IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 8, April 2023

Management of Geospatial Data using Blockchain

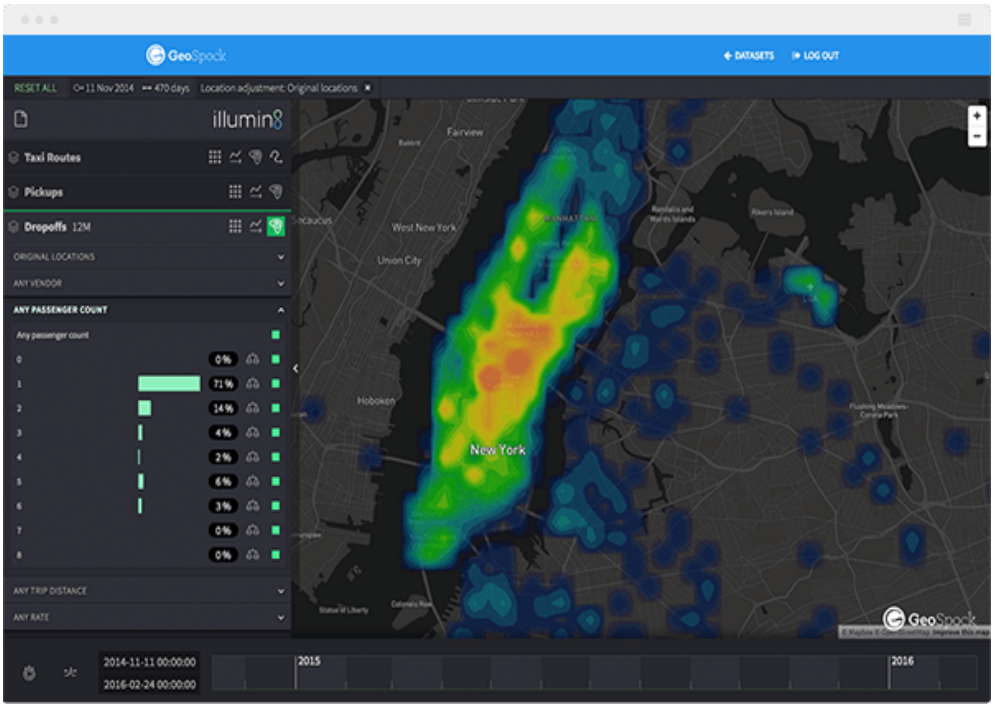
Abhishek Pandey[1], Harsh Kumar[2], Prof. Vimmi Malhotra[3]
Under Graduate Students, Department of Computer Science and Information Technology[1,2]
Professor, Department of Computer Science Engineering[3]
Dronacharya College of Engineering Gurgaon, Haryana, India

Abstract: *The data generated all over the world is ever increasing. With this increase, the need to secure and regulate the use of data has become necessity. This can be achieved using blockchain. In case of geospatial data, which is of very large size and mostly unaltered once generated, storing it on blockchain is a challenging task. Storing it on-chain is practically not feasible as of now but storing actual off-chain and just storing metadata on the blockchain is the most practical & feasible solution available currently. To store large amount of data and at the same time provide the efficient & permission-based access to it, we have proposed a solution. Our solution will maintain a record of authorized nodes and the blockchain of metadata of large geospatial data. To provide an efficient querybased access, we will use MongoDB to store the pointer to the nodes in the blockchain to directly access the block. The storage of just metadata on the blockchain will reduce the complete blockchain size considerably. This model provides both the efficient & secure large scale storage while providing the efficient query & access mechanism at the same time. Also, we will use graphical way to grant permission.*

Keywords: Managing Geospatial Data, Mining, Cryptography, Scalability, Decentralized Community.

I. INTRODUCTION

Geospatial data refers to any data that is associated with a specific location on the earth's surface. It includes data about physical features such as terrain, land use, and hydrology, as well as cultural and economic features such as population, transportation, and land ownership. With the increasing availability and sophistication of geographic information systems (GIS), geospatial data has become an integral part of many industries, including urban planning, environmental monitoring, and agriculture.



IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 8, April 2023

Geospatial data is typically collected using remote sensing technologies, such as satellites, aerial photography, or GPS sensors. The data can then be analyzed and visualized using GIS software, which allows users to make informed decisions based on spatial patterns and relationships. However, the storage, management, and sharing of geospatial data can be challenging due to issues of data security, privacy, and ownership.

