



Data and Location from Insights to Action via Geo-Smart Location System

Location data has evolved from simply telling us where things are to providing insights into how objects and phenomena interact with each other in their environment. This advanced understanding, known as Geo-Smart Location, enables organizations to make more informed decisions and achieve better operational and business outcomes. By leveraging the Science of Where, we can unlock the power of location data and drive innovation across industries.

To solve the most complex problems, we must first understand them in the crucial context of location. Hidden patterns, trends, and relationships emerge when you visualize and analyze data on a map.



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Introduction

When we cast our eyes upon the realm that envelops us, that which appears facile on its surface is oftentimes far from it. What presents itself as uncomplicated may actually possess a multiplicity of dimensions. Since the genesis of our existence, we have endeavored to apprehend our surroundings through the prism of spatial placement. However, now that our vision has expanded, our sensory faculties augmented, and our capacity to track amplified beyond all prior epochs, we have at our disposal an unparalleled tool with which to detect patterns, subdue intricacies, and bring into focus not only the whereabouts of phenomena, but also the temporal, personal, quantitative, and actionable facets thereof. This lucidity empowers us to undertake decisions that can potentially determine the divergence between profit and loss, tranquility and strife, life and death. It is when we view the world through the lens of locality that we encounter resolutions.



In VALOORES we have location down to a science, a Science of When, Why, What and Where.

What is a Geo-Smart Location?

Geo-Smart Location is achieved via visualization and analysis of different data types. Geospatial data analysis enhances understanding, insight, decision-making, and prediction. By clustering hits aggregating coordinates to a smart map or dashboard, organizations can use intelligence tools to identify where an event has taken place, understand why it is happening, and gain insight into what caused it. As part of a digital transformation, many organizations are relying on geographic information system technology to create location intelligence.

Why is Geo-Smart Location important?

Numerous challenges in both business and government are intricately linked to questions of location. Location intelligence has a vast array of applications, from promoting sustainability and equity to tackling the climate crisis, and from utilizing real-time analytics to gaining operational intelligence in commercial real estate and retail. In particular, Geo-Smart Location, powered by Mapbox, is of utmost importance when making business decisions. Neglecting geography means overlooking essential information that can enhance comprehension.

What does Geo-Smart Location do?

In today's world, billions of devices are connected to the Internet of Things, granting executives and decision-makers unparalleled access to business data, including a plethora of geospatial information. Geo-Smart Location enables the visualization and analysis of vast volumes of data in a location-specific context, empowering holistic planning, prediction, and problem-solving. By viewing all pertinent data in the context of location, whether on a smart map, app, or dashboard, unique insights can be gleaned. Location technology can uncover hidden relationships, patterns, and trends, providing a competitive edge.

What is a Geo-Smart Location Solution?

A Geo-Smart Location Solution is powered by Mapbox technology, which allows users to store, visualize, and analyze geospatial data in real time to gain actionable insights. Often leveraging maps and dashboards to make geospatial insights easy to share with executives and decision-makers. Analysts can use the solution to combine all kinds of data such as demographic data, crowd relationship management data, density, patterns and telecommunication data.

Translate Problems Into Spatial Answers

Utilize spatial analysis and data science to connect disparate elements through a comprehensive set of analytical methods and spatial algorithms. Employing location as a central theme reveals hidden patterns, enhances predictive modeling, and provides a competitive advantage. On-demand access to these tools facilitates easy tapping into the benefits of spatial analysis and data science.

Data preparation: Use out of the box tools and data science libraries to

integrate, structure, transform, clean and enrich your data.

Data exploration: Create beautiful maps and dynamic charts to visually investigate your data.

Location analysis: Bring location data into your analysis. Use more than 1000 analytic tools in VCIS and integrate packages from the data ecosystem.

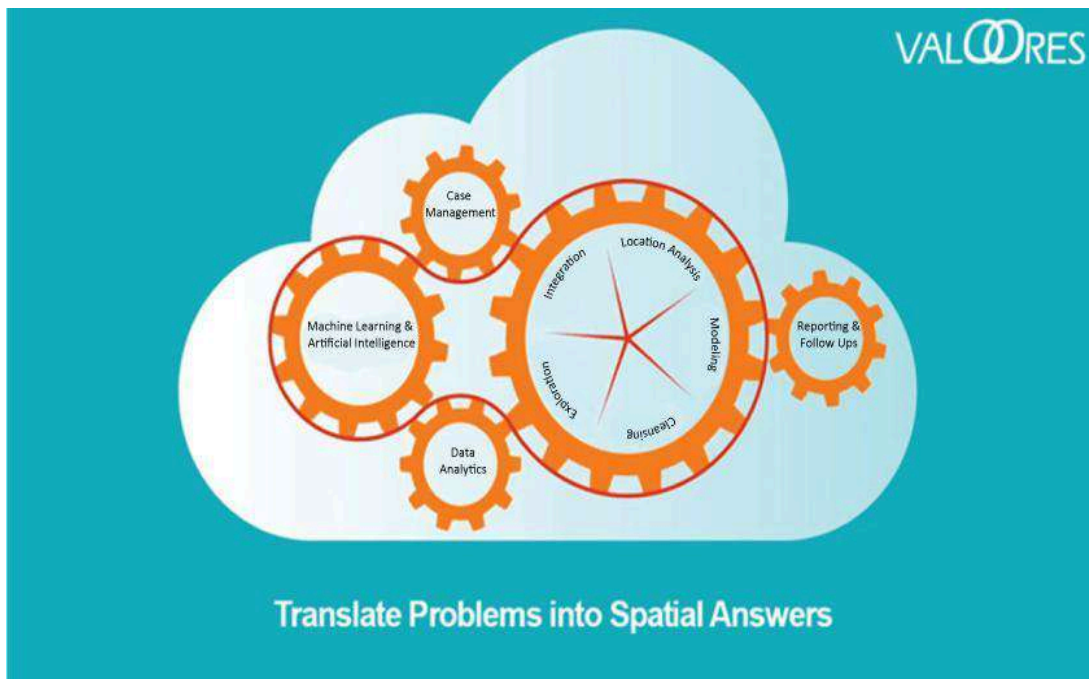
Machine learning and artificial intelligence: Easily integrate spatial analysis into machine learning models to solve spatial problems

