Driving Emotions

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In year 2013, 777,817 out of 22,702,211 of registered vehicles were involved in road traffic crashes, with damage cost of more than 9.3 billion Ringgit Malaysia (RM). Since then, automotive manufacturers had deployed a wide range of vehicle safety systems to reduce road crash statistics. The automotive network comprises vehicles, roads and drivers. Huge attention on causes of road accidents had been placed on vehicles and roads instead of drivers. Hence, it is now prudent to shift the attention to drivers as their state of emotions influences their driving behavior.

Philosophers and psychologists interpret emotion in various ways. Katsis explained emotion as a person's internal feelings and thoughts. Aristotle, on the other hand, deduced it as stimulus that evaluates experience based on potential gain or pleasure. Yet, another group of psychologists proposed that emotion as mental state or feeling that reflects physiological changes in human body. Various emotion models had been developed among which are the notable Ekman and Freisen cross-cultural study, Parrott emotion and Lang's valance-arousal framework. These models were widely recognized by researchers investigating driving-related emotion.

This study aimed to investigate drivers' emotion during neutral, stress and anger state while performing simulated driving task. Electrodermal activity and Electroencephalography (EEG) measurements were monitored and recorded during the test. Acquired signals were pre-processed and had time-frequency components analyzed via Short-Time-Fourier-Transform. Support vector machine was then performed simultaneously with 10-fold cross-validation to obtain optimal kernel constraint. The developed framework successfully classified stress and anger from neutral emotion at accuracy of 85 % and 70 % accuracy for differentiating stress and anger.

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