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Driving Behavior Classification From Smartphone Sensor Data Using Graph Attention Network

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Abstract

Driving behavior analysis is essential for enhancing road safety and enabling intelligent transportation systems. However, traditional models often fail to capture complex dependencies between sensor features, limiting their effectiveness. In this study, we propose a Graph Attention Network (GAT)-based approach to classify driving behavior into predefined categories using smartphone sensor data. GAT leverages attention mechanisms to model relationships between input features, providing a more context-aware representation. We evaluate the model on a public driving behavior dataset and compare it against classical classifiers such as Random Forest, SVM, XGBoost, LSTM and CNN. The proposed GAT model achieved an accuracy of 80% and a macro F1-score of 0.78, showing promising performance surpassing baseline models. These results highlight the potential of graph-based learning in behavior-level classification for telematics applications. © 2025 IEEE.

Author keywords

Classification; Deep Learning; Driving Behavior Analysis; Graph Attention Network

Indexed keywords

Engineering controlled terms

Behavioral research; Graphic methods; Intelligent systems; Intelligent vehicle highway systems; Motor transportation; Traffic control

Engineering uncontrolled terms

Behavior analysis; Behaviour classification; Deep learning; Driving behavior analyze; Driving behaviour; Graph attention network; Intelligent transportation systems; Road safety; Sensors data; Smart phones

Engineering main heading

Classification (of information); Deep learning

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