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**GRAPH MODELS OF OPTIMISATION
OF INFORMATION INTERACTION IN TERRITORIAL COMMUNITIES
ГРАФОВІ МОДЕЛІ ОПТИМІЗАЦІЇ ІНФОРМАЦІЙНОЇ ВЗАЄМОДІЇ В
ТЕРИТОРІАЛЬНИХ ГРОМАДАХ**

The modern development of territorial communities involves the integration of information technologies to improve the efficiency of management and interaction between residents and local governments. Optimisation of information interaction is becoming critically important due to the growing volume of information and the need for its rapid processing. Graph models are a powerful tool for analysing, optimising and visualising such processes. They allow you to display the relationships between system elements in the form of vertices and edges, which is especially useful for solving complex problems.

Graph models are a powerful tool for analysing territorial communities, as they reflect the complex relationships between different elements, such as institutions, residents, and resources. In these models, communities are represented as a collection of nodes that symbolise individual elements and links between them that show information flows, interactions and access to services. This allows professionals to better understand the structure and functioning of the community.

One of the main types of graphs used in this context is organisational graphs. They illustrate the relationships between institutions, authorities and residents. For example, an organisational graph can show how different healthcare, social services and educational institutions interact with each other, which is critical to understanding how the community functions as a whole.

Social graphs are another important type of graph model that models the interactions between community members. These graphs help to analyse how different groups of people communicate, share information and collaborate. For example, a social graph can reveal which residents are more likely to be in contact with each other, which can be useful for identifying opinion leaders or activists in a community.

Communication graphs, in turn, analyse the transfer of information through different channels. They show how information flows from one node to another, which can include both traditional means of communication and modern digital platforms. This allows us to identify which channels are most effective for disseminating information in the community.

In the context of territorial communities, the construction and analysis of graph models are based on various information technologies. One of the main tools used is database management systems (DBMS). In particular, Neo4j is a graph database that allows you to store and analyse the relationships between different objects. This capability is extremely important for understanding complex interactions in communities. Another important DBMS is OrientDB, which provides powerful tools for working with complex graph structures, allowing for more sophisticated analyses that can support decision-making in community planning.

Programming languages and their associated libraries also play an important role in graph modelling. Python, for example, offers libraries such as NetworkX and Graph-tool that facilitate the creation and analysis of graph data structures. These tools enable researchers and community planners to effectively visualise and manipulate data. Similarly, the R programming language offers packages such as

igraph and visNetwork that are particularly useful for data visualisation, allowing for clearer insights into community dynamics and connections.

Information and communication systems also enhance the functionality of graph models. Geographic information systems (GIS), such as ArcGIS or QGIS, are essential for visualising territorial graphs. These systems allow for the integration of spatial data, which can be crucial for understanding geographical relationships and trends in a community. In addition, citizen engagement platforms, such as Smart Community, use these graph models to improve communication and interaction between local authorities and residents, which in turn promotes greater participation in community development.

Artificial intelligence (AI) and machine learning also contribute to the analysis of graph models, especially through the use of Graph Neural Networks. These advanced techniques can predict the behaviour of residents based on existing data patterns, providing valuable information for urban planning and public services. By using AI, communities can become more responsive to the needs and behaviours of their residents, ultimately leading to a better quality of life.

Thus, the integration of these various information technologies not only facilitates the construction and analysis of graph models in territorial communities, but also improves decision-making, citizen engagement, and predictive capabilities. The combined use of DBMS, programming languages, GIS, and AI represents an integrated approach to understanding and improving community dynamics.

Graph models are an effective tool for optimising information interaction in territorial communities. Their use helps to improve management processes, provide quick access to information and create a more transparent communication system. The integration of information technologies, such as graph databases and optimisation algorithms, significantly increases the efficiency of communities. However, technical and social challenges need to be taken into account for full implementation.

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МОДЕЛЮВАННЯ ПРИЙНЯТТЯ УПРАВЛІНСЬКИХ РІШЕНЬ, ЩО ПОВТОРЮЮТЬСЯ, В ОРГАНАХ МІСЦЕВОГО САМОВРЯДУВАННЯ MODELING OF RECURRENT ADMINISTRATIVE DECISIONS IN LOCAL SELF-GOVERNMENT

Важливим процесом у діяльності керівників місцевого самоврядування є прийняття управлінських рішень. Органи місцевого самоврядування реалізують державно-владні функції на приналежних їм територіях. Прийняття управлінських рішень є однією із функцій управлінської діяльності, а рішення – її результатом. Сфера управління є складною і вимагає значної уваги до процесу прийняття рішень у ній.

Успішна реалізація управлінського рішення базується на чіткому алгоритмі дій, що зумовлює необхідність моделювання та теоретичного обґрунтування здійснення процесу прийняття рішень, вибору рішення та управлінських дій, що зобов'язує органи місцевого самоврядування особливу увагу приділяти прийняттю якісних та ефективних управлінських рішень у