

Development of Real-time AI Technologies and Ecological Driving Assistance System

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[Abstract]

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This project aims to develop a new mining technology for the automatic driving assistant system. To reduce energy consumption and CO₂ emissions during driving, we proposed an efficient and effective mining approach that contributes to energy conservation based on real-time AI technology.

Specifically, we proposed (1) a new modeling method that can automatically extract various vehicle driving patterns for the IoT big data (e.g., vehicle driving information, location information, fuel efficiency/power consumption information) of multiple vehicles collected from a large-scale in-vehicle sensor network.

We also developed (2) a multi-way data stream mining algorithm for IoT big data. Our proposed method successfully extracted the cause-effect relationships between temporal driving patterns and fuel efficiency information. We also developed a scalable algorithm for real-time processing. Our proposed algorithm can predict future driving patterns up to 500,000 times faster than the state-of-the-art modeling approaches.

Finally, we developed (3) an energy-saving automation support system based on real-time modeling and optimization of IoT big data. We conducted technical feedback through industrial collaboration with several companies. We also improved our method to reduce the computation cost of the development system, implemented in a compact edge device.

Thanks to our efficient and effective modeling approaches, energy resources and power consumption can be reduced for the automatic driving assistant system.

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