Lehrstuhl Steuerung, Regelung und Systemdynamik

Bachelor/Master Thesis
Literature research, Programming

Time complexity of different Machine Learning algorithms used for driving behavior prediction/ recognition
Keywords: Lane chnaging behaviors, Time complexity

Conditions:
Duration: 6 months
Requirements: Matlab
Language: English
Zielgruppe: Bachelor/ Master students

Contents:
Advanced Driving Assistance system (ADAS) play an important role in assisting driver to make a safe and right driving deciision. Thus, research in understanding human behavior is a growing field within the development of Advanced Driving Assistance Systems (ADAS). Machine learning algortihms are currently used within this field to develop a driving prediction model based on the environment. Each of these machine learning algorithms used to develop driving behavior prediction model have their own weakness and advantages. Some of the machine learning algorithms used include Support Vector Machine (SVM), Artificial Neural Network (ANN), Fuzzy Logic (FL), Bayesian Networkand Hidden Markov Model (HMM). The performance of the algortihms differ in terms of generating an close prediction ot the actual driving behavior, variable values (such as acceleration, steering wheel angle, time to collision (TTC)). Another important factor that can provide some evaluation of the algortihm's performance is the time complexity of the algorithm. Time complexity of an algortihm is defined as the time taken to run an algortihm as a function of the length of the input using the Big (O) notion. Time complexity can be obtained by counting the number of operations performed a code. In this project, the aim is to research different types of time complexity for different types of machine learning algortihms used to predict lane changing behaviors as well as how the performance of the model evaluated based on the time complexities..

The steps of this work is as follows:
- Detailed literature research of different machine learning algorithms applied for developing a lane changing behavior prediction model.
- Detailed research of the different types of Time complexities- Linear, Constant, Exponential, Logarithmic, Quadratic.
- Which time complexity belongs to each Machine Learning algortihm based model- evaluation and validation
- How different time complexities affect the performance of the machine learning based driving model- Validation.
- Complete and detailed documentation/presentation of the research results and comparison.

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