Demographic Data Analytics for Smart Transportation

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Executive Summary

Recent years have witnessed the explosive growth of ASEAN population, which may lead to significant demographic shifts and major implications for transportation systems. Gender and age are some of the decisive variables that influence travel patterns and transit ridership. Recognizing the impact of these demographic factors in urban mobility planning is vital for traffic congestion reduction. To this end, numerous on-board transit paper-based surveys have been conducted to collect the demographic data. Such method, however, is cost, time and labour consuming. In contrast, we will develop a video analytics with machine learning capability that performs the age and gender recognition of individual passengers. Existing facial recognition schemes are ill-suited to this setting as their trained neural network models tend to yield low accuracy in identifying Asians than Westerners. This motivates us to design a more accurate facial recognition algorithm by using a large-scale Asian face dataset. Second, the demographic data will be visualized and transmitted to a remote server for future transportation planning. Ultimately, these data will offer new insights to nation's long-term economic, social and environmental sustainability.

320 million people live in the urban region of ASEAN countries, and by 2050 this population will swell to nearly 500 million. The explosive growth will experience significant demographic shifts and subsequently lead to major implications for transportation system. Gender and age are some of the decisive variables that influence travel patterns and transit ridership. Recognizing the impact of these demographic factors in urban mobility planning is vital for the nation's long-term economic, social and environmental sustainability. Ultimately, enhancing mobility will translate to reduced traffic congestion in cities.

To this end, numerous on-board transit surveys have been conducted to generate the demographic data adopted for future transportation planning. Such paper-based self-complete survey mode, however, is cost, time and labor consuming. Furthermore, existing facial recognition schemes are not directly applicable to this setting as their trained neural network models tend to yield low accuracy in identifying Asians than Westerners. To address this issue, we will develop a more accurate facial recognition algorithm by using a large-scale Asian face dataset.
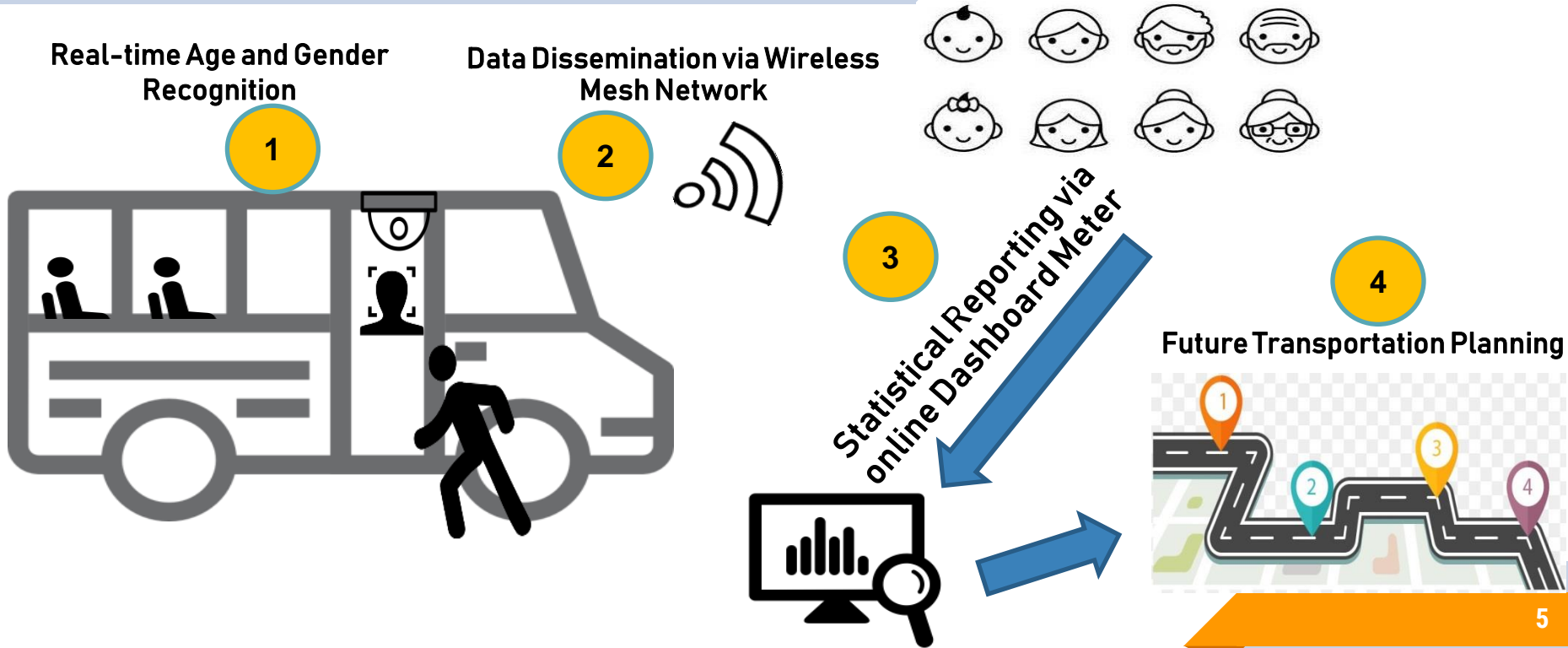
Objectives

