Project GeoMatrix

Developer will need to use Deck.gl & MapBox

deck.gl and Mapbox are used together to create interactive geospatial visualizations. Mapbox provides the underlying map, while deck.gl is used to visualize the data on top of the map. This combination allows you to take advantage of the strengths of both tools: the advanced mapping capabilities of Mapbox, and the powerful data visualization capabilities of deck.gl.

https://www.mapbox.com/
https://deck.gl/

MVP Description (PHASE 1) | GeoSight: Interactive Geospatial Visualization Tool

GeoSight is an interactive geospatial visualization tool that enables users to engage with data in a more intuitive and visually compelling way. Built using the robust capabilities of Mapbox for base maps and deck.gl for data visualization, GeoSight combines the strengths of these technologies to present a user-friendly and powerful data visualization platform.
Base Map Styles

GeoSight comes with a variety of base map styles to cater to diverse user preferences and use cases. Leveraging the mapping capabilities of Mapbox, users can choose from four map styles - Light, Dark, Streets, and Satellite Streets - to use as the backdrop for their data visualization.
Data Visualization and Interaction

With GeoSight, users can create data points manually by clicking on the map or upload multiple data points at once using a CSV file. Each data point can have a name, location (latitude and longitude), date and time, and description. Once added, these data points are instantly visualized on the map using deck.gl's powerful rendering capabilities.
Geofencing and Data Extraction

GeoSight also includes geofencing tools, allowing users to draw geofences in various shapes - square, circle, and multipoint - directly on the map. Users can then extract all data points within a specified geofence and view them in a user-friendly table format. This data can be exported as a CSV file, enabling further data manipulation or sharing.

GeoSight is designed to provide a seamless and interactive geospatial data visualization experience. It's a powerful tool for anyone who needs to understand and present data in a geospatial context, such as analysts in military or law enforcement, city planners, logistics managers, researchers, and more.

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I. Map Layers:

Utilize Mapbox's capabilities to provide a variety of base map styles for users to choose from. The styles should include:

1. Light
2. Dark
3. Streets
4. Satellite Streets

II. Data Layers:

Provide the ability for users to:

1. Manual Data Input:
    - Allow users to click on a location on the map to add a new data point.
    - When a location is clicked, display a form in an info box that allows users to input the following details:
        - Name
        - Location (automatically filled based on clicked location but editable)
        - Date and Time
        - Description
2. CSV Data Import:
    - Provide an option for users to upload a .csv file containing multiple data points.
    - The .csv file should have columns for Name, Location (as latitude and longitude), Date/Time, and other details.
    - After the .csv file is uploaded, display the data points on the map.

III. Tools:

Develop a set of tools that allow users to:

1. Draw Geofences:
    - Provide options for users to draw geofences in the following shapes: square, circle, and multipoint.
    - The geofence tool should allow users to specify the size and location of the geofence.
    - Once a geofence is drawn, it should be clearly visible on the map.
2. Extract Data:
    - Provide an option for users to extract all data points within a specified geofence.
    - The extracted data should be displayed in a user-friendly format, such as a table.
    - Provide an option for users to export the extracted data to a .csv file.

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TOOLS – Features 2:

1. Search and Zoom:
    - Implement an autocomplete feature in the search bar to suggest locations as the user types.
    - Include a feature for users to bookmark or save frequently accessed locations for quick navigation in the future.
2. Geofencing:
    - Add the ability to color-code geofences for better visual organization.
    - Introduce a feature to copy or duplicate existing geofences.
3. Data Extraction:
    - Offer a feature to display basic statistical information (e.g., mean, median, mode) about the extracted data.
    - Include an advanced search option in the extracted data table for more targeted data exploration.
4. Data Filtering and Sorting:
    - Provide custom filtering options where users can create and save their own filter criteria.
    - Allow multi-level sorting for more detailed data arrangement.
5. Data Point Interaction:
    - Add the option to group data points into categories or clusters, and display them using different markers or icons.
    - Implement a feature to allow users to annotate or add notes to specific data points.
6. Layer Toggling:
    - Include an option to adjust the transparency level of different data layers and geofences.
    - Offer a feature to reorder the layer hierarchy, determining which layers appear on top of others.
7. Save and Load Sessions:
    - Incorporate a version control system to track changes made during different sessions.
    - Offer an option to share session states with others via a shareable link or a file export.
8. Help and Documentation:
    - Include interactive tutorials that guide users through the application's features.
    - Provide a readily available and comprehensive FAQ or troubleshooting guide.
9. Collaboration Tools:
    - Allow users to work on the same project simultaneously, providing real-time updates.
    - Offer a feature for users to leave comments or feedback on a shared project.
10. Integration with Other Tools:

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- Provide APIs or plugins for integrating with other commonly used tools in the intelligence community, such as databases or CRM systems.
- Implement options for importing and exporting data from and to different formats other than CSV, such as Excel, JSON, or SQL databases.