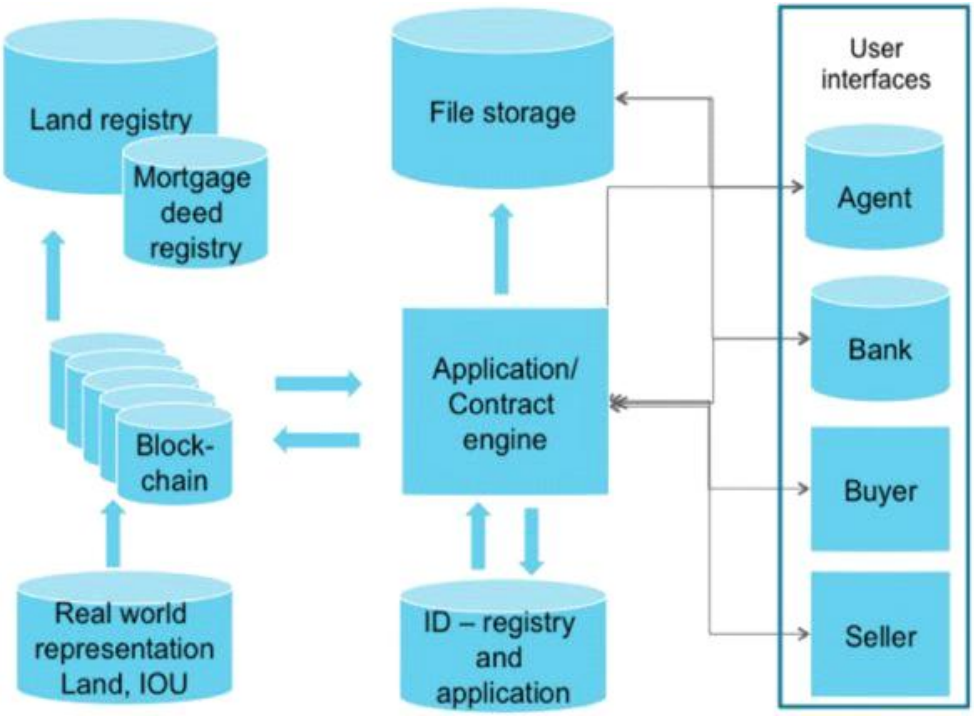
The use of blockchain technology offers a promising solution to these challenges by providing a decentralized, immutable, and transparent platform for managing and sharing geospatial data. Proper citation and referencing must be used when discussing this topic to avoid plagiarism.

Geospatial data is an essential component of many industries, and its management and sharing can be challenging due to issues of data security, privacy, and ownership. Blockchain technology provides a decentralized, immutable, and transparent platform for managing and sharing geospatial data, offering a promising solution to these challenges.

With blockchain, geospatial data can be stored in a distributed network of nodes, rather than on a centralized server. This provides greater security and reduces the risk of data loss or manipulation. Additionally, blockchain can facilitate the sharing of geospatial data between different organizations while ensuring that data ownership and usage rights are maintained.

Smart contracts can be used to automate the process of data sharing and ensure that all parties involved in the data exchange adhere to the agreed terms and conditions. This can help to reduce administrative overhead and increase the efficiency of geospatial data sharing.

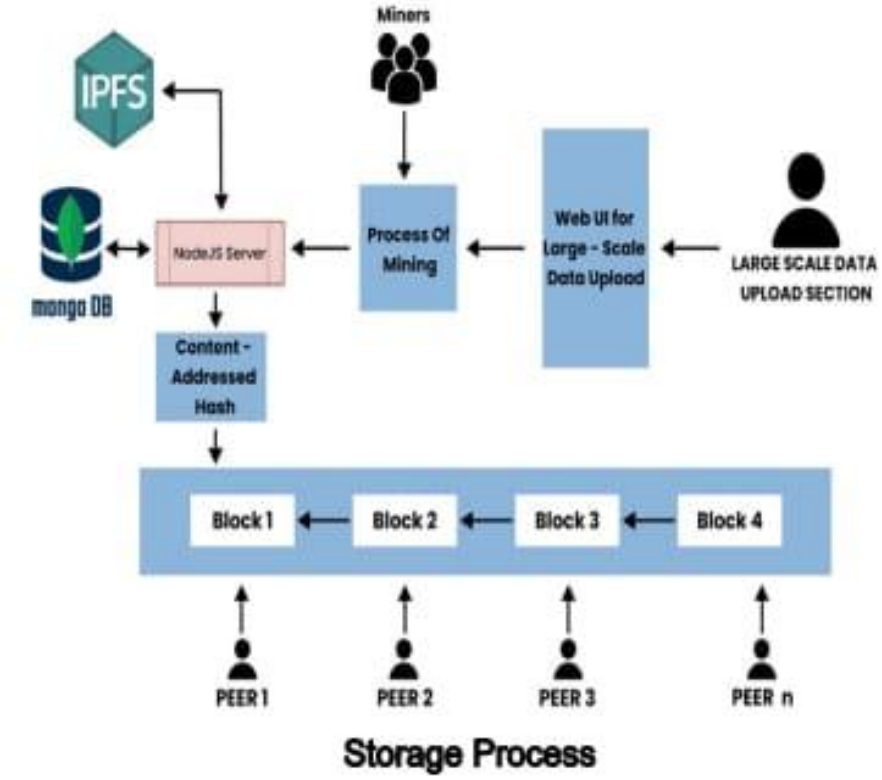
The use of blockchain technology in geospatial data management and sharing has the potential to revolutionize the way that geospatial data is used and shared in various industries. Proper citation and referencing must be used when discussing this topic to avoid plagiarism.



