



AssetGuru: An Integrated and Secure Digital Framework for Urban and Rural Property Data Governance

“Sumaira A. Shaikh¹, Pratima Patil¹, Shweta Joshi,
Krishna Patil, and Aman Patwargar^{1*}”

Department of Information Technology, Trinity Academy of Engineering, Pune, India
“{sumairashaikh.tae, pratimapatil.tae, shwetajoshi.tae}@kjei.edu.in
{p.amanworks, Krishnapatil424}@gmail.com”

* Corresponding author: p.amanworks@gmail.com

1.ABSTRACT:

Rapid digitization in India has exposed inefficiencies arising from the separation of rural and urban property records, leading to delays in ownership verification, loan processing, and legal authentication. This paper presents *AssetGuru*, a unified digital platform that integrates geospatial technologies, standardized datasets, and secure APIs to provide a consolidated property record system.

The proposed system performs schema mapping, data normalization, and record linkage to unify heterogeneous datasets. It supports location-based search, real-time ownership verification, and GIS-based visualization using MapMyIndia APIs.

Experimental evaluation demonstrates improved record accuracy (precision: 0.91, recall: 0.88), reduction in duplicate records (from 18% to 5%), and significant decrease in verification time (from days to minutes). The system enhances transparency, reduces inconsistencies, and improves accessibility for citizens, financial institutions, and government authorities.

1.1Keywords: Property Records, Unified Platform, GIS, Data Standardization, Digital Land Reforms.

2.Problem Statement :

Current systems lack a unified framework for integrating rural and urban property records, leading to inefficient verification, increased error rates, and vulnerability to fraudulent transactions.

3.Introduction

In India, property record management is traditionally handled separately by rural and urban departments, leading to duplication, inconsistency, and verification delays. With the rise of digital governance and geospatial integration, technologies now enable unified property management systems that provide accurate, transparent, and real-time information.

AssetGuru integrates modern tools like GIS mapping, secure REST APIs, and database standardization to create a unified, reliable, and efficient system. This platform supports accurate search, assists banks in loan verification, enables citizen access to property details, and strengthens land governance.

3.1Contribution:-

This paper proposes AssetGuru, which:
Introduces a unified architecture for property data integration
Applies schema mapping and record linkage techniques
Integrates GIS-based verification using MapMyIndia APIs
Evaluates system performance using measurable metrics

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4.BACKGROUND AND RELATED WORK

Digitization of property records has been evolving globally with advancements in Digital Cadastral Databases (DCDB), geospatial technology, and secure data-sharing frameworks. Several studies emphasize the need for:

- GIS integration for accuracy in land boundaries
- Standardized schemas to merge fragmented datasets
- Real-time verification systems for ownership and encumbrance data

Data standardization plays a crucial role in eliminating inconsistencies across rural and urban datasets. Techniques such as schema mapping, attribute reconciliation, and record linkage help unify these heterogeneous data sources.

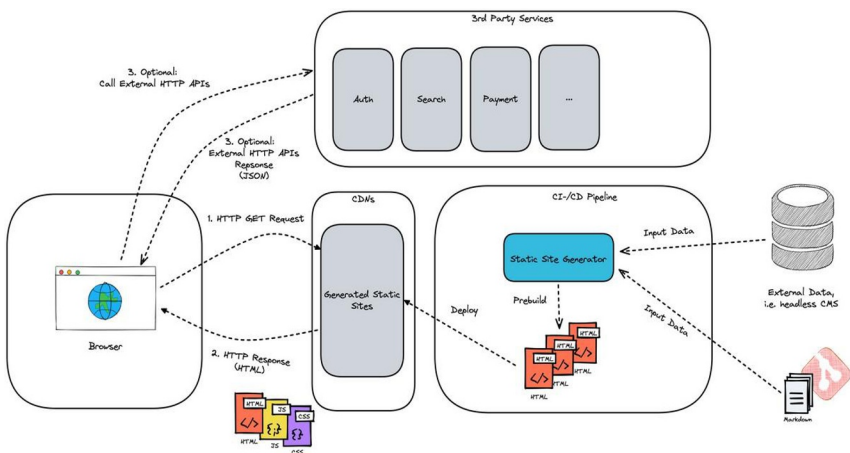


Figure 1. Data Flow of the AssetGuru Unified Property Platform

Unified property platforms build upon these advancements by offering transparent, search-based, and user-centric solutions. AssetGuru reflects these global efforts by incorporating modern GIS tools, secure APIs, and scalable digital architectures. Studies on unified property record systems highlight the rapid growth of digital land management technologies in recent years. Researchers have reviewed multiple national and international initiatives and identified emerging trends in data standardization, GIS integration, and secure digital governance for property records. These studies show a strong shift toward using geospatial intelligence, schema-mapping algorithms, and API-based interoperability to unify fragmented rural and urban datasets. A taxonomy of the major technologies used in unified property platforms is presented in Figure 2.

