Big Data Analytics in Geographic Information System

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Abstract — Geography is an art of understanding the location through which the people can commute. The study of this art would make the human race more effective in terms of infra-structure development, agricultural development, economy, population distribution, etc. In this modern world, the unknown locations were being betrayed to the people due to the unawareness of geography. Geographic information system will be more useful with the use of satellites and Global Positioning Systems. In this modern era, Science makes the people to be more sophisticated to get the things that they would love to achieve. The details that the people surf in the internet are very vast. The Geographical data from satellite are being stored as demographic information, weather information, historical information, population information, frequency of the request and so on. Using numerous algorithms, various information stated above are being analyzed and the results are shared as the forecast to the users.

Keywords — *Big Data Analytics; GIS, Human Geography; Physical Geography and Environmental Geography.*

1. Introduction

"A Geographic Information System (GIS) is a computer based information system that provides tools to collect, integrate, manage, analyze, model, and display data that is referenced to an accurate cartographic representation of objects in space."[1]

Geography is a study of various kinds of lands and its features. There are multiple types of geographical study. The main part of this study includes human, physical and environment study of geography.

2. Human Geography

Human Geography places an important role to study the historical, religious, political, population information of a location. It also helps to understand the origin, interactions and perceptions that the human had regarding their ideology, culture, social and economic behaviour. Human are mostly living in any suitable locations as they can live. Population Geography study will have various attributes like, lifestyle of the people, distribution, migration, and growth in particular location. Religious Geography will deal about the beliefs of the human. Religion congregates the people from various locations to live together. This study includes the spread and distribute of the religious groups, their origin and the built environment. Economic geography is the study of the products which are being produced and served by the particular group of people. It also analyzes the status and social and economic behaviour of the people.

Medical Geography mainly helps to get the information about the disease of people in a particular location. This also studies the widespread of diseases in a community at a particular time and the diseases widespread over the world and their origins and distributions. Political geography deals about the boundaries of the country, states, cities and other demographic locations. There are studies about the political aspects of human in a particular location which shows the people interest and involvement towards their common goals. This also mention about the voting patterns, and behaviours within each jurisdiction.

3. Physical Geography

Physical Geography is a study of the nature and physical characteristics of the earth. This is not limited only to physical characteristics of the earth but also includes the underneath and around the earth surface. This can also be referred to as "Physiography". This involves the below categories of studies. Bio-Geography is the study to get the information of animals and plants in and around earth's surface. Water Resource geography is a study of water resources and the management of water resource across the distribution of population. This also involves the collection, distribution and usage of water spread across the planet.

Climate Geography is to study the weather patterns and management of weather patterns across the planet. Also involves the study on the activities that affect the atmosphere and atmospheric composition. Geomorphology is a study to understand the erosions and formation of a land due to various nature calamities in a location. Soil Geography is a study of the upper layer of earth's surface and categorization of soil in nature.

4. Environmental Geography

This study is about the human interaction between the environment effect and the activities human made on the environment which could have resulted in massive calamities in the environment. This can be pre-looked by the geographers based on the activities happening in a particular location. The following are the main factors that

will help to identify any causes due to environmental effect. Physical Land formation is a main factor which is caused by the human activities. Based on the human activities, researchers or the geographers can identify the land usage and also involves the study how to avoid and encourage certain activities that affect the environment.

The management of the above information would really need a vast storage environment which could adhere the future technologies. As these data are not of same kind, there will be many sources, the storage and visibility would be more complicated and complex in nature. Big data is a data warehousing environment which deals with multiple types of data and the storage can be extendable as required. The retrieval and the analytics is easier in this Big Data compared to other systems. Big Data analytics can play a vital role in Geographical study which deals with the human, physical and environment to collect the information which produces qualitative and quantitative results for the people to enhance their life style in technological manner.

Geographic information system would mainly collect the data from various sources like, satellite, people, government systems, private organizational systems, and natural resources. Big data analytics can be used to analyze the above details to conquer the natural calamities, migrating people from one location to another location, land formation and etc. This can also be serving to the people, government and private organizations.

Big Data Analytics with Geographical information can also be used to help the agricultural problems. Region landslide field and vegetation coverage are the key problems that is mainly faced by the farmers. Big data Analytics in GIS can suggest the solution to these above problems. Based on the various historical information, soil information, climate and environmental information, the Big Data Analytics can suggest an inline, cost effective and qualitative method for agricultural industry.

BDA in GIS can also help in analyzing the health of people in a particular location through medical geography. Health-care providers face lot of challenges in maintaining healthy environment. There are lot of pollutions, viruses, natural disasters which produces lots of diseases to the people in an environment. Health Geography mainly invokes the domain of Medical Geography. This Medical Geography would be more considered on diseases and the diffusion of these diseases without considering the aspects of human interactions. Hence the Health Geographical result would not be more appropriate to the human at different locations. This controversy can be overcome if Big Data Analytics is in place which can interact with human geography and environment geography in addition to health geography which would be more appropriate for the people in a particular location.

5. Conclusion

Various domains like agriculture, healthcare, weather forecasting, economic analysis, political suggestions can be analyzed more appropriately through Geographic Information System with Big Data Analytics. This will produce results more accurately. As per the current era, Medical or health care providers have achieved good results using this information technology. In agriculture too, people found the good way of transforming the land.

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