Potential uses of Probe Data for transport planning and policies

Toyota Tsusho Nexty Electronics (Thailand) Co., Ltd.
Content Distribution & Development Department
10th July, 2019
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Company Profile

- **Company**: TOYOTA TSUSHO NEXTY ELECTRONICS (THAILAND) CO., LTD

- **Name**: (NETH)

  *15th March, 2018: Merged with TMETH*

- **Address**: Thailand (Mercury Tower, Bangkok)

- **Establishment**: 29th April, 2005 (Operation Start: 1st October, 2005)

- **Capital**: 32 million Baht

  - NEXTY Electronics Corp. 99.999%
  - Toyota Tsusho Corp. <1%
  - Toyota Tsusho (Thailand) Co., Ltd. <1%

- **Business**

  - **Area**: Electronics Device Sale
  - Content Development & Distribution

- **Investment**

  - Software Development  May, 2005 (BOI)

- **Promotion**

  - Electronics Device Sale  March, 2006
  - Content Distribution  November, 2011 (BOI)

- **Employee**: 308 staffs (Expat.: 3, National Staff: 301) (21st May, 2019)
Traffic Situation in Bangkok

World’s Top 10 Worst Traffic Ranking

1st Mumbai, India
2nd Bogota, Columbia
3rd Lima, Peru
4th New Delhi, India
5th Moscow, Russia
6th Istanbul, Turkey
7th Jakarta, Indonesia
8th **Bangkok, Thailand**
9th Mexico City, Mexico
10th Recife, Brazil

Bangkok’s Road & Transportation Info
- Road Length: 5,400 km.
- Road Surface: 84.85 sq. km. (5.4% of city’s area)
- Automotive Unit: 10.3M Units (6.3M Cars + 3.8M Motorcycles + 0.2 Buses/trucks)

We lost time from traffic jam **as high as 21 working days per year** from traffic jam in Bangkok.
TSQUARE Business Timeline

**Traffic Information**
- Conduct MOU with Taxi Groups
  - 10K GPS Taxi
  - FM-RTIC BKK (Toyota) & IP-RTIC (Smart G-Book)
- Cover Bangkok + B6

**Simulation/Prediction**
- WBCSD Project
- IP-RTIC (5 countries)
- IP-RTIC Phuket & T-connect
- Smart Phuket
- Cover Bangkok and T77 Link

**Nationwide**
- Nation-Wide Traffic
- Data Analytic Platform
- Multi-modal Navi
- Logistics Solutions

**e-Logistics Platform**
- Logistics Intelligence Platform
  - VRP
  - VMS
  - Dashboard

- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
General GPS Data Format

**Format:** `id, IMEI, Lat, Long, Timestamp, Speed`

**Example:** `1, 353419030099647, 13.75728, 1299970051, 100.54456, 17.4`

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<thead>
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<th>No.</th>
<th>Name</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>id</td>
<td>Running number of data</td>
</tr>
<tr>
<td>2</td>
<td>IMEI/Serial number</td>
<td>Unique number for each device</td>
</tr>
<tr>
<td>3</td>
<td>Latitude</td>
<td>North – south geographic coordinate</td>
</tr>
<tr>
<td>4</td>
<td>Longitude</td>
<td>East – west geographic coordinate</td>
</tr>
<tr>
<td>5</td>
<td>Timestamp</td>
<td>GPS Epoch Time Stamp in seconds since 1970 UTC. Time zone: GMT + 0</td>
</tr>
<tr>
<td>6</td>
<td>Speed</td>
<td>Speed measured by GPS in km/h</td>
</tr>
</tbody>
</table>
Use Case of GPS Probe Data
End User Service
Traffic Information

- Traffic information is one of NETH’s business.
- NETH provides service to Car OEM and mobile application.
- More than 380,000 vehicles in Thailand using TSquare traffic.
Multi-Modal Transportation Planning

In WBCSD Project, Sathon Model, we provide multi-modal transportation planning app. 69% of users could improve travelling to/from work in Sathon area.
Business Solution
Vehicle Route Planning

A logistic service which help planning multiple deliveries to multiple vehicles at the same time. It could plan 20 times faster than manual planning and use 10% less vehicles for delivery.
City Planning
World Business Council for Sustainable Development: Sustainable Mobility Project 2.0

**WBCSD SMP 2.0 Outline**
- 3 years project (2013 – 2016)
- Cross sectorial 15 companies’ participation
- Support 6 model cities to develop vision and roadmap for sustainable mobility

**Bangkok Project Concept**
1. First priority target is traffic congestion, which is one of the biggest mobility issues in Bangkok.
2. Develop a roadmap to build a multi-modal society by 2019 and beyond.
3. Quantify side effects to improve traffic congestion by using mobility indicators.
4. Develop a business model for the cooperation between the governmental and private sector with the aim to change people’s behavior.
5. Conduct a social experiment to simulate effects of measures by 2015 to get leanings for the development of a roadmap towards 2019 and beyond.

Toyota is the leader for Bangkok model city
In WBCSD Project, Sathon Model, Bangkok mobility simulator utilized taxi probes, government data and road side observation data as inputs.
We used taxi probes for evaluate the actual result of countermeasure. Reversible lane countermeasure helped improve 7% traffic throughput and 26% vehicle speed during peak hours.
City Visualization: Heat Map

Heat map helps us quickly identify density of probes (in this case is taxi) in target areas
Congestion pattern can help explaining traffic situation of city during a week.

Meaning of graph:
- Black: Total road segments which there is GPS data
- Red: Total road segments which have traffic jam
- Yellow: Total road segments which have moderate traffic
- Green: Total road segments which have flow traffic
Research and Development
Taxi probes were used for finding parking location. The result from GPS probe data could detect candidate parking locations. However, most of them were taxi garages.
Incident Detection

Taxi probes were used for creating normal pattern in particular area. Once something deviated from normal pattern happens, system will detect.

Heavy Floods - Pathum Wan District at 8th June 2015

Overturned gas tanker - Salaya at 3rd June 2016
NETH GPS Probe

Taxi 10,000 vehicles
Logistic 130,000 vehicles
Total 140,000 vehicles

~ 120 million data point per day
Summary

- GPS probes can be utilized for several use cases not limited to traffic related
- Transportation planning is one of its use case either for personal or business use
- GPS probe can provide better understanding of city activities through traffic simulation and visualization
- Innovative techniques can be applied for extracting meaningful information from GPS probe
- NETH has more than 8 years experience in GPS and traffic information business and be able to provide nationwide GPS probes which cover more than 10% of taxi and logistic probes in Thailand
Thank you very much for your attention

For more information please contact;

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