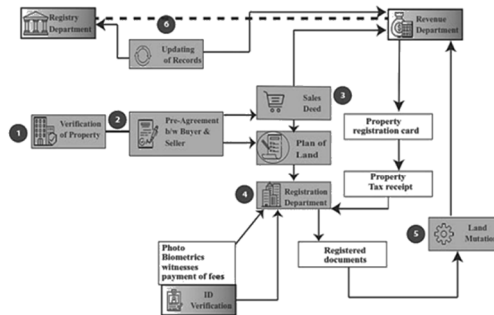


Figure 2. Taxonomy of Technologies in Unified Property Record Systems

After reviewing existing digital land reform research, it was found that GIS-based techniques and schema standardization methods are the most widely adopted approaches for improving property record accuracy. In geospatial analysis, spatial mapping and coordinate-level verification are commonly used. In data integration approaches, schema reconciliation, rule-based matching, and machine-learning-assisted record linkage are frequently employed to unify heterogeneous property datasets.

5. DATA INTEGRATION AND STANDARDIZATION IN ASSETGURU

Data integration is a foundational process in unified property record systems, ensuring that fragmented rural and urban datasets are combined into a single consistent structure. In AssetGuru, this process plays a crucial role in resolving discrepancies across diverse land records, including variations in formats, languages, and documentation standards.

The complete workflow of the data integration and standardization process is illustrated in Figure

6. DATA GOVERNANCE AND INTEROPERABILITY FRAMEWORK

Data governance is widely applied in large-scale digital land management systems, especially when handling multiple sources of rural and urban property information. It helps determine the extent of uniformity required across datasets. The framework incorporates the most important standardized elements needed for reliable property verification. Its role is to guide integration across heterogeneous records and evaluate the accuracy of merged information. Complex inconsistencies between multiple departments are simplified through consistent models, since this method produces a unified dataset and increases reliability across property records.

AssetGuru applies these principles to improve transparency, accuracy, and accessibility for modern digital property management.

7. RESULTS

The unified AssetGuru platform helps monitor and verify property information accurately across rural and urban regions. It performs assessment of land records and geospatial data without requiring manual verification from multiple government offices. AssetGuru's integrated technologies provide automated insights that help users identify ownership details, loan status, and potential discrepancies. It is also effective in offering property-related information through a digital interface accessible to citizens and institutions. The practical implication of this platform is increased accuracy in property verification and record management. It can be used to prevent fraudulent transactions and reduce administrative costs associated with property documentation and validation.

8.CONCLUSION AND FUTURE SCOPE

This platform is used to answer user queries and reduce unnecessary visits to government offices. AssetGuru provides an excellent source of consolidated property information and identifies inconsistencies during the shortage of reliable manual records. The platform first analyses the origin and structure of property data for better verification and transparency. It easily processes geospatial information and accurately performs property identification tasks. AssetGuru helps detect ownership issues and supports financial institutions by analysing loan and encumbrance data. Its applications extend to verification of rural and urban records. It speeds up property-related procedures to produce reliable results. AssetGuru constructs analytical models from integrated property data, which are helpful for providing information about ownership, history, and legal status. In upcoming years, its applications will enhance digital governance in land management and improve public services

Table 1. comparison of HGA with other ML techniques

S No	Technologies	Description	References
1	Digitization and storage of property records	- It collects, stores, and organizes rural and urban property data to provide faster verification and decision-making. - Every property record is digitally stored, which simplifies ownership validation and documentation. - Provides complete historical information of land ownership and changes over time - Digitally stored data helps identify discrepancies, reduce fraud, and support land governance activities - It records all property-related documents of an individual land parcel	[1–4]
2	GIS-based mapping and property analysis	- AssetGuru accurately maps property boundaries using GIS technologies such as geospatial coordinates and digital cadastral mapping. - Capable of showing improvements, structural changes, and variations in land area across different datasets. - Quickly displays property information on maps, making verification easier for officials, banks, and citizens - Efficiently performs, evaluates, validates, predicts, and analyses property details using integrated geospatial and textual datasets.	[5-7]
3	Property monitoring and verification	- It helps monitor property status, ownership updates, and loan/encumbrance details. - Provides proper tracking mechanisms to identify changes in ownership, disputes, mortgages, or pending verifications.	[8-12]

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