



Geospatial Analytics using Google Maps — Unlocking location intelligence

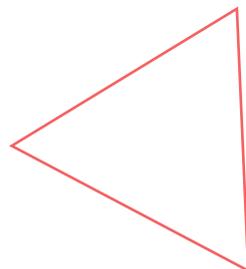
Understanding the business relevance of geospatial analytics and how to unlock its insights



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Introduction:

Enterprises driven by spatial data are turning to geospatial analytics to extract insights and make informed decisions. In industries like urban planning, retail, and logistics, companies need to visualize and analyze location-based data to reshape their business strategies and outcomes. Valued at \$73 billion in 2025, the global market for **geospatial analytics** is expected to grow to \$118 billion by 2032.



Image source

At its core, geospatial analytics is about collecting and analyzing location data using technologies like geographical information systems (GIS) and global positioning systems (GPS). Combining data visualization with data science techniques allows users to generate dynamic heat maps and 3D models.

With the global reach and API ecosystem of the Google Maps platform (GMP), location-based data companies can leverage geospatial analytics for use cases like:

- Identifying accident hotspots and responses.
- Implementing a sustainable supply chain operation.
- Choosing the right location for a business facility or service center.
- Monitoring infrastructural assets for potential issues.

In this eBook, we'll explore how location-dependent enterprises can leverage Google Maps and Geospatial analytics as a location intelligence platform.

Geospatial analytics - Key industries

• Defense & Intelligence

- Military surveillance and reconnaissance
- Mission planning
- Border surveillance and monitoring
- Threat assessment and tactical operation planning.

• Energy & utilities

- Sustainability
- Asset and outage management
- Energy demand forecasting
- Environmental impact assessments and energy grid optimization.

• Government

- Urban planning
- Infrastructure development
- Environmental monitoring
- Public safety

• Telecommunication

- Network coverage analysis and optimization
- 5G infrastructure planning
- Territory planning and geomarketing
- Compliance monitoring

• Insurance & financial services

- Risk assessment
- Catastrophe modeling
- Policy pricing
- Fraud detection

• Real estate & construction

- Site selection
- Land surveying and mapping
- Real estate market analysis
- Property valuation
- Construction monitoring

• Automotive & transportation

- Fleet management
- Route optimization
- Accident analysis
- Smart parking and tolling
- Autonomous vehicle navigation

• Healthcare & life sciences

- Disease mapping
- Health resource allocation
- Emergency response planning
- Medical and public safety
- Medicine distribution

• Mining

- Resource mapping
- Land resource and inventory management
- Environmental monitoring
- Geological hazard mapping
- Mining operation management

• Agriculture

- Smart farming
- Soil mapping
- Crop monitoring
- Irrigation management
- Pest and disease management

• Retail & logistics

- Supply chain optimization
- Delivery accuracy
- Route optimization
- Customer targeting

• Urban planning & infrastructure development

- Infrastructure management
- Environmental change monitoring
- Public safety



Chapter 1: Fundamentals of Geospatial Data

At the core of geospatial analytics, geospatial data essentially represents objects in a fixed geometric space, including vector and raster data.

Vector data is a simple 2D (or 3D) geometric object with a coordinate-based data model. This type of geospatial data is represented in the form of:

- Points – or discrete geographic locations represented with a coordinate pair.
- Lines – represent linear objects such as roads and cables, and are composed of vertices (with a beginning and an end) along with an ordered list of vertices.
- Polygons – represent bounded areas such as geographic land masses and islands, and are composed of nodes and vertices.

Here's an illustrated representation of vector data:



Image source

Raster data is more complex and larger than the vector data type, and is composed of rectangular arrays of equally spaced square grid cells. Some examples include the salinity of water bodies and soil pH. A multidimensional (or 3D) raster can represent data captured multiple times, with different depths and heights - for example, atmospheric data and earth sciences.

Here's an illustration of both 2D and 3D raster data:



Image source

Key concepts in geospatial data

Besides vector and raster data, here are some more key concepts to understand in geospatial data and analytics:

| Concept | Definition | Real-world applications |
|-------------------|---|--|
| Geocoding | The process of converting location data into geographical coordinates, such as latitude or longitude. | Tracking logistics movement Locating the incident spot for emergency services period providing locational context to datasets |
| Reverse geocoding | This is the opposite of geocoding, where geographical coordinates are converted to a descriptive location period. | Accurate listing of properties Location-based advertising |
| Spatial queries | The process of retrieving location-based data using filters like proximity, containment, or intersection. | Optimizing urban planning Improving disaster response Precision farming |
| Data overlays | The GIS-based process that combines multiple maps of land use, soil, and elevation to analyze relationships. | Site suitability analysis Resource management |

▶ How does Google Maps source geospatial data?

