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DEVELOPMENT OF AN INFORMATION SYSTEM FOR THE DIGITAL DOCUMENTATION OF HISTORICAL SITES IN A REGION

Abstract: *The article presents the development of a web-based information system for the digital documentation of historical sites in the city of Semey. The relevance of the study is associated with the need to move from scattered and locally stored information towards a unified digital environment in which data on historical and cultural heritage sites can be structured, searched, updated and visually presented. The object of the research is the process of recording and presenting information about historical sites in digital form, while the subject of the research includes the methods and software tools used to store and process such information. The study applied domain analysis, data modelling, database design, modular programming and functional testing. As a result, a digital site record structure was developed, covering identification, classification, spatial, historical-descriptive, visual and system data. Based on this structure, the architecture of the web application and the logical database model were designed, and a software prototype was implemented using Python, Flask, SQLite, HTML, CSS and JavaScript. GIS integration and QR-based identification are considered as directions for further development and are supported at the level of the proposed data structure rather than as completed functional modules. The scientific value of the work lies in the proposed structural and functional model for the digital documentation of historical sites, adapted to the local urban context. Its practical value is related to the possible use of the system in education, museums, archives, local history work and the further development of the digital infrastructure for Semey's historical and cultural heritage.*

Key words: *digital documentation, historical sites, information system, web application, database, digital heritage, Semey, digital site record.*

Introduction

As digital technologies become increasingly embedded in archival, museum, educational and cultural practices, the preservation of historical and cultural heritage is no longer viewed solely as a matter of conservation and public outreach. It is also becoming an important area for the application of modern information technologies. Digital solutions make it possible to convert information about heritage sites into a structured electronic format, support centralised data storage and updating, and provide tools for search, visualisation and further use in educational, research and cultural contexts. International approaches to the preservation of digital heritage also emphasise the importance of long-term access to digital resources, together with the development of mechanisms for their systematic organisation and presentation to different groups of users [1, 2].

The city of Semey holds a distinctive place in the historical and cultural development of Kazakhstan. A number of important stages in the country's public, literary, educational and cultural history are associated with the city. Its urban environment includes monuments, historic buildings, museums, memorial sites and other places that contribute to the preservation of collective memory and the formation of regional identity. According to published data, the approved register of historical and cultural monuments of Semey includes 67 sites, of which 10 are of national significance and 57 are of local significance [3,4]. In addition, the official website of the city akimat provides information on a number of historical and cultural monuments, which further underlines the need for a systematic digital description of such sites [4].

In practice, information on the city's historical sites is often dispersed across different sources. Some materials are held in official registers, while others can be found in local history publications, museum collections, archival documents, online publications and separate reference resources. This fragmentation makes it more difficult to search for, compare, update and reuse

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information. In addition, the absence of a unified digital structure complicates the inventorying of sites, the preparation of educational materials, the development of tourist routes and the organisation of research activities.

From a scientific and technical perspective, the issue is not limited to the accumulation of information about historical sites. It also involves the development of a formalised model for representing such information in digital form. For the field of Automation and Information Technologies, this means moving beyond descriptive record-keeping towards an information system with a defined data structure, software architecture, and automated procedures for entering, updating, searching and identifying records. In this context, digital documentation is not treated merely as an electronic catalogue, but as an applied information system that processes and presents data within a unified digital environment.

The relevance of this study is determined by the need to develop a digital tool for the systematic registration and documentation of historical sites in Semey. Such a system would make it possible to bring together dispersed information within a single database, standardise the description of heritage sites, improve access to information, and provide a foundation for the further development of digital local history, museum and educational resources.

The aim of this study is to develop a web-based information system for the digital documentation of historical sites in Semey. The system is intended to support centralised data storage, data structuring, search, visualisation and the automated identification of information relating to sites of historical significance.

To achieve this aim, the following objectives were set: to analyse existing approaches to the digital representation of historical and cultural heritage sites; to develop the structure of a digital record for a historical site; to design the architecture of the information system and the logical database model; to implement a software prototype of the web application; and to carry out pilot testing in order to assess its main functional capabilities.

