In-Car Air-Quality-Control (IC-AQC) Driver Behavior Analysis

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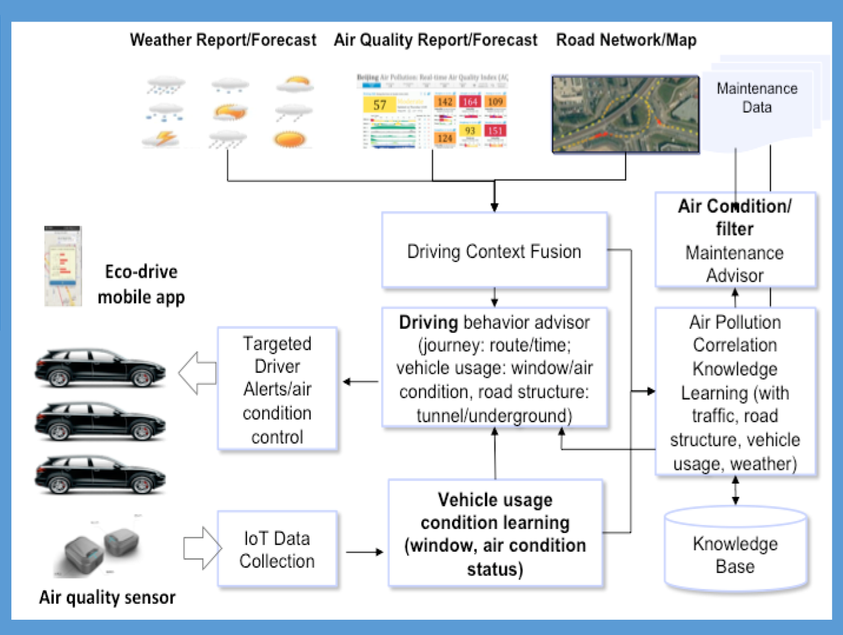
Background

- More and more people use vehicles in their daily life. In Beijing City only, there are 5.62 million vehicles as of 2015.[1]
- Air pollution in many cities is a serious problem, e.g. in Beijing, there are 119hs per week people living in unhealthy air quality, 85% of which are under serious pollution.[2]
- Drivers usually lack visibility of air pollution in the traffic and effective means to reduce exposure while driving.
- A novel intelligent in-vehicle air quality management solution is proposed by utilizing Internet of Things (IoT) technology for minimalizing the travelers' pollution exposure.
- Driver behavior analysis: (1) Patterns between environment features and a driver's In-Car Air-Quality Control(IC-AQC) behavior; (2) Driver preference identification and profile generation.

