

CSE523 - Machine Learning

Weekly Report 1

**Classification of Drivers based on their Driving Patterns**

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2023-2024 (Winter Semester)

**Objective Setting**: Defined the project's scope to classify drivers using machine learning techniques based on distinct driving patterns.

**Literature Review**:

Went through the below cited paper :

**Title -** "End to End Autonomous Driving Behavior Prediction Based on Deep Convolution Neural Network”

**Understanding Created:**

The paper "End to End Autonomous Driving Behavior Prediction Based on Deep Convolution Neural Network" showcases an approach to enhancing autonomous driving prediction models using deep learning and attention mechanisms. Here are 10 key pointers we created based on it:

**1. Objective:** Develop a more accurate end-to-end autonomous driving behavior prediction model using deep convolutional neural networks (CNNs) enhanced with an attention mechanism.

**2. Model Framework:** Utilizes a Residual Network (ResNet50) integrated with an Effective Channel Attention Mechanism (ECANet) to improve prediction accuracy.

**3. Feature Extraction:** Employs ResNet50 to extract spatial features from RGB images collected by vehicle-mounted cameras.

**4. Attention Mechanism:** Incorporates the Effective Channel Attention (ECA) module to selectively focus on more relevant features, improving model performance.

**5. Prediction Target:** Focuses on predicting the steering angle of the vehicle based on the visual input from the cameras, using weighted spatial feature information.

**6. Dataset:** Conducts experiments using Udacity's public dataset, demonstrating superior performance of the ECA-ResNet50 model over other CNN models.

**7. Model Comparison:** Compares ECA-ResNet50 with other models, including PilotNet and ResNet+CBAM, showing its higher accuracy in driving behavior prediction.

**8. Evaluation Metrics:** Uses Mean Squared Error (MSE) and Root Mean Squared Error (RMSE) as evaluation metrics to assess model performance.

**9. Training Details:** Describes the training process, including data preprocessing steps, loss function, optimizer, learning rate, and training iterations.

### **References:**

1. B. -c. Guo, Y. -l. Wang, M. Gao, J. Lu, G. -s. Han and L. -b. Zhang, "End to End Autonomous Driving Behavior Prediction Based on Deep Convolution Neural Network," 2022 IEEE 2nd International Conference on Digital Twins and Parallel Intelligence (DTPI), Boston, MA, USA, 2022, pp. 1-6, doi: 10.1109/DTPI55838.2022.9998956