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Data Analysis on Government Land Information System

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Abstract—

The Government Land Information System (GLIS) provides a large repository of land data which contain information including ownership information, spatial data, and land use trends. Analyzing the data provides insight into urban development, infrastructure planning and environmental sustainability. This research study presents a method by which GLIS data can be used to inform policy decisions, improve related socio-economic conditions, and promote sustainable land use and land resource management. Through the study, the application of data analytics and machine learning to examine land usage trends, provide predictions about urban sprawl, and study environmental impact will be explored. Additionally, after proposing how GLIS data can be incorporated into decision making through land resource management, a more optimal process for land resource management can be informed that encompasses economic component and ecological component.

Keywords: GLIS, land analytics, Urban planning, Environmental protection, land use patterns, land management, Infrastructure development, socio-economic insights, Environmental sustainability.

INTRODUCTION

Globally, governments are utilizing data-based technologies to better manage land resources. The government Land Information System (GLIS) is an important system to have extensive demographic and geospatial information, which offers additional insight into the social, economic and utilization of land and ownership of land. Obtaining this information to create intelligence, promotes putting this land information into the decision-making processes through sophisticated analysis.

This research looks at analyzing GLIS data for urban planning, improvements to infrastructure, and environmental sustainability, through analytics. We intend to use machine learning and predictive modelling to improve decision-making processes relating to land management.

MOTIVATION

This project represents an opportunity to take full advantage of the Government Land Information System (GLIS) data and to directly identify meaningful solutions to important challenges in society. By analyzing ensembles of land-use characteristics, demographic information, and infrastructure we hope to provide insights that enable better, informed, sustainable decisions. This is an exploration of new ideas to create opportunities in urban planning, environment, and socio-economic issues while advancing good practice in the development of effective and equitable land-management responses. Ultimately, we hope to provide guidance in ensuring that land resources are used wisely, sustainably, and grow with prosperity while improving community well-being.

LITERATURE REVIEW

Research highlights the fundamental role land information systems play in decision making.

- For instance, Kumar et al. (2006) identified complications caused by ineffective integration of high-resolution geospatial data to model the land surface.
- Dueker (1979) focused on land resource information systems (LRIS) and found methodical explanations for understanding land resource information systems.
- More recently, Ho et al. (2021) and Ja'afar et al. (2021) showed that machine learning has great potential for property value prediction, encouraging evidence-based land valuation.

- Additionally, Loveland and Belward (1997) explored analytical features of the global land surface for documenting land cover assessments with the DISCOVER dataset. Overall, land information systems (GLIS) could be used with analytics to improve land use, infrastructure, and land use policy decisions.

PROPOSED SYSTEM

The proposed analytical framework offers the potential to benefit from integrating GLIS data with machine learning models and techniques, to determine land use trends and implications for infrastructure needs. The system includes the following key components:

- **Data Collection & Processing:** Live GLIS data is collected aggregated, cleansed and integrated with socioeconomic indicators.
- **Predictive Analytics:** Machine Learning Models such as Random Forest and Linear Regression predict land use trends and infrastructure needs.
- **Visualization & Decision Support:** Land used distribution, urban development forecasts and environmental risk assessments are presented on dashboards to support decision-making.
- **Policy Recommendations:** The insights generated by the analytics will provide trails of information for policymakers to make evidence-based decision for sustainable development.

Possible Advantages Over Conventional Methods:

- **Resource Optimization:** Guarantees land is allocated efficiently according to demand and environmental effect.
- **Environmental Protection:** Identifies sensitive ecological areas and supports conservation.
- **Informed Policies:** Quality evidence is used in urban planning and official land governance.
- **Socio-economic Equity:** Aids in land distribution and equitable infrastructure development.

IMPLEMENTATION STRATEGY

The infrastructure of the system consists of three sequential states:

- **Data Processing:** The GLIS data, supplemented with additional data that we collect from government repositories, goes through a cleaning process to identify and delete any possible erroneous entries. The data is normalized for machine learning purposes. Any missing values are managed through statistical imputation methods.
- **Machine Learning Models:** Predictive models (Decision Trees and Neural Network models) will be used to interpret land use patterns based on historical data. Model performance will be measured using R-squared and Mean Absolute Error (MAE).
- **Visualization & Interpretation:** Data visualizations will be created using Tableau and GIS Software to emphasize insights from the data in the form of interactive maps and dashboards for urban planners and policy setters to help identify prioritized developed areas.

CASE STUDY & RESULTS

Utilizing GLIS data, a case study was completed for specific global regions. This analysis revealed the following–

- **Urban Expansion Trends:** Information revealed areas of rapid urban growth, to assist with infrastructure investments.
- **Land Degradation Risks:** Potential environmental degradation sites due to deforestation and urban sprawl were pinpointed.
- **Infrastructure Gaps:** Road network access and essential services were identified for equity tasks.

CONCLUSION & FUTURE SCOPE

This study emphasizes the value of integrating GLIS information with analytical tools to improve the management of land resource planning. The presented framework establishes data-driven opportunities to improve decision making, leading to sustainable development of urban environments and improved ecological management.

Future research avenues would include:

- Improving predictive capabilities by utilizing deep learning models to train them to predict land-use change.
- Expanding the data set to include near-real-time satellite imagery, to enhance land monitoring.

- Developing artificial intelligence models to support decision-making that automate recommendations/policies & land-use.

With the use of analytics, governments can help land-use planning while ensuring a vector towards sustainable growth from the standpoint of both economic objectives and ecological requirements.

REFERENCES

- Global Land Information System (GLIS) Report U.S. Geological Survey. Global Land Information System (GLIS). USGS Publications Warehouse, 1999.
- Sharma, R., & Verma, A. (2023). Examining government land information systems. National Institute of Land Management Studies.
- Roy, S., & Bandyopadhyay, S. (2020). Implementation of blockchain in land record management: A case study of India. Journal of E-Governance Studies, 12(3), 89–97.
- Singh, N., & Kaur, R. (2021). Role of technology in transforming land administration: A study on Indian initiatives. International Journal of Information Systems and Smart Technologies, 5(2), 22–31.