Geospatial Innovation – Science and Technology

20 November, 2018

Data is Growing at Amazing Space.....

- Sensors/RFID/Devices
- Mobile Web
- User Click Stream
- Web Logs
- User generated contents
- Social Media
- Interactions and Feeds
- Spatial GPS coordinates
- HD, Video, Images
- Many more...

- Size of universal data doubles every 2 years
- Increase Variety and Complexity of Data

- Zettabytes
- Exabytes
- Petabytes
- Terabytes
- GB
- MB
GeoSpatial Data Lake - Introducing

Large amount of Spatial Data – Imagery, Vector, Drone Feeds, LIDAR,

Injest all data

Variety of Information embedded - Structured Data, Semi Structured and Raw Data

Store in native format

Mobile data feeds, Vehicle data, Variety of IoT/sensors data

PROCESSING
- Schema on the Read
- Massive Spatial Processing

AGILITY
- Highly Agile
- Fit for purpose

STORAGE
- Low Cost Storage

ANALYTICS
- Predictive Analytics
- Prescriptive Analytics

TELECOM USE CASE
By Examining Massive Amounts of End-User Mobile Location Data with Other Wireless Network Observation Data, We Can Introduce Subscriber-Verified Coverage that Prove QOS, and Thereby Reduce Churn and Increase NPS.

Capitalize on your coverage

- Network Optimization
- Data Monetization
- Customer Acquisition
- Customer Engagement
Multi-Source Approach to Optimize Telecom Network Coverage

**Description** - Improve Understanding of Network Performance by Collecting, Organizing, Enriching and Visualizing Device Driven Network Insights.

**Data Sources** - Device Collected Location Based Network Performance Data

**Types of Analysis** - Perform Spatial Processing via Vector and Raster Based Methods to Generate Map, Data Science and Business Intelligence Data Products That Deliver Network Performance Insights

**Expected Business Outcomes** - Through the Deployment of this Solution, a Wireless Providers can dramatically Improved ROI and Decision Making on Infrastructure Investments in New Spectrum, Small Cell and Tower Based Technologies.
Multi-Source Approach to Optimize Telecom Network Coverage

Old: RF Propagation Modeling

New: Big Data + RF Propagation Modeling

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Old</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>Model based</td>
<td>Verified with real users</td>
</tr>
<tr>
<td>Granularity</td>
<td>Coarse</td>
<td>High (60 m or lower hex)</td>
</tr>
<tr>
<td>Timing</td>
<td>Monthly or worse</td>
<td>Near Real Time</td>
</tr>
<tr>
<td>Information</td>
<td>Yes/No</td>
<td>Rich (e.g. network speed)</td>
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</tbody>
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Big Data technologies are changing how coverage analysis and planning are done

Data Capture [Location Server]

Process & Analysis [Spatial Data Lake]

Uses [GIS, DS, and BI tools integration]
Each layer of location data adds new details and additional insight.

Location Insights
Complete location attributes by grid segment.

Scalability & Performance
90 billion records in 30 min

Mobile log records
Hex level coverage map

Hex-binning
Verification

90 days aggregation

count: 5
rssi_mean: -93
Drop call: 0
Spatial Data Lake - Traffic Density

Big Data Driven Spatial Analytics and Visualization Engine