The scientific novelty of the study lies in the proposed structural and functional model for the digital documentation of historical sites in Semey. Unlike a conventional electronic catalogue or a simple database of records, the proposed model combines a unified digital site record, mandatory and optional attributes, system fields, textual search attributes and coordinate fields prepared for further GIS and QR-based integration. The model is adapted to the local urban context and to the heterogeneous nature of historical, descriptive, visual and spatial data related to historical and cultural heritage sites.

The practical significance of the study is reflected in the potential use of the developed system by educational institutions, museums, archives, local history associations and other organisations involved in the study, preservation and promotion of the historical and cultural heritage of Semey.

Materials and Methods

The object of the study is the process of digitally recording and presenting information about historical sites in Semey. The subject of the study comprises the methods, models and software tools used to develop an information system that supports the storage, editing, search and visualisation of data on sites of historical significance.

The information base of the study consisted of open materials on historical sites in Semey, including data on historical and cultural monuments, local history descriptions, reference materials, photographic data, address information and additional textual descriptions [3, 4]. In developing the digital site record, the following parameters were taken into account: the name of the site, its category, address or location description, historical period, current condition, brief historical note, source of information and visual materials.

The methodological basis of the study included the analysis of scientific literature, systematic analysis of the subject area, data modelling, database design, modular programming and functional testing. The literature review made it possible to identify the main approaches to the development of information systems for cultural heritage sites. Recent studies emphasise the importance of bringing together descriptive, visual and spatial data, as well as the need to design information systems that can be further extended and integrated with mapping services [5-9].

The study was carried out in several stages. At the first stage, the functional requirements for the prototype were defined. The system had to support the addition of new sites, the editing of existing records, the viewing of a digital site record, search by key attributes, the storage and display

of photographic materials, and the automated generation of system fields. These system fields include the unique identifier of the site, the date on which the record was created, and the date of its most recent update.

At the second stage, a logical data model was developed. The historical site was defined as the central entity of the system. The following attributes were assigned to this entity: a unique identifier, name, category, address, location description, historical period, current condition, historical description, source of information, latitude, longitude, image file name, creation date and record update date. The structure of the digital site record and the purpose of its main fields are presented in Table 1.

Table 1 – Structure of the digital site record

Data category	Field of the digital site record	Field purpose
Identification data	Unique identifier	Unambiguous identification of the record in the database
Identification data	Site name	Display of the official or commonly used name of the site
Classification data	Site category	Grouping of sites by type
Spatial data	Address	Indication of the site's location within the urban environment
Spatial data	Location description	Additional textual description of the site's location
Spatial data	Latitude and longitude	Preparation of data for subsequent integration with a mapping module
Historical and descriptive data	Historical period	Indication of the period in which the site emerged or functioned
Historical and descriptive data	Historical note	Brief substantive description of the site and its significance
Condition data	Current condition	Recording of the site's state of preservation or specific condition-related features
Visual data	Photographic material	Visual representation of the site
Source data	Source of information	Indication of the origin of the information used
System data	Creation and update date	Control of the relevance and currency of the record

At the prototyping stage, the implemented database structure was based on one main table, historical_objects, which stored the core attributes of a historical site. This simplified structure was sufficient for testing the main functions of the prototype, including data entry, editing, search, viewing and image display.

In parallel with the implemented prototype structure, an extended logical database model was designed for the further development of the system. This model includes separate entities for categories, sources, photographic materials and relationships between historical sites and information sources. The extended model is intended to reduce data duplication, improve data consistency and support future scalability. The design of the system also took into account general principles of software development, database design and web application development [10-15].

At the third stage, the architecture of the software solution was designed. The system was implemented according to a modular principle and includes a user interface, a server-side request processing module, a database access module, an image upload module and a search module. The user interface is intended for entering, editing, viewing and searching data. The server-side module processes user requests, manages page routing and transfers data between the interface and the database. The database module is responsible for saving, updating and retrieving records. The image upload module stores photographic materials associated with each site, while the search module filters records according to textual parameters.

The overall architecture of the developed information system is presented in Figure 1. It includes the user interface, the server-side component, functional data processing modules, the database and image storage.