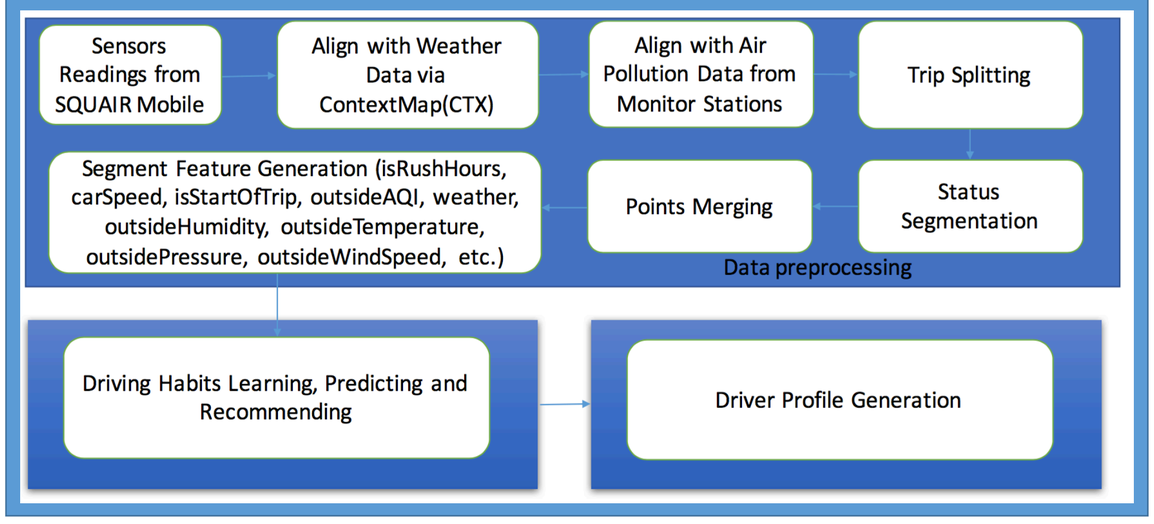
Procedures

➢ Device and App

➢ System Diagram

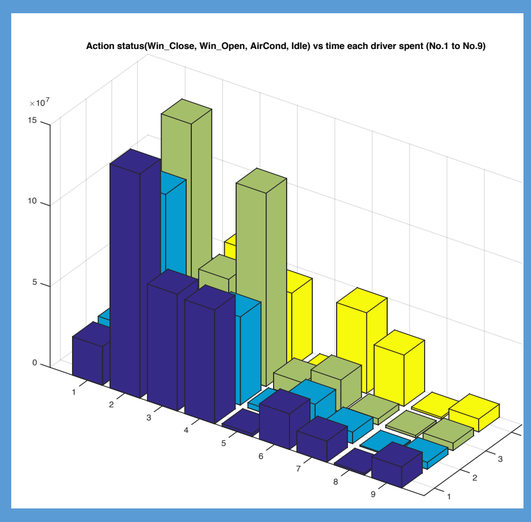


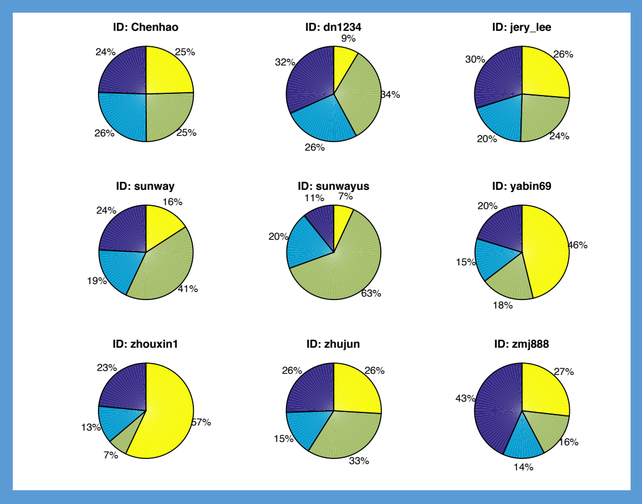
➢ Data Preprocessing and Analysis Workflow