Data analytics: Transform massive spatial data into manageable information. Analyze and display large volumes of streaming data.

Modeling: Automate processes and extend functionality using multiple data science packages.

Reporting and follow ups: Effectively communicate and share complex analysis results through visually stunning reports and apps.

Case management: Build a strong case by gathering and analyzing diverse sources of information that align with your specific investigation needs. With a thorough approach to sourcing data, you can ensure that your case is well-supported and informed by a wide range of relevant information.



BIG DATA

As datasets grow in size and activity, maintaining database performance becomes increasingly challenging. Apache Cassandra is an application that helps organizations process large

volumes of fast-moving data in a reliable and scalable way. With Cassandra, your cloud can reach "hyper-scale," providing practical solutions to achieve the speed, scale, and availability needed for

hundreds of thousands of data writes per second. This database focuses on reliable performance, speed, and scalability, storing massive amounts of incoming data and handling hundreds of thousands of writes per second.

Cassandra's distributed architecture and emphasis on scalability make it an attractive option for organizations dealing with large datasets and requiring high levels of performance and availability.

Performance-Speed

Cassandra achieves its fast speed through its specific architectural choices. It employs a hashing algorithm to determine where to store data quickly, enabling rapid decision-making on data storage. Additionally, it allows any node to make data storage decisions, eliminating the need for a centralized "master node." This distributed approach to data storage and decision-making enables Cassandra to achieve fast write and read speeds, making it an ideal choice for organizations that require high performance and scalability in their data management solutions.

Scalability

Cassandra is highly scalable, and its performance can be easily increased by adding a new rack. Unlike traditional databases, there is no need for a

"master" node to handle the orchestration and management of data. To achieve its scalability, Cassandra places less emphasis on data consistency, instead employing a peer-to-peer communication model known as the "gossip protocol," which allows nodes to communicate and pass metadata among themselves. This approach makes adding new nodes to the cluster a straightforward process. Cassandra is also a highly robust data store, achieving a high level of fault tolerance by creating and storing copies of data in multiple locations through its hashing algorithm. In the event of a node failure, additional copies of the data are available. Cassandra allows for more flexibility in data consistency, which enables it to maintain high levels of data redundancy while still achieving fast performance, making it an ideal choice for organizations that require both speed and reliability in their data management solutions.



VCIS Location Analysis

With an endless list of spatial questions that need to be answered, it is helpful to classify and group these questions in order to establish a common language. The resulting classification, or taxonomy, provides the structure that can help us better learn, understand and communicate to the world how location analysis is a critical part of problem solving.

The taxonomy of location analysis includes four categories that classify and group related analytical questions. The four categories are:

- Measuring hits, density and distribution
- Determining how hits are related
- Detecting & quantifying patterns
- Making predictions

Measuring hits, density and distribution

Crowd behavior exhibits both stability and variability across different situations. To better understand the relationships between hits and various parameters, the VCIS approach first examines the density of hits and the distribution of behavior. The density of the crowd can lead to different conclusions, such as area classification. For example, a sparse crowd in one

location may be considered dense in another, highlighting the importance of considering location in the analysis. Measuring hits and density is a common requirement in location analysis, and it may involve describing a group of hits or devices in terms of their location properties, such as the type of area they are located in (e.g., residential, work, or a place with repetitive visits, etc...).



Determining how hits are related

To answer certain questions, one needs to understand the context and relationships between different hits or groups. For instance, how are they related in space and time? The relationships can include proximity, coincidence, intersection, overlap, visibility, and accessibility. Determining these relationships involves a set of phases that help describe and quantify

the relationships between two or more features.