This architecture separates the functions of data entry, storage, search, visualisation and updating. Such separation simplifies the further extension of the system, including the integration of a mapping module and QR-based identification tools.

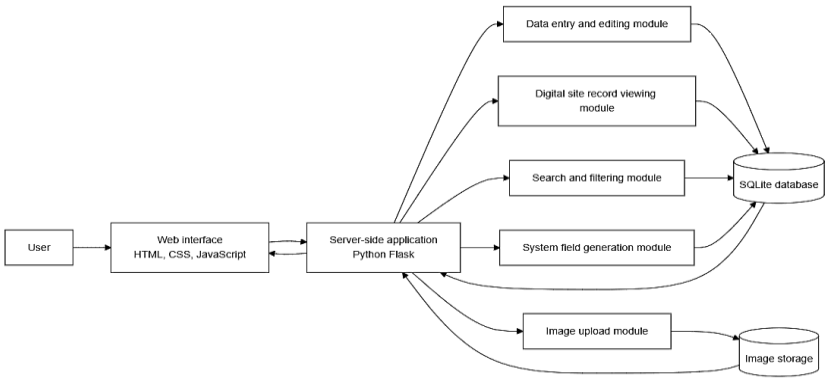


Figure 1 – Architecture of the information system for the digital documentation of historical sites

The extended logical database model is shown in Figure 2. The central entity of the model is the HISTORICAL_OBJECTS table, which contains the main information about each historical site. It is linked to the tables containing categories, photographic materials and sources of information. This structure is proposed for the next stage of system development and is intended to improve extensibility, reduce data duplication and support more consistent management of heritage-related information.

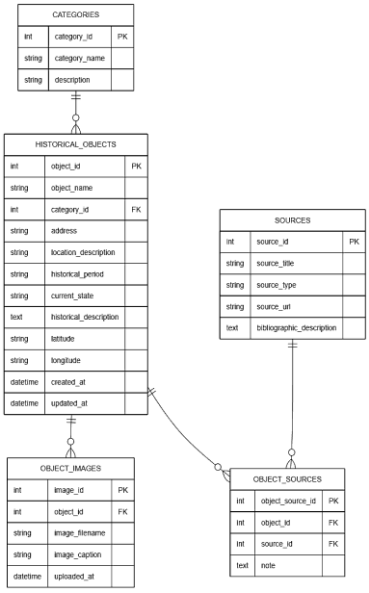


Figure 2 – Extended logical database model for the further development of the information system

The OBJECT_SOURCES table is used to represent the relationship between historical sites and sources of information. This structure allows a single site to be linked to several sources, while one source may also be associated with several historical sites.

The prototype was implemented as a web application. Python was used as the main programming language, while the server-side component was developed using the Flask framework. This choice was made because Flask is lightweight, supports convenient routing and is well suited to the rapid development of information system prototypes. Information about historical sites was stored in an SQLite database, which was selected as a simple and lightweight solution for local pilot testing. The user interface was developed using HTML, CSS and JavaScript. This made it possible to implement data entry and editing forms, a digital site record page, a list of sites, search functionality and basic navigation elements.

The automated functions of the prototype include assigning a record identifier, registering the creation and update dates, validating required fields, processing search queries and generating a structured digital site record. In the current version of the system, QR-based identification and the mapping module have not yet been implemented as complete functional components. However, the database structure provides the basis for their later integration through the use of coordinate fields and a unique record identifier.

Functional testing was used to verify the performance of the developed solution. The correctness of the operations for adding, editing, saving, searching, viewing and deleting records was assessed. In addition, the logical structure of the digital site record, the usability of the interface, the completeness of the information presented, the correct display of photographic materials and the potential for further scaling were analysed. Pilot testing was carried out in a local development environment using a test dataset containing 5 records of historical sites in Semey. The dataset included one record for each of the five categories implemented in the prototype: architectural monuments, historic buildings, memorial sites, archaeological sites and cultural sites. Each record contained the mandatory fields of the digital site record, namely the site name, category and historical description, as well as additional attributes where available, including address, historical period, current condition, source information, coordinates and photographic material.

