

Geographic Information Systems for Humanitarians

Geographic Information Systems (GIS) are a set of tools that allow for the capture, storage, management, analysis, and visualization of geographic information. GIS is a powerful technology that is used in a wide range of fields, including humanitarian response and disaster management. In this explanation, we will cover some of the key terms and vocabulary related to GIS for humanitarians in the Graduate Certificate in Humanitarian Data Analysis.

- * **Geographic Information:** Geographic information refers to any data that has a spatial component, meaning it is related to a specific location on the earth's surface. This can include data on natural features such as rivers and mountains, as well as man-made features such as buildings and roads.
- * **Spatial Data:** Spatial data is a type of geographic information that is stored in a digital format, allowing it to be easily analyzed and visualized using GIS software. Spatial data can take many forms, including points, lines, and polygons, and can be stored in a variety of file formats, such as shapefiles, GeoJSON, and KML.
- * **GIS Software:** GIS software is a type of computer program that is used to capture, store, manage, analyze, and visualize spatial data. Examples of GIS software include ArcGIS, QGIS, and GRASS GIS.
- * **Map Projections:** Map projections are mathematical models that are used to represent the three-dimensional surface of the earth on a two-dimensional map. Different map projections can be used to emphasize different aspects of the earth's surface, such as shape, area, or distance. Common map projections include the Mercator, Robinson, and Albers Equal Area projections.
- * **Georeferencing:** Georeferencing is the process of aligning a digital image or map with a known coordinate system, allowing it to be used in a GIS. This can be done manually by identifying reference points on the image or map, or automatically using specialized software.
- * **Spatial Analysis:** Spatial analysis is the process of examining spatial data to identify patterns and relationships. This can include techniques such as spatial joins, buffering, and overlay analysis.
- * **Spatial Joins:** Spatial joins are a type of spatial analysis that involves combining data from two different spatial datasets based on their spatial relationship. For example, a spatial join could be used to combine data on population density with data on healthcare facilities to identify areas with high population density and low access to healthcare.
- * **Buffering:** Buffering is a type of spatial analysis that involves creating a buffer zone around a specific feature or set of features. For example, a buffer zone could be created around a hazardous waste site to identify areas that may be at risk in the event of a spill.
- * **Overlay Analysis:** Overlay analysis is a type of spatial analysis that involves combining multiple spatial datasets to create a new dataset that shows the combined information. For example, an overlay analysis could be used to combine data on land use, population density, and infrastructure to identify areas that are at high risk of flooding during a storm.
- * **Geocoding:** Geocoding is the process of converting an address or other location description into a set of coordinates that can be used in a GIS. This can be done manually, or using specialized software or web services.

- * Web Mapping: Web mapping is the process of creating and sharing interactive maps on the web. This can be done using a variety of tools and technologies, including web mapping services (WMS), web mapping libraries such as OpenLayers and Leaflet, and web-based GIS software such as ArcGIS Online.
- * Crowdsourcing: Crowdsourcing is the process of obtaining information or services from a large group of people, often through the use of the internet. In the context of GIS, crowdsourcing can be used to collect spatial data from a large group of volunteers, such as during a disaster response.
- * Humanitarian Data: Humanitarian data refers to data that is collected and used during humanitarian response and disaster management. This can include data on population, infrastructure, hazards, and aid activities.
- * SDI: Spatial Data Infrastructure (SDI) is a framework for managing and sharing spatial data within an organization or between organizations. SDIs typically include a set of standards, policies, and technologies for managing and sharing spatial data.
- * Open Data: Open data is data that is freely available for anyone to access and use, without restrictions. Open data is often made available through open data portals, such as the Humanitarian Data Exchange (HDX).
- * Challenges in GIS for Humanitarians: Some of the challenges in using GIS for humanitarian response and disaster management include: data quality and consistency, data security and privacy, data access and sharing, data integration and interoperability, and data analysis and visualization.

Examples:

- * During a disaster response, a GIS analyst might use spatial analysis techniques such as buffering and overlay analysis to identify areas that are at high risk of flooding and in need of assistance.
- * A humanitarian organization might use crowdsourcing to collect spatial data on the location and needs of affected populations during a disaster.
- * A GIS analyst might use geocoding to convert address data on a list of aid recipients into coordinates that can be used in a GIS.
- * A web mapping service (WMS) might be used to share real-time information on the location and movement of aid convoys during a disaster response.
- * A spatial data infrastructure (SDI) might be used to manage and share spatial data on population, infrastructure, and hazards between different organizations during a disaster response.

Practical Applications:

- * GIS can be used to create maps and analysis of population, infrastructure, hazards, and aid activities during a disaster response.
- * GIS can be used to create interactive web maps that allow users to explore and analyze spatial data in real-time.
- * GIS can be used to create spatial data models that can be used to predict the impact of hazards and aid activities.
- * GIS can be used to create dashboards that allow decision-makers to monitor and analyze the progress of a disaster response in real-time.

Challenges:

- * Ensuring data quality and consistency can be challenging, particularly when working with data from multiple sources.
- * Ensuring data security and privacy can be challenging, particularly when working with sensitive data such as personal information.
- * Ensuring data access and sharing can be challenging, particularly in situations where data is controlled by different organizations or governments.
- * Ensuring data integration and interoperability can be challenging, particularly when working with data from different systems or technologies.
- * Ensuring data analysis and visualization can be challenging, particularly when working with large and complex datasets.

In conclusion, GIS is a powerful technology that is used in a wide range of fields, including humanitarian response and disaster management. GIS allows for the capture, storage, management, analysis, and visualization of geographic information, which can be used to make informed decisions during a disaster response. Understanding key terms and vocabulary related to GIS is essential for anyone working in the field of humanitarian data analysis.