1. To develop a video analytics with machine learning capability that performs the age and gender recognition of individual passenger in real time.
2. To optimize the recognition accuracy for ASEAN faces by refining machine learning models.
3. To design an effective communication solution on wireless mesh network for demographic data dissemination
4. To create a smart management system for the visualization of real-time demographic data.

Real-time Age and Gender Recognition

1

Data Dissemination via Wireless Mesh Network

2

3

Statistical Reporting via online Dashboard Meter

4

Future Transportation Planning
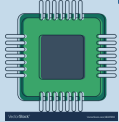
On-board unit is installed in every buses

Expected Project Outcomes

1. To develop a video analytics with high accuracy of facial recognition for Asian population
2. To design a communication solution on wireless mesh network for demographic data dissemination
3. Design and develop the IoT gateway on wireless mesh network which includes file upload/download service and demographic data visualization.
4. To setup the network infrastructure, such as cloud storage to enable real-time sensor data transfer to the dashboard monitor
5. To integrate the sensors, wireless networks and data analytics for IoT bus
6. To develop the user interface for the online dashboard meter

MIMOS

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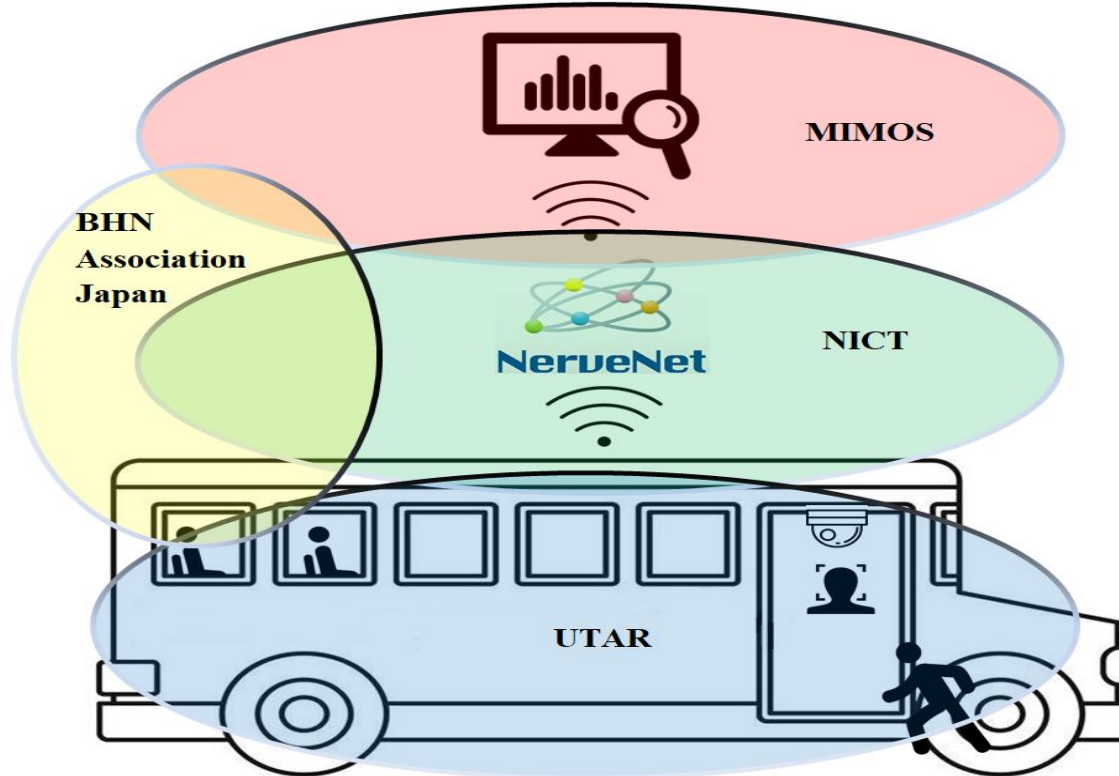
You are welcome to join the team.

Potential Impact

Social
- Increase Urban Mobility
- Facilitate Future Transportation Planning

Economical
- Creates Sustainable Business Model
- Increase Understanding on Market Demand

Environmental
- Reduce global warming by promoting public transport usage

THANK YOU

Any questions?

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SCAN ME

My CV