The Google Maps platform retrieves its geospatial data from a variety of diverse sources, including:

1. Google Earth data catalog:

As a real-time platform for earth sciences, Google Earth has over 40 years of historic satellite imagery and scientific datasets, which are updated daily. It includes data sources with the following capabilities:

- Surface temperature using thermal satellite sensors.
- Climate models to generate long-term climate predictions.
- Landsat satellite imagery to monitor the planet.
- Land cover maps include forests, grasslands, and water bodies.

2. Google geospatial datasets:

Enterprises can also integrate Google's proprietary geospatial datasets into Google BigQuery as a data analytics platform. Here are some of its geospatial datasets:

- Places insights – for Google Maps' Point of Interest (POI) that provides detailed information about specific locations like public parks and prominent landmarks.
- Imagery insights – uses Google Maps' imagery datasets for remote sensing and AI-enabled insights.
- Road management insights – for real-time traffic updates and management.



Chapter 2: Understanding Google Maps APIs

With a variety of Google Maps APIs, developers can easily integrate location-specific features in their applications. Primarily, Google Maps APIs are categorized into:

1. Maps APIs

These APIs are used to customize and display Google Maps in any application. For example, the Maps JavaScript API can embed customizable maps in the supported application, with features like location markers, overlays, and customized styles.

2. Places APIs

With Google Maps' Places APIs, enterprises can display data about any location, including business names, points of interest, and addresses. Some common Places APIs are the Geocoding API, Geolocation API, and Time Zone API.

3. Routes APIs

The Routes APIs provide the best navigation path to a selected location, along with the estimated travel times. For instance, the Distance Matrix API provides the distance and required time from the origin to the destination.

