Advance Software Engineering

Accidents Prediction on Pedestrian Using CNN

Lakshmi Keerthi Ayyagari

Northern Illinois University

Professor Dr. Mona Rahimi

Problem Significance

Accidents on pedestrian are the rare incidents that happen if driver break the traffic rules, there may be other reasons of accidents on the road. To understand the reason and whether accidents happened on road or not is the objective of the research. Identifying and classifying the accident reasons will help the government or citizens to make an improvement in traffic system. Model will classify the data is we implement any other same accident dataset in the model.

Research hypotheses

The aim of the study is to detect the number of accidents by using Image of CCTV footage. The objective is to understand that which CNN model is the best prediction model for prediction of accidents by the vehicles also the aim is to try to recognize and classify the reason behind the accidents. The aim is to identify which model is the best predictor or classifier for the YouTube video data.

Data

The video of CCTV footage is taken from the YouTube accident compilation Video. Pedestrian video dataset is selected from the Yotube.com (Indian Road accidents compilation 2021 - YouTube).

Methodology

To answer the research problem classification techniques of CNN, will be used, data Generator will be used to convert video data to appropriate format, to achieve the research problem, I'm going to use jupyter notebook with Python 3.8 version with some special libraries like 'moviepy', 'Open CV', 'Tensorflow' and Keras.

Innovation

In the previous works there was accident detection like whether the accident has happened or not but in my work I am trying to find out the reason of how the accident has happened like is it because of "Human Error", "Environment Error "or "No accident" has happened.

As this is the classification problem, Confusion Matrix, classification report will be used to evaluate the model performance.

Time Plan

- ➢ Generator (Convert Video to image and image to numbers) (11/11/2021-13/11/2021)
- ➢ Labelling of Images (14/11/2021-16/11/2021)
- ➢ Convolutional Neural network (16/11/2021/17/11/2021)
- ➢ Evaluation Metrics (17/11/2021- 19/11/2021)

Report part will take 2-3 days.

Expected Results

The proposed project will provide the classifier that predicts the accidents happened on pedestrian or not, also trying to recognize and classify the reason behind the accidents.

References

1. Shine, L. and Jiji, C.V., 2020. Automated detection of helmet on motorcyclists from traffic surveillance videos: a comparative analysis using hand-crafted features and CNN. *Multimedia Tools and Applications*, pp.1-21.

2. Espinosa, J.E., Velastin, S.A. and Branch, J.W., 2018. Motorcycle detection and classification in urban Scenarios using a model based on Faster R-CNN.

3. Kim, H., Park, S. and Paik, J., 2020, January. Pre-Activated 3D CNN and Feature Pyramid Network for Traffic Accident Detection. In *2020 IEEE International Conference on Consumer Electronics (ICCE)* (pp. 1-3). IEEE.

4. Chauhan, M.S., Singh, A., Khemka, M., Prateek, A. and Sen, R., 2019, January. Embedded CNN based vehicle classification and counting in non-laned road traffic. In *Proceedings of the Tenth International Conference on Information and Communication Technologies and Development* (pp. 1-11).

5. Espinosa, J.E., Velastín, S.A. and Branch, J.W., 2020. Detection of motorcycles in urban traffic using video analysis: A review. *IEEE Transactions on Intelligent Transportation Systems*.

6. Janet, B. and Reddy, U.S., 2020, August. Real Time Detection of driver distraction using CNN. In *2020 Third International Conference on Smart Systems and Inventive Technology (ICSSIT)* (pp. 185-191). IEEE.

7. Diwan, A., Gupta, V., Chadha, C., Diwan, A., Gupta, V., Chadha, C. and R-CNN, A.D.U.M., 2021. Accident Detection Using Mask R-CNN.

8. Chirra, V.R.R., ReddyUyyala, S. and Kolli, V.K.K., 2019. Deep CNN: A Machine Learning Approach for Driver Drowsiness Detection Based on Eye State. *Rev. d'Intelligence Artif.*, *33*(6), pp.461-466.

9. Sharma, R. and Sungheetha, A., 2021. An Efficient Dimension Reduction based Fusion of CNN and SVM Model for Detection of Abnormal Incident in Video Surveillance. *Journal of Soft Computing Paradigm (JSCP)*, *3*(02), pp.55-69.

10. Madigan, R., Nordhoff, S., Fox, C., Amini, R.E., Louw, T., Wilbrink, M., Schieben, A. and Merat, N., 2019. Understanding interactions between Automated Road Transport Systems and other road users: A video analysis. *Transportation research part F: traffic psychology and behaviour*, *66*, pp.196-213.

11. Le, T.N., Ono, S., Sugimoto, A. and Kawasaki, H., 2020. Attention r-cnn for accident detection. In *2020 IEEE Intelligent Vehicles Symposium (IV)* (pp. 313-320). IEEE.

12. Espinosa, J.E., Velastín, S.A. and Branch, J.W., 2020. Detection of motorcycles in urban traffic using video analysis: A review. *IEEE Transactions on Intelligent Transportation Systems*.

13. Yu, R., Ai, H. and Gao, Z., 2020, September. Identifying High Risk Driving Scenarios Utilizing a CNN-LSTM Analysis Approach. In *2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC)* (pp. 1-6). IEEE.

14. Shine, L. and Jiji, C.V., 2020. Automated detection of helmet on motorcyclists from traffic surveillance videos: a comparative analysis using hand-crafted features and CNN. *Multimedia Tools and Applications*, pp.1-21.

15. Chauhan, M.S., Singh, A., Khemka, M., Prateek, A. and Sen, R., 2019, January. Embedded CNN based vehicle classification and counting in non-laned road traffic. In *Proceedings of the Tenth International Conference on Information and Communication Technologies and Development* (pp. 1-11).

16. Espinosa, J.E., Velastín, S.A. and Branch, J.W., 2020. Detection of motorcycles in urban traffic using video analysis: A review. *IEEE Transactions on Intelligent Transportation Systems*.

17. Kose, N., Kopuklu, O., Unnervik, A. and Rigoll, G., 2019, October. Real-time driver state monitoring using a cnn based spatio-temporal approach. In *2019 IEEE Intelligent Transportation Systems Conference (ITSC)* (pp. 3236-3242). IEEE.

18. Wan, S., Xu, X., Wang, T. and Gu, Z., 2020. An intelligent video analysis method for abnormal event detection in intelligent transportation systems. *IEEE Transactions on Intelligent Transportation Systems*.

19. Alzraiee, H., Leal Ruiz, A. and Sprotte, R., 2021. Detecting of Pavement Marking Defects Using Faster R-CNN. *Journal of Performance of Constructed Facilities*, *35*(4), p.04021035.

20. D'cunha, R., Francis, B., Britto, R. and Shaikh, P., 2019, December. Campus Traffic Reinforcement using IoT and OpenCV. In *2019 International Conference on Advances in Computing, Communication and Control (ICAC3)* (pp. 1-6). IEEE.