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IMPROVING DATABASE DIFFERENCES IN NEIGHBORHOOD INFORMATION SYSTEMS

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Abstract: Local Information Systems (LIS) are used in almost all areas of data management, creating a decision support system that is very important for decision-makers. From a theoretical and institutional point of view, LIS is a decision-making system based on the integration of spatial (locational) information. The consistency of the information processed in LIS, which is the only source for the correct analysis and effective management of information about the mahalla in mahalla committees, khokimiyats and their subordinate departments, is of great importance. The diversity of sources used in the data collection process, interruptions in information exchange and inconsistencies between systems create the need for restructuring in local governance systems. This study highlights improvement methods aimed at eliminating problems associated with database integration between different local government departments and develops a practical model that allows for automatic integration of all departments while ensuring the integrity of the Mahalla Information System.

Keywords: MAT, Neighborhood Information System, local government bodies, ontology, semantic web.

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High-performance, computer-based systems capable of collecting, processing, analyzing, storing, and presenting spatial (location-related) information about a neighborhood are collectively referred to as Neighborhood Information Systems (NIS). NIS is a set of specialized computer hardware, software, qualified personnel, and scientifically based methods for rapidly obtaining, storing, updating, processing, analyzing, and visually displaying any information with spatial coordinates.

Today, Mahalla Information Systems are recognized as one of the most important digital technologies of the modern era. It has become an essential infrastructure for the public and private sectors, as it increases the efficiency of local governments and organizations, speeds up the decision-making process. Mahalla Information Systems not only provide quick and accurate solutions to complex management issues, but also improve the quality of daily life of citizens [1]. Although the widespread use of neighborhood information systems is still in its infancy, the necessary infrastructure work has been started in almost all areas to implement this system. Based on the MAT database, it conducts analytical queries, classifies statistical data, and presents the results in a visual format [2].

Neighborhood Information Systems are distinguished from other information systems by the following capabilities:

- Data processing and analysis for strategic planning,
- Predicting future situations by modeling spatial objects and events,
- Real-time monitoring,
- Creating and integrating new types of data.

MAT technology plays a key role in digitizing and optimizing management processes by combining visual analysis through maps and statistical analysis through databases. This makes it one of the most important digital tools in developing future local governance strategies.

Neighborhood Information Systems (NIS) provide high efficiency in all areas of data management, especially in management and decision-making processes using spatial data. NIS is

an important source of information in the activities of local government bodies, increasing the quality of management activities by collecting all information on the mahalla territory in a single system, processing and analyzing it. Today, the introduction of digital management systems at the mahalla level is a priority at the state policy level. Therefore, NIS is considered the main control and management mechanism in processes such as population census, management of infrastructure facilities, control of land and water resources, monitoring of the ecological state, and assessment of natural disaster risks. [3].

METOD: Neighborhood Information Systems are understood as a combination of computer software, hardware, qualified personnel, and scientific and methodological approaches as a single system capable of quickly collecting, storing, updating, processing, and analyzing spatially-coordinated data. The main goal of MAT is to make scientifically based management decisions through complete and real-time monitoring of the resources, population structure, social infrastructure, and digital services available in the mahalla area.

To create an effective MAT solution, a set of components is required, consisting of powerful software, fast computing equipment, human resources, and methods for collecting and analyzing spatial data. A significant part of the costs of implementing MAT falls on the stage of collecting and entering data into the system. Studies show that about 80% of time, labor, and financial costs are spent on the data collection process, 15% on storing, processing, and analyzing them, and 5% on providing them to users. This indicates that the main load of MAT technology is aimed at collecting and systematizing spatial data [4].

Mahalla Information Systems digitize planning processes, and use two- and three-dimensional models to visually analyze geographic, demographic, and social indicators of the mahalla area. Centralized storage of all information necessary for mahalla management bodies in a geodatabase, their automatic updating, and real-time monitoring increase management efficiency. With the help of MAT technology, demographic changes, socio-economic processes, infrastructure development, and trends in the use of natural resources occurring in the mahalla area are analyzed based on accurate statistical indicators.

Mahalla Information Systems allow not only to manage existing processes, but also to predict future situations, identify potential problems in advance and plan strategic plans to eliminate them. Therefore, MAT is an integral part of the policy of digitizing public administration from the center to the local level. Through this system, openness, transparency and efficiency are ensured in the activities of the mahalla citizens' assembly, and a modern model of local governance is formed in the conditions of the digital economy.

Neighborhood information system

Globally known as GIS (Geographic Information System), it is widely used as a strategic management tool of modern local government in the processes of neighborhood planning, implementation of management plans and analysis of spatial data related to neighborhoods. These systems are based on development and over time have formed as a comprehensive management platform under the name of Neighborhood Information System (NIS) [5].

For local governments, MAT is a central digital management system that creates a spatial database containing information about the population and territory of a neighborhood, such as its socio-economic status, infrastructure, housing and land structure, population registration, and transport and communication systems.