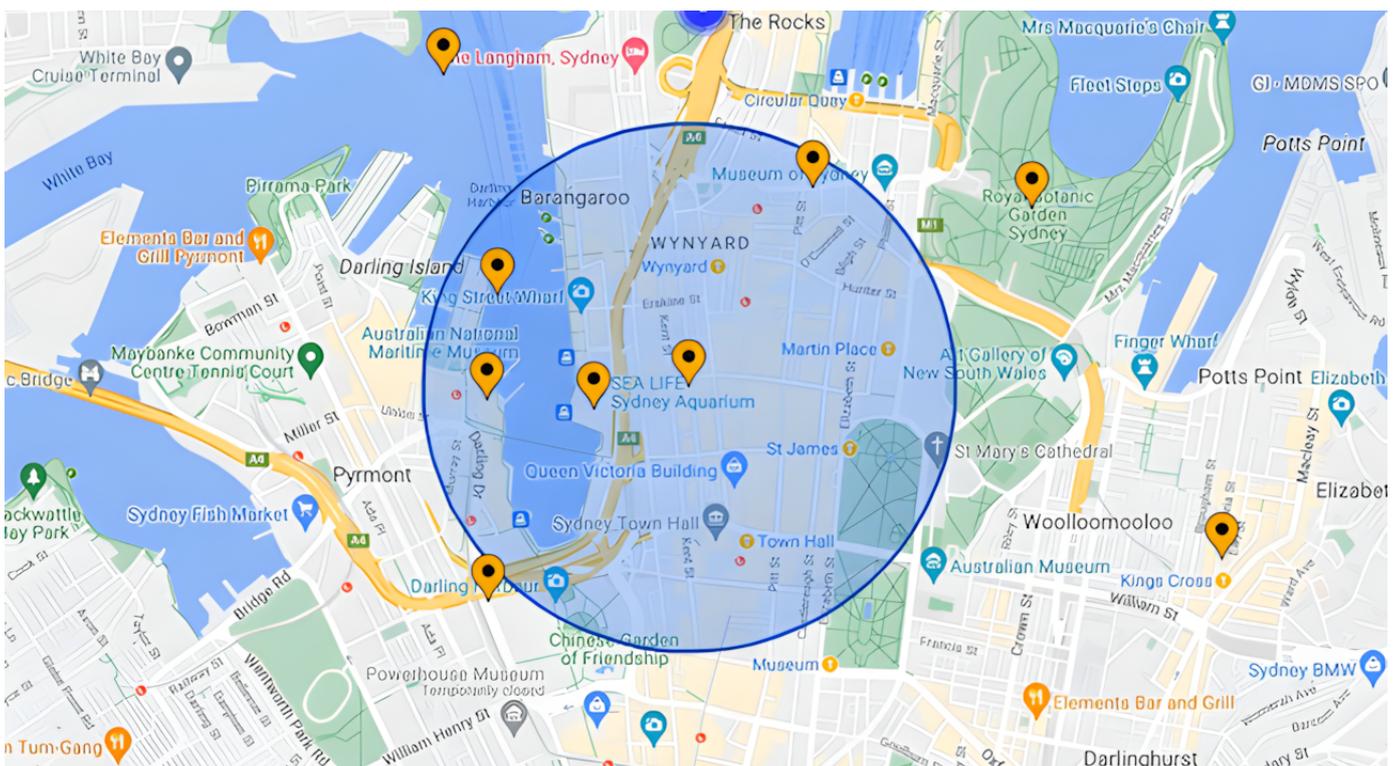


Image source

▶ How to integrate Google Maps APIs

Here are the essential steps to integrate Google Maps APIs into any location-based application or site:

1. Create and configure a Google Maps API project on the Google Maps platform.
2. Enable the APIs and services, and search for the right API.
3. From the Credentials section in the “APIs and services” tab, create a new API key (along with restrictions). Next, configure the HTTP referrers to restrict to your domain usage.
4. Add the new API key to your application or website’s HTML code.



Chapter 3: Use cases of Geospatial Analytics

In a location-driven world, geospatial analytics is used across industries and operations, including supply chains, environmental management, urban planning, and healthcare analytics.

Here are four of these use cases of geospatial analytics:



Site selection in retail

Retailers are using geospatial analytics to select the store site (or location) where they can attract the maximum number of footfalls and customers. With this tool, retailers can leverage heat maps to analyze customer activity and mobility patterns to optimize store location. Similarly, they can use the Places API to analyze competitors' store performance and identify opportunity zones.



Route optimization in logistics

By using real-time GPS data, logistics companies can leverage geospatial analytics to find the most fuel-efficient and time-optimized delivery routes. They can also improve fleet management by choosing the best routes between depots and multiple delivery points. Geospatial information also enhances last-mile logistics operations with real-time visibility into pending deliveries.



Urban planning

City planning and urban development authorities can leverage geospatial analytics to plan their next infrastructure project. They can make informed decisions based on current zonal infrastructure and movement & travel routes taken by residents. By analyzing foot traffic, city authorities can improve the walkability factor using geospatial data.



Network planning in telecom

Telecom companies can also leverage geospatial analytics to analyze foot traffic data in urban and rural locations. This helps them plan their network infrastructure and maximize connectivity in highly populated areas. Geospatial data is also useful in setting up Wi-Fi hotspots in urban locations and telecom centers for customer service.