TOOLS – Features 3:

1. Real-Time Data Streaming: Integrate real-time data streaming capabilities to allow users to visualize and analyze live data as it comes in.
2. Heatmap Visualization: Incorporate heatmap functionality to allow users to visualize data density or intensity in certain areas.
3. Time-Series Analysis: Enable time-series analysis and visualization to let users see how data points change over time.
4. 3D Visualization: Provide 3D visualization capabilities for a more immersive and detailed view of the geospatial data.
5. Automated Reporting: Develop an automated reporting feature that generates detailed reports based on the user's data and analysis.
6. Machine Learning Integration: Integrate machine learning capabilities to predict patterns or trends based on the existing data.
7. Mobile Compatibility: Make the tool compatible with mobile devices for users who need to access it on the go.
8. Accessibility Features: Implement accessibility features, such as text-to-speech or high-contrast mode, to cater to users with different needs.
9. Customizable Dashboard: Allow users to customize their dashboard according to their needs, including the ability to add, remove, or rearrange different data widgets.
10. Multi-Language Support: Offer multi-language support to cater to a global user base.

TOOLS – Features 4:

1. Satellite Imagery Integration: Incorporate satellite imagery into the map layers for a more detailed view of the terrain.
2. Data Validation: Include an automatic data validation feature to ensure data integrity when users are importing or manually inputting data.
3. User Roles and Permissions: Implement different user roles and permissions to control access to certain features or data.
4. Weather Data Overlay: Provide real-time weather data overlay on the map for users interested in weather conditions in certain areas.
5. Historical Data Access: Allow users to access historical data for long-term analysis or trend spotting.
6. Data Anonymization: Include data anonymization features to protect sensitive information, especially when sharing data.
7. Terrain Analysis: Provide tools for terrain analysis, such as slope, aspect, or elevation analysis, if relevant to your users.

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8. Custom Map Styling: Allow users to customize the style of their map, including colors, labels, and icons.
9. Route Planning and Distance Measurement: Include tools for route planning and distance measurement on the map.
10. Notifications and Alerts: Implement a system for notifications and alerts, for instance, when new data is available or when certain conditions in the data are met (e.g., a data point enters a geofenced area)

TOOLS – Features 5:

1. Offline Mode: Develop an offline mode for users to access and analyze downloaded data without an internet connection.
2. Augmented Reality (AR) Integration: Implement AR capabilities to overlay digital data onto the real world for a more immersive experience.
3. In-App Messaging: Include a feature for in-app messaging or communication to facilitate collaboration among users.
4. Data Security Measures: Implement robust data security measures, such as encryption and two-factor authentication, to ensure user data protection.
5. Data Backup and Recovery: Provide automated data backup and recovery options to prevent data loss.
6. Batch Processing: Allow batch processing of data, which could be useful when handling large datasets.
7. User Activity Log: Maintain a log of user activities to track changes and operations performed on the data.
8. Integration with IoT Devices: If relevant, provide options to integrate with Internet of Things (IoT) devices for real-time data collection and visualization.
9. Customizable Alerts: Allow users to set up customizable alerts based on specific criteria or events in the data.
10. API for Custom Integration: Provide an API for users who want to build custom integrations with other software or services they use.

OTHER FEATURES TO CONSIDER:

1. Network Analysis Tools: Enable users to analyze relationships between different locations, such as calculating the shortest path or determining the accessibility of one location from another.
2. Spatial Analysis Tools: Provide advanced spatial analysis tools, such as hotspot detection or spatial autocorrelation.
3. Data Categorization: Allow users to categorize data points based on specific criteria and visualize different categories using unique markers or colors.
4. Integration with External Data Sources: Enable integration with external data sources or feeds, such as social media feeds, news feeds, or custom APIs.
5. Automated Data Updates: Implement automated data updates to ensure that the visualized data is always current.

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6. Custom Plugins/Extensions: Allow users to create and use custom plugins or extensions to add new features or capabilities to the tool.
7. Graphs and Charts: Provide various graphs and charts to visualize non-geospatial data, such as histograms, pie charts, or line graphs.
8. Population Density Layers: Include layers for visualizing population density, if this data is relevant to your users.
9. Data Forecasting: Implement data forecasting features to predict future trends based on existing data.
10. Performance Optimization Tools: Provide tools to optimize the performance of the application, especially when handling large datasets, such as data indexing or query optimization.
11. **Training Mode:** Implement a training or tutorial mode for new users, guiding them through the software's features and functionalities.
12. **Multispectral Imagery:** If applicable, include a feature to view and analyze multispectral imagery.
13. **Cross-platform Compatibility:** Ensure the software is compatible across different operating systems (Windows, macOS, Linux) and platforms (desktop, web, mobile).
14. **Animated Data Over Time:** Allow users to animate their data to see changes over time. This could be particularly useful for visualizing patterns or trends.
15. **Interactive Legends:** Implement interactive legends that allow users to toggle the visibility of different data layers directly.
16. **Collaborative Annotation:** Enable collaborative annotation, allowing multiple users to add notes or comments to a single map.
17. **Integration with Cloud Storage Services:** Provide integration with popular cloud storage services like Google Drive or Dropbox for easy data import/export and backup.
18. **Customizable User Interface:** Allow users to customize the user interface according to their preferences, including themes, layout, and more.
19. **Data Scrubbing Tools:** Include data scrubbing or cleaning tools to help users handle missing, inconsistent, or incorrect data.
20. **Import/Export Map Settings:** Allow users to import/export map settings, including zoom level, center point, base map style, and visible layers, making it easier to share consistent views across different users or sessions.

Integration Options
https://deck.gl/examples/arcgis **(3D Building)**
https://deck.gl/examples/carto **(MasterCard Data)**
https://deck.gl/examples/google-3d-tiles **(3D Building)**
https://deck.gl/examples/google-maps **(Animated Truck Routes)**

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