Topics

- INRIX – Introduction & Overview
- Growing a global data model
- Data GPS & Cellular Network
- Traffic to Movement – Population Analytics
- Use Cases in Transport
Powering the World's Largest Traffic and Population Intelligence Network

- Market leader in North America and Europe
- 150+ million GPS-enabled vehicles & devices
- 175 million drivers reached daily
- 200+ blue-chip customers
- 6 million kilometres of road across 41 countries
- Crowd-sourcing: 2 Billion GPS points gathered and processed per day
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Helping the Traveller
Managing the Movement of People & Things

Media
Provide congestion / incident data and apps to enhance radio & TV broadcasts

Government Agencies
Augment roadway operations & analytics by delivering accurate data on infrastructure performance

Private/Public Fleets
Use vehicle and location aware services to improve mobility and flow

Public Transportation
Manage the efficiency of bus, metro, and rail services

Mobile
Enhance apps and services with traffic and multimodal info

Private cars
Connect drivers to relevant content and services

People
Monitor mass people movement for safety, event management and dynamic changes to services

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INRIX Big Data – Developing the model

GPS & Infrastructure Sources

• Over 500 unique sources of data
• 150 Million + GPS enabled devices globally – (Growing rapidly)
• Probe data sourced under contract
  • Fleet operators and tracking companies
  • Transportation companies - commercial and public
  • Fee or Barter model
• 2 Billion GPS data points processed daily
• + Millions of sensors, Loops, BT, WiFi
• 300 TB of historical data and growing
INRIX - Cellular Network Data

Concept Overview

Active device creates handovers between each cell

Passive devices create handovers between each ‘group’ of cells
Cellular Network Data

Background and challenges

• Early focus on creating real time traffic (travel time) using network data
• Many challenges –
  • Network topology (which changes)
  • Noisy data (Large processing resource)
  • Not suitable for short map link segments (difficult to match data and create accurate speed)
  • Business model – Commercial challenges – Economic model, privacy, etc.
• However
  • Vast scale of data 1.7 Billion “events” daily (UK only)
  • Cell density in urban environment allows high levels of granularity ideal for relative movement
  • Good for long segment travel time measurement
  • New applications in transport planning and population movement
From Traffic to Population

GPS probe data (FVD)

- Focus has been on traffic data services using probe data to generate global real-time flow model

But it's not just about Traffic

- It’s about how people move and how their information needs are rapidly developing
- It’s about how big data can help in transport planning and changing the way we measure how people move and travel

It’s now about the movement of People and Things
Trip Creation Example

1: Probe overnight creates multiple ‘noisy’ events on many supporting cells. Estimation of true location evaluated by INRIX.

2: Probe travels from home to destination, creating event ‘breadcrumbs’ through the trip. Route calculated by INRIX (including mode, and travel time).

3: Probe signal ‘flickers’ to illogical cell tower. INRIX processes identify rogue behaviour and remove error.

Processed in real time from aggregated probes, providing insight for population movement.
GPS + Cellular Analytics Enabling Expanded Use Cases

Flow

Density

Movement
Data Analytics for Transportation

Turning Data into Information

- Real-Time Bottlenecks Identification
- Historical Traffic Download for Custom Analysis
- Congestion Tracking Analysis
- Congestion Trends
- Bottleneck Ranking & Movement
Population Analytics

*Insights Into the Movement of People*

Population Analytics from INRIX is designed to answer the most pressing and valuable questions about how we move through our world.

- How many people are here right now?
- What transport modes are being used?
- What is the relative density of people in this area?
- What was the origin and destination of trips?
- How many people saw my ad?
Use Cases
Origin Destination: Regional Trips

TfGM - REQUIREMENT
Creating a regional transport model where traditional methods deliver limited results. Understanding the true flow and demand of population in a network.

PROBLEM
Maximising the impact of infrastructure investment is valuable. Transport needs are changing, so how to create an integrated model to meet the needs of growing city and its transport infrastructure.

SOLUTION
Historical insight on population movement, aggregating flow over time and space providing Origin Destination Matrices to inform transport simulation and modelling.
Transport Mode Identification

- How far can we go in differentiating different modes.
- Algorithms differentiate travel by mode Road vs. train.
- Certain modes (such as trains) are identifiable through use of cluster analysis techniques.
- Such modes display unique behaviour, with each probe in the travelling population triggering handover events very densely in space and time.
- How far can we go?
**Sector Travel Time**

**REQUIREMENT**
Monitoring speed and travel times on a road network.

**PROBLEM**
Alternative measurement techniques frequently rely upon fixed infrastructure, or are constrained in non-connected, limited quality solutions.

**SOLUTION**
Delivery of high quality, real time speed and travel time for an ever expanding global network, provided via a fusion of GPS, Cellular, Fixed Sensor, Journalistic, and other sources.
GPS Probe data is a critical element of the National Traffic Information Service. Data is fused with sensor data and provided as a hosted service for the UK Highways Agency that monitors and manages England’s entire Strategic Road Network.

With the largest integration of agency sensor and private GPS Floating Vehicle Data (10,000+ km):

- Full nationwide motorway network speed monitoring and slowdown detection, updated every minute.
- Greater network granularity than HA sensors alone; full system coverage regardless of sensor location and health status.
- Automated alerts to operators of conditions deviating from normal conditions.
Real Time Population Movement data for Event Management

**REQUIREMENT**
Monitoring population density and behaviour for expected events in near real time, to ensure safety and efficiency.

**PROBLEM**
True understanding using existing techniques of real time population behaviour is extremely limited, both in sample and through cost constraints.

**SOLUTION**
Delivering near real time visualisation of population movement and density for organised events from a statistically significant sample. The data can identify how busy a region is, and provide intelligence about the attending population.
**Incident Detection and Control**

**REQUIREMENT**
Monitoring population density and behaviour when unexpected events occur.

**PROBLEM**
Population behaviour is unpredictable, and in unusual scenarios true transparency of behaviour is often unavailable when it is needed most.

**SOLUTION**
Continuous monitoring of population behaviour compared to normal, providing exception driven alerts to drive fast and decisive incident response. Providing near real time visualisation of population movement and density as incidents develop to inform control centre policy.
Thank You

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