Research results

As a result of the study, a prototype of a web-based information system for the digital documentation of historical sites in Semey was developed. The application provides centralised work with digital site records and brings together the main registration and documentation operations within a single information environment. Unlike dispersed textual descriptions, spreadsheets and local materials, the proposed solution converts information about a historical site into a standardised digital format that can be searched, updated, visualised and subsequently integrated with external services.

The main page of the system contains a list of historical sites, a search field, category-based filtering and tools for opening the detailed record of a selected site. Users can view existing records, search by name, category, address or historical description, and proceed to the form for adding a new site. This interface structure provides quick access to the data and makes the system suitable for educational, research and local history work. The general interface of the developed system is shown in Figure 3. It presents the list of historical sites, the search field, category-based filtering and navigation tools for opening or editing individual records.

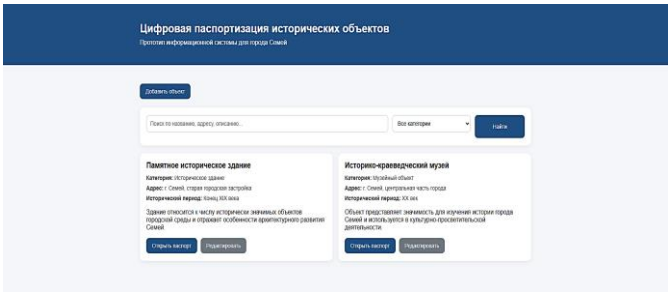


Figure 3 – Main page of the information system for the digital documentation of historical sites in Semey

One of the main outcomes of the study was the development and implementation of a unified digital record for a historical site. Its structure includes both mandatory and optional attributes. The mandatory attributes include the site name, category and historical description. The optional attributes include the address, location description, historical period, current condition, source of information, coordinates and photographic materials. This division makes it possible to ensure the minimum required completeness of each record while retaining flexibility for the later addition of further data.

The site addition form is designed for entering the main information and uploading photographic material. When a record is saved, the system automatically generates a unique identifier, records the creation date and checks whether the mandatory fields have been completed. This reduces the likelihood of incomplete records and contributes to a higher level of data structuring. The form used to add a new historical site is shown in Figure 4. It includes fields for entering identification, classification, spatial and historical-descriptive data, as well as an option for uploading photographic material.

The use of mandatory fields in the form supports data completeness, while the automatic generation of system fields reduces the need for manual data entry and improves the consistency of records.

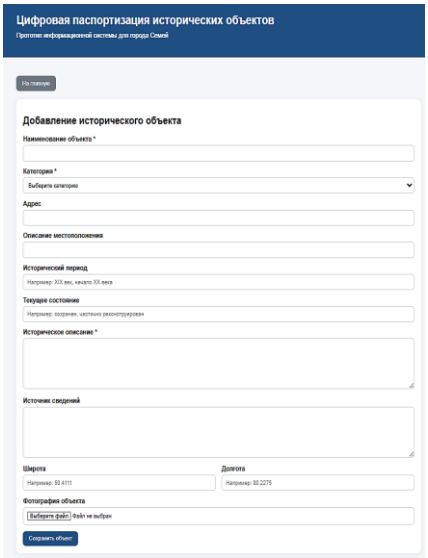


Figure 4 – Form for adding a historical site to the information system

Functionally, the prototype consists of five main modules. The first module is responsible for entering and saving information about a site. The second module supports the editing and updating of the site record. The third module provides access to the digital site record in a structured form. The fourth module is used to search by name, category, address and other textual attributes. The fifth module handles the uploading and display of images. In this way, the system covers the basic operational cycle of working with a site, from creating a record to updating, searching and viewing it. The digital site record viewing window presents information about a site in a single structured format. The record displays identification, classification, spatial, historical-descriptive, visual and system data. This form of presentation allows users to obtain a coherent overview of the site quickly and, where necessary, proceed to edit the record. The viewing window of the digital site record is shown in Figure 5. It presents the main information about a historical site in a structured format, including identification, classification, spatial, historical-descriptive, visual and system data.

