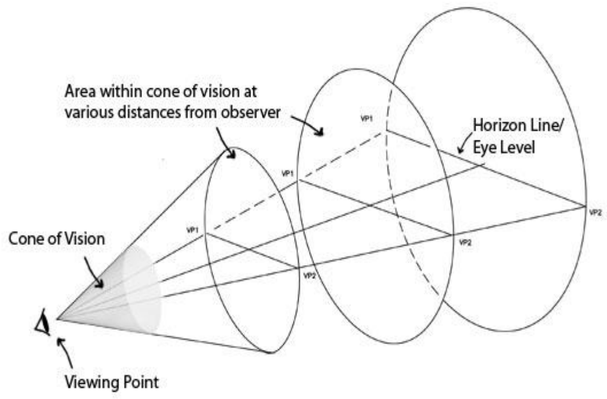


Fig.4 Cone of vision

CONCLUSION

We were able to pass the research phase and complete a chunk of the implementation phase within the allotted time. Collection of data for training the model and trimming it accordingly for use were completed.

Currently we are using ‘Stacked Hourglass Networks for Human Pose Estimation’ research paper for the stage 1 in the pipeline and YOLO real time object detector with its pre-trained data set for the 2nd part of the pipeline.

Object detection and stacked-hour glass implementation for pose detection were run by us on the collected data and results noted for further use.

We are also studying the Gazenet prospects for future implementation and as soon we can find out the feasibility, the implementation for belief networks would be done.

FUTURE WORK TO BE DONE

Currently we have the following work left to do

1. GazeNet prediction finalisation and implementation, if needed.
2. Belief Network implmentation.
3. Creating a flow for connection the 3 stages.
4. Training the finalised algorithm on the collected data set.

REFERENCES

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