

FYP 1682: Driver Drowsiness Detection

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Abstract

Driver drowsiness is an issue faced by the average road user. Not only does it jeopardize the driver itself, but as well as other road users. The creation of a detection system to detect drowsiness and to warn the users will be able to mitigate this problem. In this study, drowsiness detection will be looked at as a whole, and a prototype system will be proposed. Experiments will also be carried out to test and analyze the components of this prototype in order to fully understand its functionality and to increase its performance.

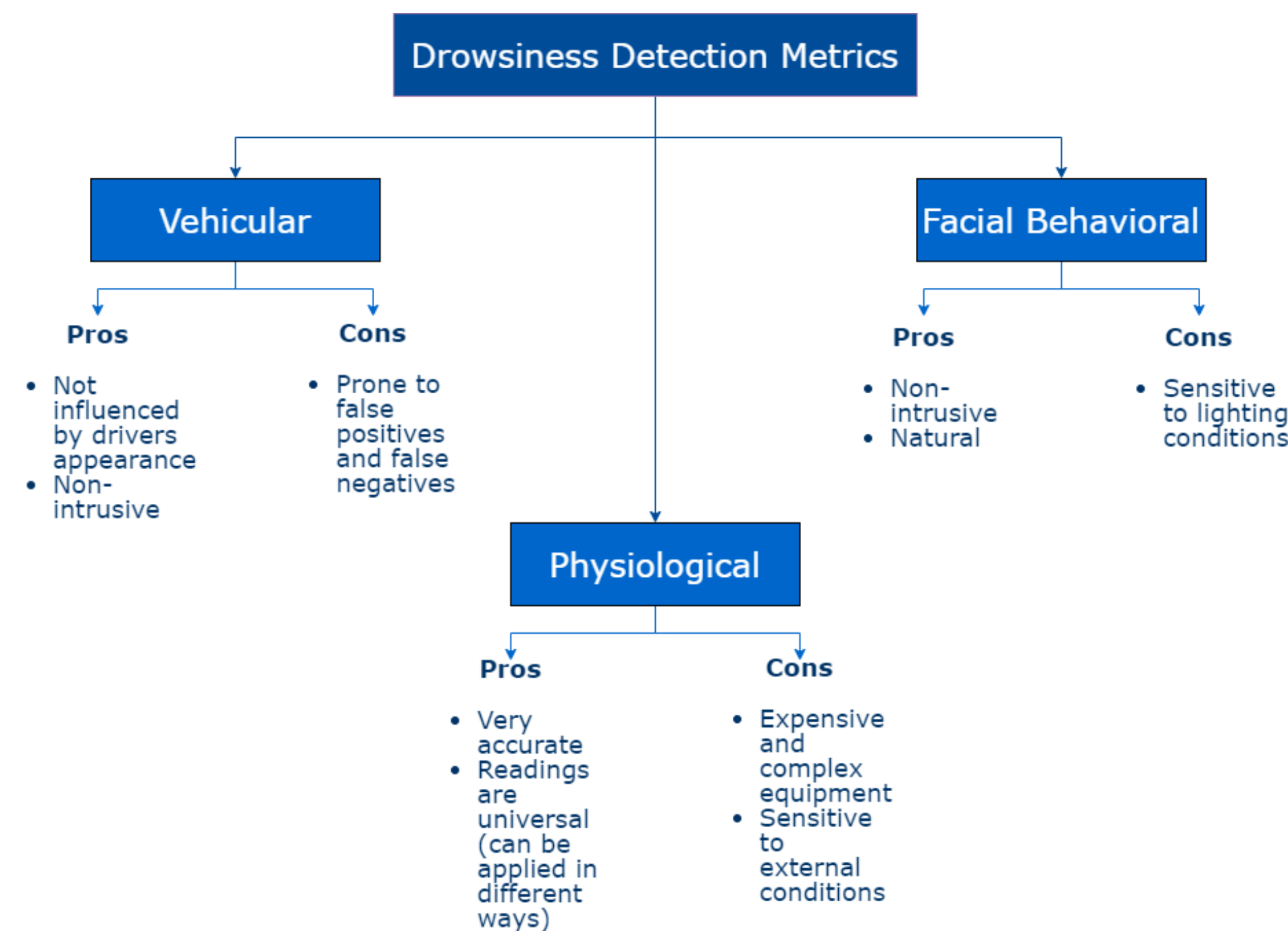
Problem Statement

Driver sleepiness is a common cause for road accidents. Therefore, by developing a detector for drowsiness, it could be used as a potential security feature for many modern automobiles to reduce the rate of road accidents caused by driver drowsiness.

