Geo-analytics eases Singapore's transport woes

Almost a decade ago, Singapore faced an unprecedented demand for land transport services due to a rapidly growing population and bustling economy.

In a bid to accommodate Singapore's growing ridership the Land Transport Authority (LTA) unveiled a master plan aiming to double the rail network by 2030 amidst the country's tight land constraints.

Buses were seen as an effective alternative until the rail is completed. However, in order to accurately forecast travel demand, planners needed a powerful system to crunch the massive amounts of commuter data collected daily by LTA and other government agencies.

In a single day, LTA captures more than 15 million public transport transactions. Executing a typical query of 100 million records through the systems LTA had back then would have taken at least 20 hours.

In order to create greater process efficiency, the authority needed an enterprise data warehouse providing timely access to current and historical data to undertake meaningful trend analysis, long-term policy planning and data mining.

In July 2010, LTA launched an enterprise data warehouse project known as Planning for Land Transport Network (PLANET).

PLANET, one of the largest government data warehouses in Singapore, was designed to carry out advanced data analytics on travelling patterns in Singapore whether by car, bus or train.

It aims to provide analysts and decision makers a common understanding of issues and constraints at hand, enabling them to optimise the utilisation of transport infrastructure by prioritising investments, determining trade-offs among competing demands, and refining and introducing new mechanisms to influence travellers' behaviours.

Since PLANET was rolled out, 83 billion records have been accumulated and more than 100 analytics reports have been made available to users in various functions allowing them to fine-tune key transport policies.

The ArcGIS advantage

The Singapore public transport network is an intricate and complex system equipping buses, trains, and taxis with smart sensors. These sensors collect and transmit data daily to form BIG-DATA@LTA.

LTA also enhanced the fare card readers on all buses in 2012 to collect and transmit data (for daily download and analysis) to assist in interpreting the authority's public transport information.

The agency used the geoprocessing toolkits in ArcGIS to understand the geographical aspects of commuter trends for the purpose of improving bus services.

ArcGIS helped to establish a framework for performing analysis and managing the geographic data derived from PLANET. The technology's geoprocessing capabilities enabled LTA to analyse the complex spatial relationships which were initially considered to be mundane.

It also allowed the authority's planners to map and analyse hotspots with persistent heavy-passenger loads during peak hours and to study commuter travel patterns and behaviours. The results from these activities are used to engage town councils and community leaders to minimise differing views when assessing improvement measures.

The timely implementation of geo-analytics enabled the Government to roll out a S$1.1 billion bus service improvement programme and which saw the addition of 1,000 buses to address over-crowding and frequency of service issues.

As a result, LTA achieved a 90 per cent reduction in persistently crowded bus services and a reduction to average waiting times by three to seven minutes.

This is despite a yearly increase in average daily bus ridership of 100,000.

By leveraging the unrivalled power of the ArcGIS platform, LTA has been able to keep in front of the nation's ever changing public transport challenges to keep Singapore moving.

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