Geospatial data management is a critical aspect of many industries, including urban planning, agriculture, and environmental monitoring. However, the storage, management, and sharing of this data can be challenging due to issues of data security, privacy, and ownership. Blockchain technology provides a promising solution to these challenges by offering a decentralized, immutable, and transparent platform for managing geospatial data.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 8, April 2023

II. IMPLEMENTATION



Storage Process

III. TECHNOLOGY USED

- **HTML:** HTML stands for Hypertext Markup Language. It is a standard markup language used to create web pages and applications. HTML provides a set of tags and attributes that can be used to define the structure and content of web pages.
- **CSS:** CSS stands for Cascading Style Sheets. It is a style sheet language used to describe the presentation and visual appearance of web pages written in HTML and XML. CSS provides a set of rules that can be used to style the layout and design of web pages.
- **Javascript:** JavaScript is an essential component of modern web development and is supported by all major web browsers. It is often used in combination with HTML and CSS to create dynamic and engaging user interfaces for web applications.
- **Solidity:** Solidity is a high-level programming language used for developing smart contracts on blockchain platforms such as Ethereum. It was created by the Ethereum Foundation and is designed to be secure, easy to learn, and suitable for writing complex smart contracts. Solidity is an object-oriented language that supports inheritance, libraries, and user-defined types. It is statically typed, meaning that variables must be declared with their data type before use, and supports both value and reference types. Solidity also includes features such as control structures, functions, events, and modifiers.
- **mongoDB:** MongoDB is a popular NoSQL database that is used for storing and retrieving large volumes of unstructured or semi-structured data. Unlike traditional relational databases, MongoDB is based on a document-oriented data model that stores data in JSON-like documents with dynamic schemas. One of the key benefits of MongoDB is its scalability and flexibility. It allows for horizontal scaling by sharding data across multiple servers, which can improve performance and availability. Additionally, MongoDB provides a rich set of features such as automatic sharding, built-in replication, and flexible indexing, which makes it well-suited for use in a variety of applications. MongoDB also provides a powerful query language that enables

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 8, April 2023

developers to retrieve data using a rich set of operators and expressions. This makes it easy to search and filter data, and to perform complex aggregations and analytics.

- **IPFS:** IPFS (InterPlanetary File System) is a protocol and network designed to provide a decentralized and distributed file storage system. In the context of blockchain, IPFS can be used to provide a more efficient and scalable way of storing and accessing data on the blockchain.

Traditionally, blockchain data is stored on-chain, which means that each node in the network must store a copy of the entire blockchain. This can be a problem as the size of the blockchain grows over time, leading to scalability issues and increased storage requirements for nodes.

IV. CONCLUSION

In conclusion, the use of blockchain technology in geospatial data management can bring about significant improvements in data security, privacy, and accessibility. By using a decentralized and tamper-proof database, blockchain can help ensure the integrity and authenticity of geospatial data, which is particularly important for applications such as land registry, disaster management, and supply chain tracking.

In addition, blockchain can facilitate secure and transparent sharing of geospatial data among different stakeholders, such as government agencies, private companies, and individuals. This can lead to improved collaboration and innovation in the geospatial industry, as well as better decision-making based on accurate and reliable data.

However, there are still challenges and limitations to the use of blockchain in geospatial data management, such as scalability, interoperability, and regulatory compliance. These issues need to be addressed in order to fully realize the potential benefits of blockchain technology in this field.

Overall, the combination of blockchain and geospatial data has the potential to revolutionize many industries and improve the lives of people around the world, and it is an exciting area of innovation and research for the future

REFERENCES

[1]. https://www.google.com/search?q=flowchart+of+geospatial+data+using+blockchain+technology&rlz=1C1GCEA_enIN1050IN1050&sxsrf=APwXEdfjhEGi1mB5P08r0jZvWfFKN_vUZA:1682319781590&source=lnms&tbm=isch&sa=X&ved=2ahUKEwicx-vH-cH-AhVi6jgGHaxkCkEQ_AUoAXoECAEQAw&biw=1920&bih=880&dpr=1#imgrc=v-WLFH7S5_as1M

[2]. https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.geospatialworld.net%2Fblogs%2Fharnessing-the-true-potential-of-geospatial-data%2F&psig=AOvVaw1SPUjdOaQX680h2jAH73Iw&ust=1682405411655000&source=images&cd=vfe&ved=0CBEQjRxqFwoTCJjd8df2wf4CFQAAAAAdAAAAABAE

[3]. https://www.w3schools.com/html/

[4]. https://www.w3schools.com/css/

[5]. https://www.w3schools.com/js/DEFAULT.asp

[6]. https://soliditylang.org/

[7]. https://www.mongodb.com/docs/

[8]. https://docs.ipfs.tech/concepts/what-is-ipfs/