Results

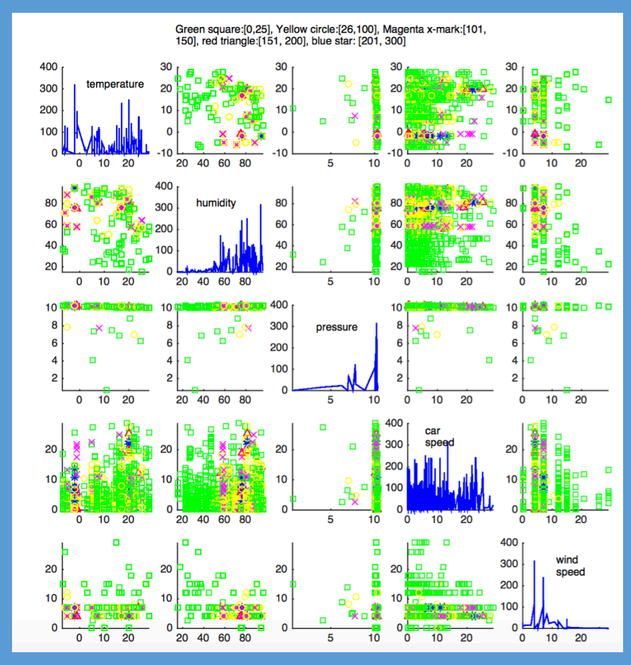
➢ Driver Data Analysis



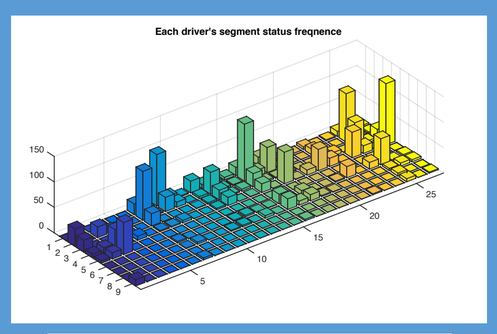


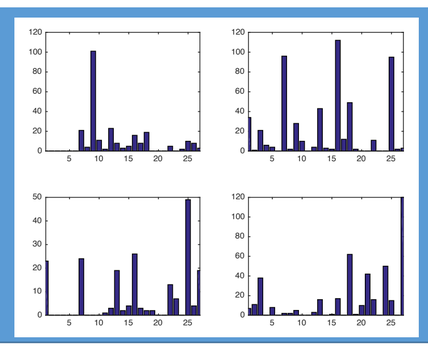
➢ Driver Action Prediction and Correlation Matrix between Surroundings and In-vehicle Air Quality

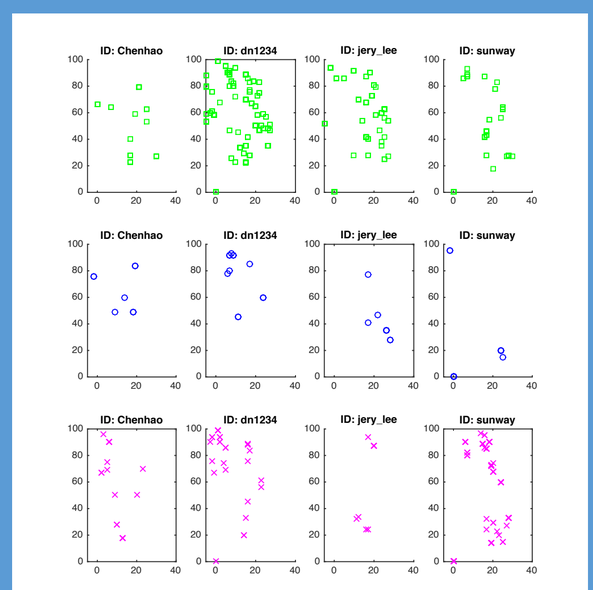
Algorithm/ID	dn1234	Jery_lee	sunway	chenhao
Linear SVM	84.7%	82.7%	70.2%	67.3%
Decision Tree	86.1%	84.5%	79.5%	67.3%
Knn	85.4%	82.7%	68.9%	59.6%
Ensemble Boosted Trees	85.0%	83.6%	62.3%	67.3%
GBDT	**98.95%**	**86.49%**	**84.0%**	**72.22%**



➢ Driver Profile Generation







Summary

- Multimodal sensor data fusion and features extraction/generation for driver behavior prediction
- Develop tools for data visualization and correlation analysis
- Driver behavior pattern recognition and profile generation
- In-vehicle air quality correlation analysis and driver action prediction
- Coauthor and submit a paper."Intelligent in-vehicle air quality management: a smart mobility application dealing with air pollution in the traffic"
- Team seminar presentation about my Phd research work

[1]. Beijing Traffic Report. http://InfoCenter\NewsAttach\2015年交通运行报告_20160303145741564.pdf
[2]. Beijing Air Qulity Report.http://www.statcenter.pku.edu.cn/Stat/Uploads/Files/[20150421_0913]Air%20report.pdf

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- Thanks!