Chapter 4: Step-by-step guide to implement Geospatial Analytics in Google Maps

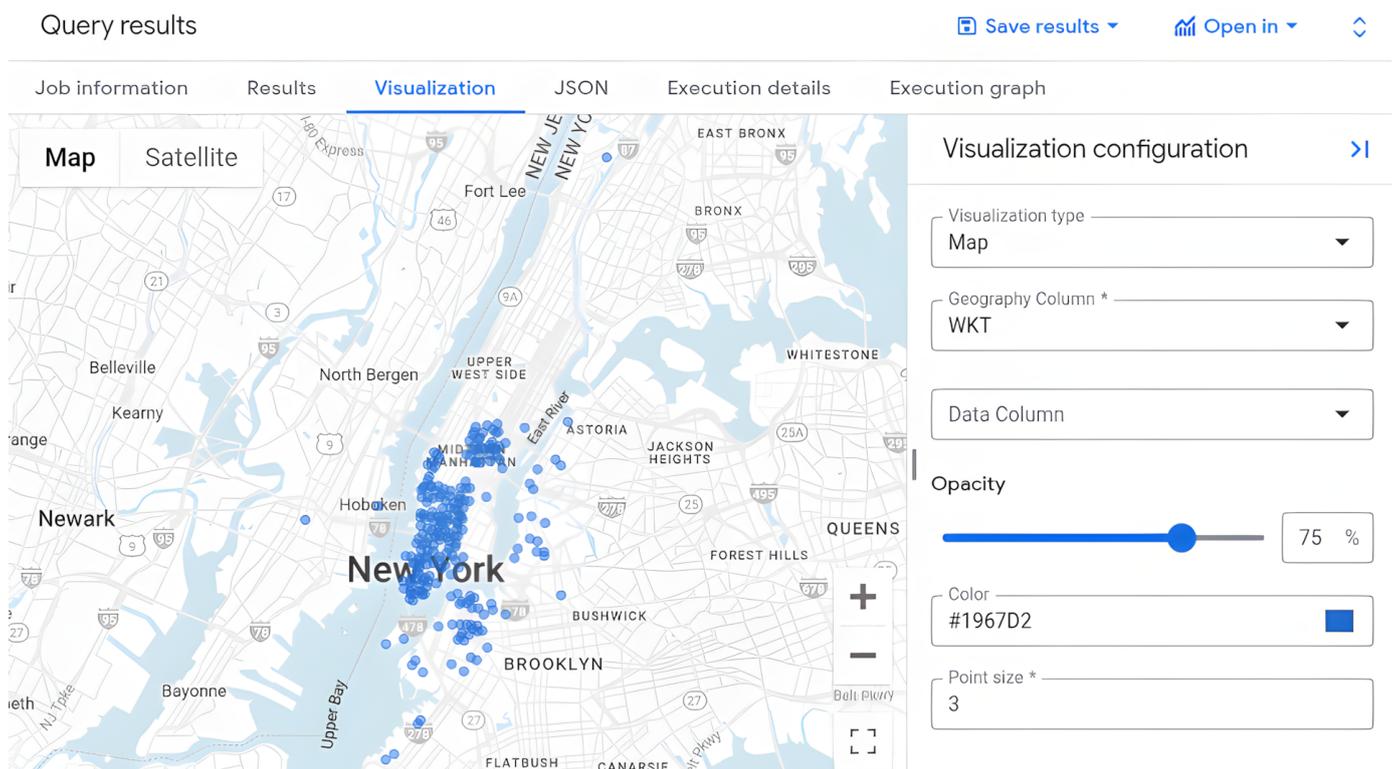


Image source

To integrate geospatial analytics in Google Maps, enterprises can use a variety of geospatial tools and techniques, including:

- Vector and raster processing tools for geometric processing, proximity analysis, and geostatistical analysis.
- Remote sensing tools to process satellite imagery and aerial images.
- Network models (or graphs) to analyze the best directions and distances.
- LiDAR-powered cloud processing tools to create accurate numerical models.

Geospatial analytics in Google Maps is effectively a 4-step process as explained here:

1. Acquire and process geospatial data.

Depending on the purpose or use case, the first step is to collect primary and secondary geospatial data from various sources - for example, geodetic data from drone or satellite imagery. Remote sensing tools can provide multiple types of data, including optical, LiDAR, and synthetic aperture radar (SAR) data.

The next step is to process the collected geospatial data into the right database systems for further analysis.

2. Develop the geospatial analytics solution.

The second implementation step is to display the

geospatial data on Google Maps using Google Maps APIs. Enterprises can also customize their map appearances using styling tools according to their business needs. They can also visualize the data on Google Maps by adding markers, polygons, and customized data layers.

Through 2D and 3D visualization, they can utilize large geospatial datasets for advanced analysis.