One of the most important functions of the Mahalla Information System is the provision of electronic mahalla services. Through this system, services provided to the population can be provided remotely via digital platforms. Citizens will have the opportunity to obtain information on mahalla activities using the Internet or mobile phones, express their opinions on planned projects, participate in electronic surveys, and send their suggestions and complaints directly to

the responsible agencies. The introduction of MAT will serve to form a modern, effective and interactive model of mahalla management and increase the participation of the population in public administration [6].

RESULT:

The implementation of Mahalla Information Systems has encountered a number of technical and organizational problems due to the implementation of various and complex services by local government structures, as well as errors and inconsistencies that arise during the use of the system. The main ones are as follows:

- Neglect of the data update process, which requires the active participation of the human factor;
- Lack of integration between the units operating in the system and the emergence of inconsistencies in information exchange;
- Repetitive entry of data used in different departments and lack of automatic processing mechanisms;
- Lack of a data control system;
- Lack of sufficient technical capabilities in data transfer processes.

It is necessary to introduce a single standard for symbols used in maps, graphics, and other information visualization tools created in Mahalla Information Systems. This process will ensure the integration of information created by different departments based on a single symbol and notation system, facilitating their interoperability with other systems [7].

Planned development specialists working under local government bodies are creating digital models and analysis systems that affect the socio-economic development of the mahalla, using statistical indicators of their territory based on existing maps and digitized data. Through mathematical modeling, statistical approaches and thematic maps, the content of the Mahalla Information System data is deepened and the possibilities for solving problems at the regional level are expanded.

During the implementation of any project, the collected data needs to be processed for various purposes and compared with other data sources. Depending on the quality and completeness of the data, their accuracy, adaptability and degree of updating, various problems may arise. In addition, the incompatibility of databases created by different organizations in the systematization of data by spatial coordinates creates complications in the integration process. This leads to delays, loss of information or inconsistencies in the integration of data collected at the mahalla level into a single system [8].

DISCUSSION: The original meaning of the word ontology is "knowledge about being". Gruber described ontology as "a clear and formal definition of concepts". Ontology can also be called a "manageable dictionary". The words and terms included in an ontology have a logical meaning that can be understood by the user, and they contain semantic (content) relationships. However, if these terms and concepts are not clearly defined or undefined, software cannot interpret them correctly, and as a result, the ability to process data in an automated way is limited [9].

The main goal of ontology is to unify the information and concepts used in the system on a single semantic basis, determine their semantic relationships, and create the necessary logical structure that allows them to be processed by a computer.

Main features of ontology

To be accepted as a formal ontology, it must have the following properties:

- Having a limited and controlled vocabulary;
- Clearly defined terms and semantic relationships between classes must be indicated;
- There is a hierarchical structure between classes, that is, there are higher and lower class relationships.

Ontologies with these features are called basic ontologies. In addition, there are ontologies with optional features, which may include the following features:

- The presence of clear definitions for each class;
- Complete coverage of all classes within the ontology;
- Definition of the limiting rule and logical constraints for each class.

Typical features that are practically important, but not mandatory, include:

- Clear classification by class;
- A complete description of the logical connections between terms.

These features of ontology serve to unify data in the Neighborhood Information System based on a single standard, to systematically manage it, and to effectively organize the automatic processing process [10].

Conclusion

Mahalla Information Systems today play an important role in the effective organization of daily management work, finding quick and accurate solutions to emerging problems, as well as creating digital conveniences in the life of local society. Therefore, in our country, first of all, mahalla citizen assemblies and state service systems integrated with them should widely use Mahalla Information Systems. Through these systems, quick access to the necessary information is created, and management decisions are made based on scientifically based and accurate data.

It is very important that information about this system is regularly published on internet platforms created by state bodies and local government systems, as well as research centers, that use MAT as a practical model.

For effective use of MAT, it is necessary to clearly define short, medium and long-term needs, and to perfectly form a digital infrastructure that can meet these needs - that is, software and hardware systems. The widespread implementation of MAT will increase the speed of mahalla administration and provide digital services to the population in a more convenient way. The sustainable implementation of this process will ensure the success of the digital transformation policy at the mahalla level.

The use of the Mahalla Information System for various purposes requires the introduction of ontology-based approaches. In particular, the use of semantic web and RDF technologies to create unified data exchange criteria between local government agencies, accelerate digital integration, and increase the level of access to public services by citizens yields high results.

As part of this study, a practical model for implementing the Mahalla Information System into management based on a unified database has been proposed, which will allow local government bodies to work more effectively and sustainably in the future.

RDF technology requires a common ontological framework for computer systems to process information and knowledge based on a common semantic interpretation. Within the framework of this project, a neighborhood management ontology was developed for this purpose. In the next stages of the research, it will be possible to access information from databases created at different times and sources in a unified manner and analyze them through dynamic queries.

For example, it would be possible to automatically answer the following question: *"What is the most optimal route between neighborhoods A and B, based on the available routes and stops?"*

In future work, it will be possible to develop applications based on semantic analysis in various areas for Neighborhood Information Systems based on this ontological model.

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