Objectives

- to perform a background study on the current implementations of driver drowsiness detection.
- to study and classify the facial features required to be learned by machine learning for driver drowsiness detection

Literature Review



Implementation and Evaluation

Experiments were carried out to test the performance of a blink detector of two different implementations at different angles. The results of the experiments are as shown below;

Angle	Precision	Recall
Upper	0.800	0.727
Lower	0.333	0.909

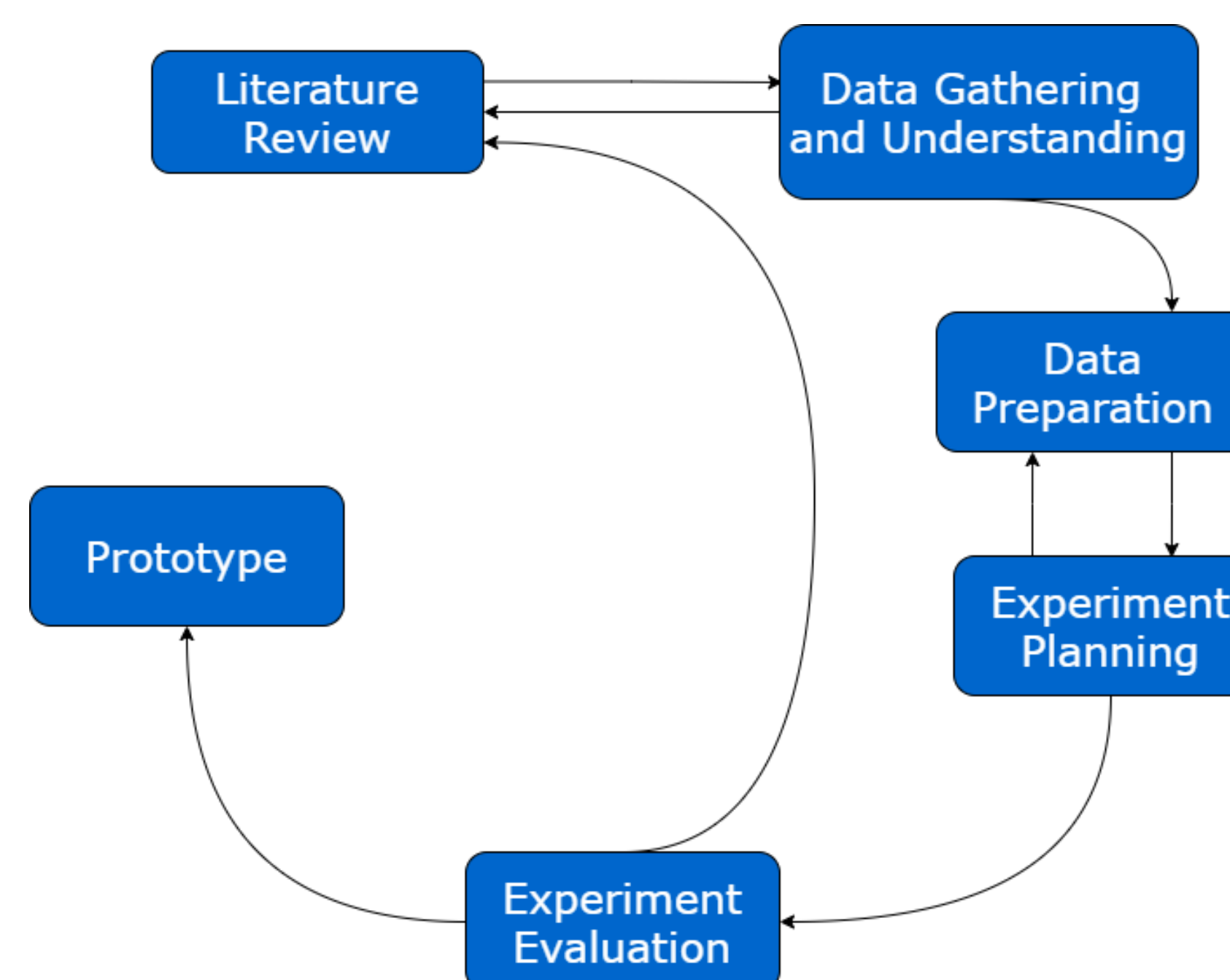
CNN Blink Detector

Angle	Precision	Recall
Upper	0.700	0.808
Lower	0.400	1.000

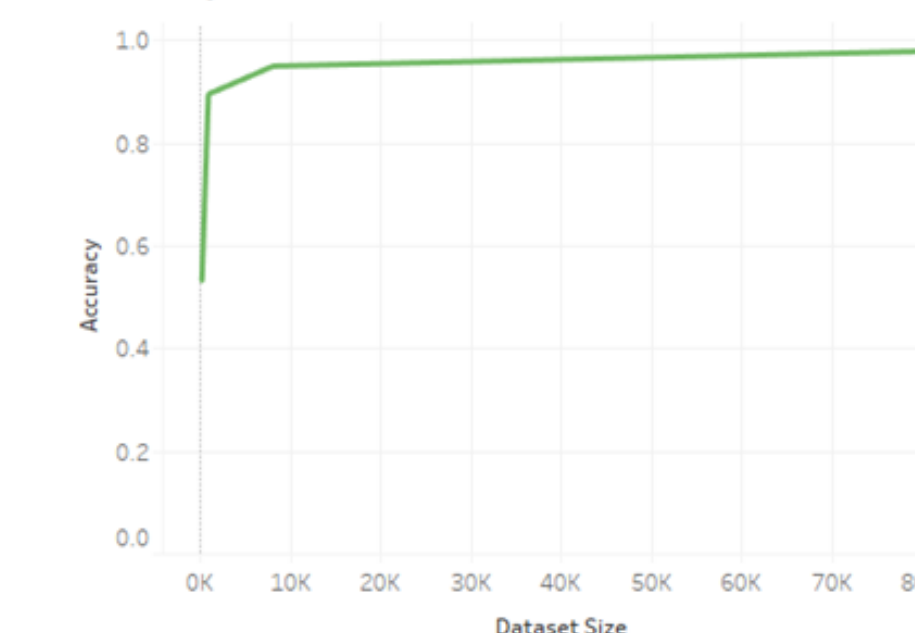
EAR Blink Detector