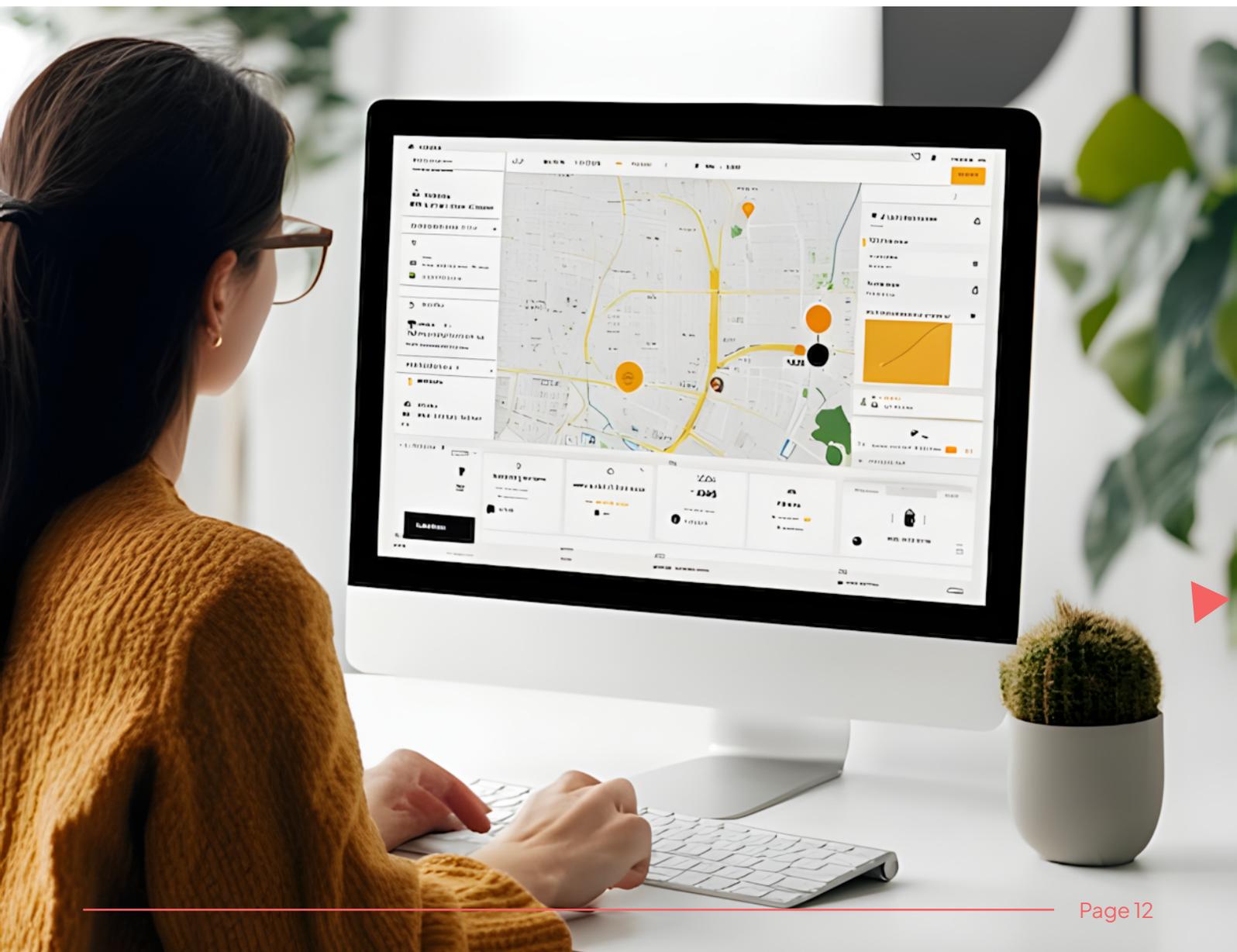
3. Apply geospatial analysis.

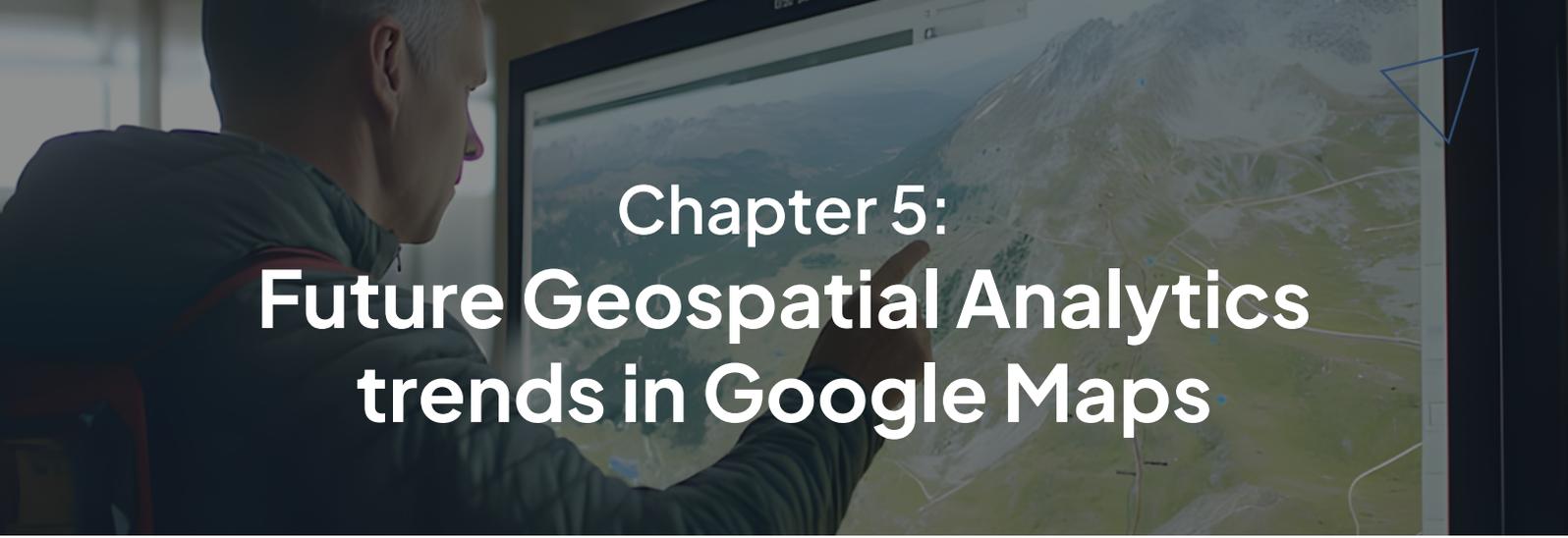
The next step is to analyze large geospatial datasets (including vector and raster datasets) by integrating them into Google BigQuery. For example, the “GEOGRAPHY” data type in Google BigQuery can store geocoding data (latitudes and longitudes).

