Highway Big Data Analytics and Visualization Dashboard

Apr 2022 – Nov 2022, Beijing
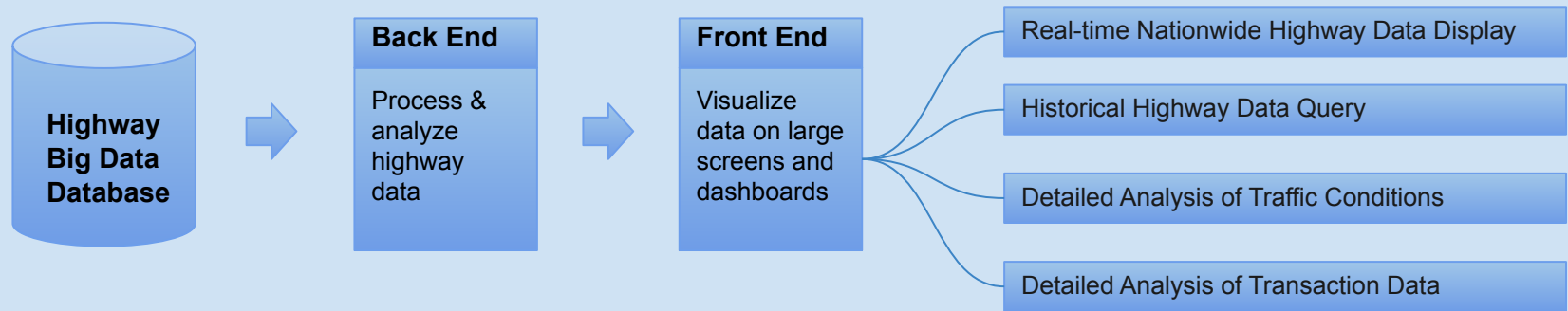Yingzi(Zoe) Yuan ; Zhuanglei Wei

📊 Project Background

- Highway IoT data volume is increasing annually.

- Developed a visual reporting system to support traffic analysis and forecasting.

- Supports nationwide and regional highway monitoring.

🛠️ Software Overview

- Perform statistical analysis and visualization.

- Real-time monitoring and historical data queries.

- Enhance data mining and analysis efficiency.

System Features & Architecture Overview

Highway Big Data Database → **Back End** — Process & analyze highway data → **Front End** — Visualize data on large screens and dashboards

- Real-time Nationwide Highway Data Display
- Historical Highway Data Query
- Detailed Analysis of Traffic Conditions
- Detailed Analysis of Transaction Data

Online Display
Highway Big Data Platform (Guangdong) http://39.105.1.143:9998/
Highway Big Data Platform (national)   http://39.105.1.143:9999/

Real-time Data Display Interface

The **real-time display interface** provides daily analysis of national highway data. It displays real-time data and forecast trends for the **top 5 provinces** in:

- Total traffic volume and mileage
- Transaction volume and value
- Road utilization efficiency
- Vehicle type distribution
- Proportion of vehicles using manual vs. ETC lanes

Users can click the **"Historical Query"** button to access historical data, or click charts to view detailed transaction or traffic data.

Real-time Data Display Interface

In the **real-time display interface,** Users can select a specific date to view historical highway data on the big data query interface.

The system displays:

- Total national highway traffic and mileage
- Total transaction volume
- Top 5 provinces by traffic volume and transaction amount
- Hourly traffic and transaction trends for the top 5 provinces
- Road utilization and profitability trends
- Vehicle type distribution
- Proportion of vehicles using manual vs. ETC lanes

Detailed Highway Transaction Data Display Interface

Displays **transaction volume distribution** and **road utilization efficiency** across provinces.

It also shows **ETC vs. manual lane usage**, **cars vs. trucks data**, and **daily transaction rankings by province**.

Detailed Highway Traffic Data Display Interface

Displays **traffic distribution** and **mileage data** for each province, along with **national total traffic volume and mileage**.

The **daily traffic rankings by province** are also shown.

Data Sourse

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Application prospects

- Perform statistical analysis and visualization.
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- Enhance data mining and analysis efficiency.

Thank You

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