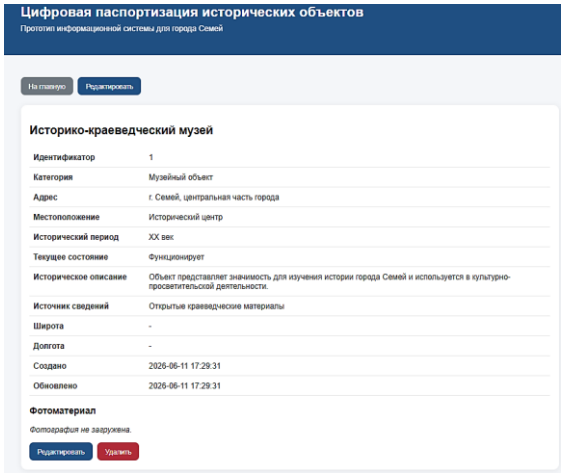


Figure 5 – Viewing window of the digital site record

This representation brings together the key information about a site on a single page and allows the user to move from viewing the record to editing it where necessary.

The search module allows records to be selected by keywords and categories. Search is implemented across several textual attributes, including the site name, category, address, historical description and historical period. This improves the usability of the database, particularly as the number of recorded sites increases. An example of the search results generated by the system is shown in Figure 6. The module allows users to filter records by keywords and categories, making it easier to locate the required historical site within the database.

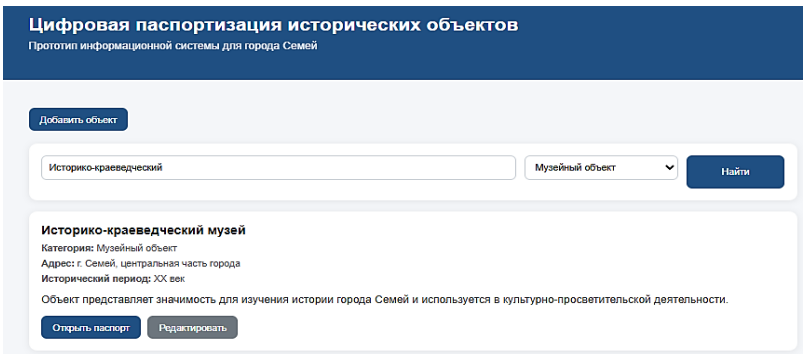


Figure 6 – Search results in the information system

The search function increases the practical value of the system, as it supports quick access to records and remains useful when the number of historical sites in the database is expanded.

During the pilot population of the system, a test database of historical sites in Semey was created, containing 5 records, one for each of the five implemented categories: architectural monuments, historic buildings, memorial sites, archaeological sites and cultural sites. For each record, the system automatically assigned an identifier and recorded the creation and update dates. The testing showed that the system correctly performs the main operations related to data entry, modification, search and display. Since the testing was carried out on a limited pilot dataset in a local development environment, the obtained results should be interpreted as an initial verification of the prototype rather than as full-scale performance testing. Functional testing included nine test scenarios corresponding to the main operations of the prototype: adding a site, validating mandatory fields, editing a record, viewing a digital site record, searching by name, filtering by category, uploading an image, deleting a record and checking system fields. A test scenario was considered successful if the expected operation was completed without data loss, incorrect display, application interruption or violation of the defined data structure. The results of the functional testing are presented in Table 2.

Table 2 – Results of functional testing of the prototype

Function tested	Description of the test	Result
Adding a site	Entering a new site with the mandatory fields completed	The record is saved correctly in the database
Validation of mandatory fields	Attempting to save a record without a name, category or description	The system displays a notification indicating that the mandatory fields must be completed
Editing a record	Changing information in a previously created site record	The data are updated without loss of previously saved information
Viewing the digital site record	Opening a site record from the general list	The information is displayed in a structured format
Search by name	Searching for a site by a keyword in its name	The system displays the relevant records
Search by category	Filtering sites by a selected category	The list of sites is filtered correctly
Image upload	Attaching photographic material to a site record	The image is saved and displayed in the digital record
Deleting a site	Deleting a selected record from the database	The record is removed from the general list and from the database
Operation of system fields	Checking the creation and update dates of a record	The system data are generated automatically

All nine test scenarios were completed successfully on the pilot dataset. The testing confirmed the correctness of the basic operations of the prototype. Minor issues identified during intermediate testing were mainly related to incomplete input processing and image display; these issues were resolved after adjusting the validation and routing logic.

