**Scene Prediction for Automated Driving: A Review**

Hatim Taher Ottwan

The development of self-driving automobile technology has advanced significantly during the past five years. Modern vehicles come with Advanced Driver Assistance Systems (ADAS), which have reached a highly advanced stage of development. First, features above the level of ADAS were added to the market for traditional Original Equipment Manufacturers, such as lane maintaining or lane change assistance (OEMs). However, this was postponed in part because of legislation and in part because of technological difficulties. The initial test scenarios have only recently been made available. While level 4 driving on clearly defined urban test fields or the use case of automated highway driving can already be handled very successfully, the main difficulty is addressing AD level 5 completely for all conceivable scenarios and corner cases.

The forecasting of future traffic participants' behaviour is one of the most difficult issues covered in this review and is a subject of growing academic activity. Sometimes the motivations behind specific movements or acts are not immediately apparent; instead, they are concealed as latent variables. The management of uncertainty is a second important challenge. Uncertainties are a part of how the environment is perceived, particularly when combining data from many sources. To contextualize scene prediction within AD and outline the challenges, the paper begins with a brief overview of AD.

The approaches for scene prediction that are used the most frequently are discussed in this section. These models can be categorized into model-driven and data-driven approaches since they are generic models that are not particular to scene prediction or AD. The first are given for completeness even though they currently only play a minor role due to their relatively short prediction horizon. The goal is to accurately represent the observed sequence of states using the parameters. Data is used to infer the transition probabilities and the connection between the observed states and non-observable events. As it is defined in this work, "scene prediction" refers to the process of foretelling all drivers involved in a specific area's traffic as a single driving circumstance.

On the cm scale, there is now a model improvement competition being observed. When installing a scene prediction model in the ultimate AD architecture, such speed benefits could not matter, hence it is debatable whether time and resources are being allocated in the proper place. Understanding the variations in model performance across various datasets is crucial. Since some older model findings were frequently evaluated on private datasets, it is challenging to measure their performance. The construction of scenarios has a significant impact on the model's performance. Since manoeuvres and scenarios are not standardized, datasets with extensive stretches of straight highway driving will perform better than those with a lot of people or curved roads.

The currently required sensor equipment is expensive and frequently takes up the entire car trunk. It uses HD (high density) maps, cameras, radar, Lidar, GPS, and many other types of sensors. New methods, such as discretizing neural networks for use in embedded systems, are necessary as part of strategies for minimizing costs and material. The creation of a so-called "weak artificial intelligence" is a further advancement in the deep learning field because it can only perform certain jobs. It is necessary to extract intermediate results from the complicated model that can be interpreted and assessed, such as the optimization of implicit layers.

Source: [Physics](https://www.mdpi.com/2624-8174/4/1/11/htm)

Key Words: automated driving; data-driven modelling; deep learning; scene prediction; trajectory prediction