They can also use the GoogleSQL geography functions to perform spatial analysis, such as estimating the accurate delivery arrival time or identifying customer clusters for store optimization.

4. Publish the findings of the geospatial analysis.

The final step is to publish the findings of geospatial analysis to business stakeholders through integrated dashboards or web applications. Through continuous improvement of analysis and visualization, enterprises can streamline their location-based operations and decision-making processes.





Chapter 5: Future Geospatial Analytics trends in Google Maps

AI and machine learning are expected to play a dominant role in location intelligence platforms like Google Maps. With an AI-powered location intelligence platform, enterprises can benefit from:

- An accurate prediction of traffic congestion and best navigation routes.
- Understanding the customer's buying patterns and demographics in a particular location.
- Real-time tracking of logistics fleets and deliveries.
- Optimized network planning for telecom companies.

Here are some of the latest trends in geospatial analytics in Google Maps:

1. Geospatial data integration with digital twins

Among the emerging use cases, geospatial data and analytics can deliver personalized models of city infrastructure in industry sectors like real estate, utilities, and telecom networks. With 3D spatial data, digital twins can simulate real-world environments in a virtual space. This enables city planners to visualize the impact of infrastructure changes on traffic, energy consumption, and drainage systems.

2. Real-time analytics using IoT

With connected Internet of Things (IoT) devices, real-time geospatial analytics can deliver dynamic, location-based insights for faster decision-making. Real-time spatial data can be extracted from connected devices, including traffic monitoring cameras, drones, satellites, and GPS-enabled devices.

Some of the leading use cases of geospatial analytics with IoT technology include:

- Supply chain optimization using IoT and geospatial datasets
- Catastrophe modelling for volcano eruptions, floods, and avalanches
- Agricultural yield optimization using real-time maps generated from UAVs and satellites
- Utilities management using IoT sensors to detect water leakages or gas pipeline faults

3. Indoor mapping

Among the significant geospatial trends, indoor mapping enables companies to extract valuable insights from indoor environments, such as airports, hospitals, and corporate campuses. Enabled by Google Cloud, navigation apps can guide visitors through complex layouts. With real-time heatmaps, retailers can optimize product placements and traffic flow.

By applying geospatial analysis to indoor location data, companies can uncover data patterns and improve their decision-making process.

4. Augmented reality (AR)

Innovations like Geospatial augmented reality (GAR) combine AR technology with geographical data, thus effectively overlaying digital data on real-time location data. This provides AR users with context-sensitive insights for location-based applications like navigation and urban planning.

Google's [ARCore Geospatial API](#) allows remote users to attach their content to locations covered by Google Street View and create immersive AR experiences.

Conclusion

By integrating its datasets with Google Earth Engine datasets, Google Maps has made it easier for customers to access real-time insights from geospatial data. With this innovation, Google is directly integrating its geospatial analytics capabilities into Google BigQuery.

As a reliable **Google Maps** partner, **Onix** can help you unlock the potential of location intelligence tools. **Get in touch** for an optimal geospatial solution.



 onixnet.com

 connect@onixnet.com

 800.664.9638

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