Chapter 1
Geospatial AI Concepts and Fundamentals

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ABSTRACT

In terms of its progress and the ways in which it might be applied in our everyday lives, geospatial artificial intelligence (Geo-AI) is an intriguing issue. When it comes to the economic and social growth of a region or country, one of the factors that contributes to this development is spatial planning. The primary focus of this investigation is based on spatial data, with the objective of maximizing the efficiency of land use of spatial data on the region as upstream data and developing GIS-based urban planning apps that automatically present the findings of analysis and predictions of urban objects. Also, the plans for urban areas for both spatial and land use can be made, and geospatial AI generates a significant amount of spatial data based on the characteristics of the environment and the geography. This is done in order to maximize the revenue that is generated by tourists. In the context of urban planning and the tourism industry, this Geo-AI can offer many advantages and benefits. This chapter discusses several topics related to geospatial AI, including geo-computation, geospatial AI applications, challenges facing it, and its future prospects.

INTRODUCTION

Geospatial artificial intelligence, also known as GeoAI, is a combination of deep learning techniques and spatial machine learning, also known as geographic information systems (GIS). Its purpose is to assist in the resolution of difficult problems and the acquisition of more profound insights in a manner that is both powerful and inventive. The most recent developments in GeoAI, which includes geospatial data

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collecting (sensors, Internet of Things, high-resolution satellite imaging), spatial analysis techniques, artificial intelligence, and high-performance spatial computing, have made it possible to investigate the influence of location on health in greater depth. When it comes to the health of people as well as populations, location is a very important factor. What is known as a Geographical Information System (GIS) is a computer-based system that is capable of collecting, storing, representing, and manipulating spatial data. At both the individual and the population level, it has developed into a powerful instrument for studies that investigate health outcomes and the provision of healthcare. The Geographic Information System (GIS) provides assistance to the field of public health in a variety of ways, including the mapping, monitoring, and modelling of infectious and chronic diseases, disaster preparedness, disease surveillance, and the planning of health promotion efforts. Innovative sources of big spatial data, such as personal sensing, satellite remote sensing, and social media, are being utilized in conjunction with GeoAI in order to provide answers to research questions pertaining to a variety of fields, such as epidemiology, social and behavioral sciences, genetics, infectious diseases, and environmental health.

As an example, GeoAI has been utilized to model the surrounding environment and link locations to prospective consequences. This has resulted in the provision of useful insights into the ways in which environmental, social, and other exposures may have an impact on people. As an additional benefit, GeoAI has resulted in the development of hypotheses, the establishment of new data linkages, and the forecasting of the emergence of environmental problems and diseases. These innovative ideas will make a significant contribution through the integration of technology and will establish the groundwork for further research into related subjects. Using Geographic Information Systems (GIS), geographical analysis, artificial intelligence, and large amounts of spatial data, it intends to advance research on different sectors. Research from a variety of interdisciplinary perspectives will provide insights into the challenges of integrating these technologies in different fields. Additionally, researches will bring together specialists from different fields to share their ideas, experiences, and insights with one another. This chapter discusses the geospatial AI and geo-computation, applications of geospatial AI in different domains, as well as challenges and future directions in this domain.

BACKGROUND

It is also possible to describe GeoAI as a new discipline that combines innovations in spatial science, artificial intelligence (AI) methods such as Machine Learning (ML) and Deep Learning (DL), data mining (data mining), and high-performance computing (high-performance computing). According to Gartner, GeoAI is the