To strengthen the evidential basis of the results, the prototype was assessed not only in terms of the availability of its interface, but also in relation to the performance of its main functional components. The assessment focused on the completeness of the digital site record, the correctness

of data saving and search, the clarity of record viewing, and the extensibility of the data structure. The results indicate that the developed system supports structured data entry, reliable storage, search and visualisation, while also providing a basis for further extension through GIS and QR-based modules.

The evaluation shows that the prototype meets the basic functional requirements defined at the design stage. At the same time, the results indicate areas for further development, including the integration of a mapping module, QR-based identification and user access management.

The errors identified during the intermediate stages of testing were mainly related to the processing of incomplete input and the display of photographic materials. After the validation and routing logic had been adjusted, these issues were resolved. The pilot testing therefore confirmed the operability of the main prototype modules and its suitability for further extension.

A further outcome of the study is the system's readiness for subsequent modernisation. The availability of coordinate fields and a unified data model creates the basis for the future integration of a mapping module without redesigning the basic structure. The digital site record format may also be used in the future to generate QR-based links to individual site records. These functions have not yet been implemented as complete components of the current prototype, but the proposed data structure provides the necessary basis for their later development. Thus, the developed prototype can be considered not only as a local database, but also as a foundation for the further development of a digital platform for the historical and cultural heritage of Semey.

Discussion

The results obtained show that the digital documentation of historical sites at the city level can be implemented through a compact modular web-based system. The effectiveness of such a solution depends not only on the availability of a software interface, but also on a formalised data structure that allows different sites to be described according to a unified principle. This distinguishes the proposed system from a simple set of textual descriptions, spreadsheets or local archival materials.

The developed prototype follows the general logic of heritage information systems. Previous studies in the field of digital heritage emphasise the importance of combining alphanumeric, visual and spatial data, as well as the use of relational databases, mapping services and web interfaces [5-9]. The system developed for Semey represents a basic stage of this approach. Although it is not yet a full-scale GIS platform, it provides the structural basis required for further geoinformation integration and QR-based identification.

To clarify the position of the developed prototype among existing digital heritage solutions, a comparative analysis was carried out according to several criteria: the presence of a unified digital site record, support for spatial data, search functionality, multimedia materials, GIS and QR readiness, and scalability. The results of the comparison are presented in Table 3.

Table 3 – Comparative analysis of approaches to the digital documentation of historical sites

Approach or solution	Digital site record	Spatial data	Search and multimedia	Limitation
Official registers of monuments	Partial	Limited	Limited	Not focused on interactive editing, visualisation or educational use
Tourist and reference portals	Descriptive	Sometimes available	Basic search and visual materials	Do not provide a unified internal data model for updating records
Full-scale heritage GIS platforms	Present	Advanced	Present	Require complex infrastructure and prepared structured data
Spreadsheets and local archives	Unstructured or weakly structured	Limited or absent	Limited	Low scalability and weak data connectivity
Proposed information system	Unified and structured	Coordinate fields prepared	Search, editing and image upload	Prototype stage; GIS and QR functions are planned for further implementation

The comparison shows that the proposed system occupies an intermediate position between simple digital catalogues and full-scale GIS platforms. Its main advantage lies in the combination of a unified digital site record, database storage, search functionality, image handling and readiness for further GIS and QR-based extension.

The significance of the proposed solution lies in the fact that information about historical sites is presented as structured data suitable for storage, search, updating, visualisation and further software-based processing. The prototype includes a unified digital site record, a modular web application architecture, database storage, search functionality, image handling and automated system fields. These features make it possible to consider the developed solution as an applied information system rather than merely an electronic reference resource.

An important advantage of the system is its adaptation to the local context of Semey, where historical sites belong to different categories and require a unified digital format for description and further use. The prototype may be useful for educational institutions, museums, archives, local history associations and municipal bodies in preparing educational materials, developing thematic routes, conducting research and forming digital collections.