- Determining what is nearby or coincident
- Determining and summarizing what is within an area
- Determining what is closest
- Determining what is visible from a given location
- Determining overlapping relationships in space and time

Detecting and quantifying patterns

Location analysis involves more than just visualizing and interpreting data. It also entails mathematically detecting and quantifying patterns in the data. Spatial statistics, for instance, can be used to identify hotspots and outliers, while data mining techniques can help identify natural data clusters. Both approaches can also be utilized to analyze changes in patterns over time. In essence, location analysis is a data-driven process that leverages various analytical tools to gain insights into location-based phenomena.

Making predictions

The final category of the location analysis taxonomy involves using advanced modeling techniques to aid in

making predictions and enhance understanding. These techniques can be utilized to predict and interpolate data values between sample points, identify factors related to complex phenomena, and make forecasts for the future or over new geographies. Several specialized modeling approaches also incorporate principles from physical, economic, and social sciences to predict how objects will interact, flow, and disperse. Ultimately, these predictive questions aim to forecast behavior and outcomes and provide us with a better understanding of the world around us.

- Given a success case, identifying, ranking, and predicting similar locations
- Finding the factors that explain observed spatial patterns and making predictions
- Interpolating a continuous surface and trends from discrete sample observations
- Predicting how and where objects spatially interact
- Predicting how and where objects affect wave propagation
- Predicting where phenomena will move, flow, or spread
- Predicting what-if

The Integration of Geo-Smart Location Tools with Geopolitics

What are Geopolitics?

Geopolitics may not immediately come to mind as a part of Geo-Smart Location. But it:

- Involves some types of human activity
- Draws on knowledge of the earth
- Provides information to support decision-making

Geopolitics refers to the study of how geography influences international relations, including the advantages and disadvantages associated with particular geographic locations. By examining various geographical variables, researchers can gain insights into international political behavior and make predictions about future trends. In essence, geopolitics represents a strategic approach to understanding the power of location in global affairs, which is also known as Geo-Smart Location.

Governments' concerns

In today's rapidly evolving geopolitical landscape, government leaders are facing unprecedented risks linked to territorial disputes, changing global

dynamics, and security threats. To mitigate these risks and develop advanced models based on big data, policymakers are increasingly turning to Geo-Smart Location strategies. By implementing machine learning automation at scale and in real-time, these strategies enable government agencies to leverage georeferenced drone and satellite imagery to automate fieldwork, model growth scenarios, predict crop yields, and assess crop health. Ultimately, Geo-Smart Location is playing a transformative role across various industries, enabling organizations to navigate geopolitical risks more effectively and make more informed decisions.

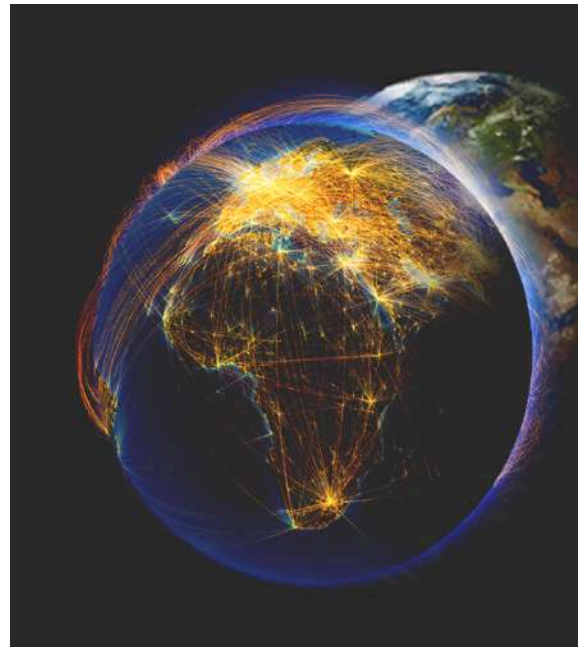
Geopolitical Risks Assessment and Optimization at the global scale.

The location-based approach to geopolitical risk management is a valuable tool that can save time, money, and lives. Geo-Smart Location tools effectively detect potential geopolitical risk areas, provide detailed information on how to manage risks, and help

rationalize communication during all phases of the risk management process. Effective governance policies are essential in decision-making processes, presenting both opportunities and challenges. Public authorities need to intervene in several sectors to regulate them. Implementing targeted geostrategic actions can help decision-makers manage these transformations and seize development opportunities.

For instance, disparities in access to vaccines and healthcare can have significant consequences on national policies, encouraging governments to rethink their foreign and national policies, income prospects, human resources, reputations, and geopolitical risk management strategies. The continuous evolution of geopolitical powers, international relations, climate change, and sustainability issues affects global agendas and political prospects, with an increasing need for governments to play a role in directing economic activities, especially through their industrial policies. These geopolitical risk optimizations pose both challenges and opportunities for governments, who must adopt strategic approaches to manage risks.

Using location data-based risk assessment and predictive analysis, governments can identify when, why, and where to allocate resources, develop models to share geospatial data in real-time, and target the resources, people, and places impacted. Creating detailed risk attenuation plans and visualizing data-related needs in real-time during crises allows for effective crisis management by integrating, analyzing, and displaying data from many sensors, devices, and social networks. This leads to quick decision-making and effective treatment of the repercussions of crises.



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