Another experiment was carried out to test the accuracy of the blink detector model by manipulating the dataset size. This was done to provide an approximate minimum for the number of samples in the training data for the model to be trained.

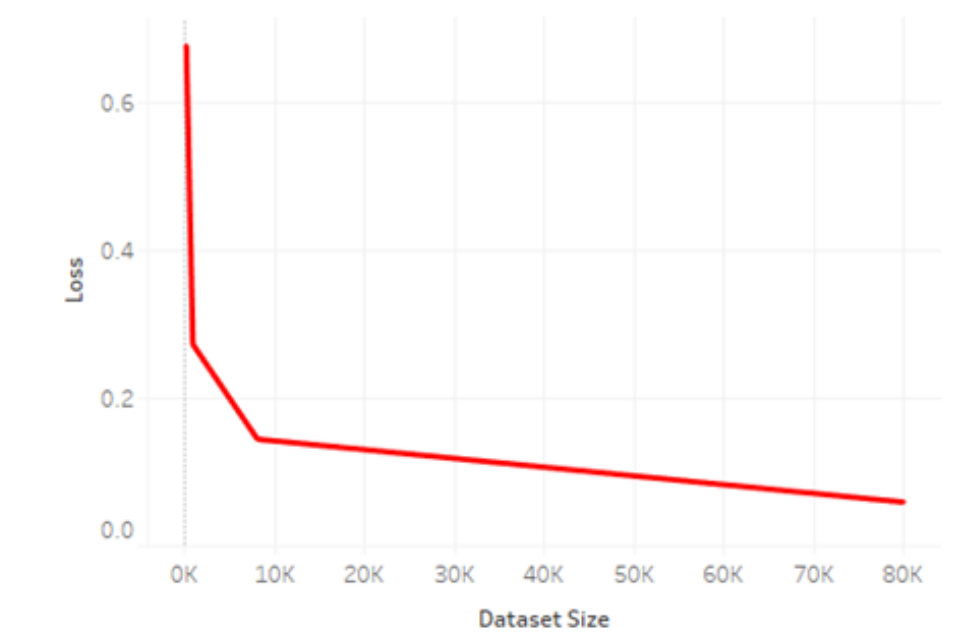
Research Methodology



Accuracy Vs. Dataset Size



Loss Vs. Dataset Size



Conclusion

In the end of this study, a basic prototype of a drowsiness detector was successfully created. However the current application has its own limitations, which includes it being a static implementation instead of a dynamic one. This prototype could be improved further in the future to make it industrially applicable. One of the improvements that can be made is by creating systems to manipulate the static elements of this prototype.