At the same time, the study has several limitations. The system is currently a prototype and was tested in a local environment using a limited dataset. The use of SQLite is appropriate for pilot testing; however, practical deployment in a multi-user environment would require migration to a database management system designed for concurrent access, such as PostgreSQL or MySQL. The current version also does not yet include user role differentiation, authentication, a full mapping interface, automatic QR code generation, batch data import, regular backup procedures or mechanisms for protecting uploaded files. Therefore, further development should include access control, data integrity checks, backup mechanisms and additional testing on an expanded dataset under multi-user access conditions.

Further development of the system should focus on integrating an interactive map, implementing QR-based identification, supporting multiple images for each record, introducing user access control, enabling data export and creating an administrative module. In the future, the system may also be supplemented with tools for analytics, thematic route generation and integration with educational platforms.

Conclusion

This article has addressed the development of a web-based information system for the digital documentation of historical sites in Semey. The relevance of the study is determined by the need to move from fragmented storage of information towards a unified digital environment that supports the structured description, search, updating and visual presentation of information about sites of historical significance.

During the study, a digital site record structure was developed for a historical site. This structure includes identification, classification, spatial, historical-descriptive, visual and system data. On the basis of the proposed structure, the architecture of the information system was designed, a logical database model was developed and a software prototype of the web application was implemented. The system supports the addition, editing, viewing, searching and deletion of records, as well as the uploading and display of photographic materials.

The pilot testing confirmed the operability of the main prototype modules. The system correctly performs data entry, saving, search and display operations, provides the automatic generation of system fields and enables information about a site to be presented in a unified digital form. This confirms the applicability of the proposed approach to the digital recording of historical sites in Semey.

The scientific novelty of the study lies in the development of a structural and functional model of an information system for digital documentation, adapted to the local urban context. The practical significance of the study is reflected in the potential use of the developed prototype in educational, museum, archival and local history activities, as well as in the further development of the digital infrastructure for the historical and cultural heritage of the region.

Further work should focus on expanding the database of sites, migrating the system to a multi-user database environment, introducing user access control and backup mechanisms, and testing the system on a larger dataset. The integration of a mapping module, QR-based identification and tools for creating thematic routes should be considered as subsequent stages of development based on the proposed data structure.

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РАЗРАБОТКА ИНФОРМАЦИОННОЙ СИСТЕМЫ ЦИФРОВОЙ ПАСПОРТИЗАЦИИ ИСТОРИЧЕСКИХ ОБЪЕКТОВ РЕГИОНА

В статье рассматривается разработка веб-ориентированной информационной системы цифровой паспортизации исторических объектов города Семей. Актуальность исследования связана с необходимостью перехода от разрозненного хранения сведений об объектах историко-культурного наследия к единой цифровой среде, обеспечивающей структурированное описание, поиск, обновление и визуальное представление данных. Объектом исследования является процесс цифрового учёта и представления информации об исторических объектах, предметом – методы и программные средства разработки информационной системы для их хранения и обработки. В ходе исследования применялись методы анализа предметной области, моделирования данных, проектирования базы данных, модульного программирования и функционального тестирования. В

результате разработана структура цифрового паспорта исторического объекта, включающая идентификационные, классификационные, пространственные, историко-описательные, визуальные и служебные данные. На её основе спроектирована архитектура веб-приложения, разработана логическая модель базы данных и реализован программный прототип с использованием Python, Flask, SQLite, HTML, CSS и JavaScript. Система обеспечивает добавление, редактирование, просмотр, поиск и удаление записей, загрузку фотоматериалов, автоматическое формирование идентификаторов и фиксацию временных меток. Интеграция GIS и QR-идентификация рассматриваются как направления дальнейшего развития и поддерживаются на уровне предложенной структуры данных, а не как завершённые функциональные модули. Научная ценность работы заключается в разработке структурно-функциональной модели цифровой паспортизации, адаптированной к локальному городскому контексту. Практическая значимость состоит в возможности применения системы в образовательной, музейной, архивной и краеведческой деятельности, а также в дальнейшем развитии цифровой инфраструктуры историко-культурного наследия города Семей.

Ключевые слова: *цифровая паспортизация, исторические объекты, информационная система, веб-приложение, база данных, цифровое наследие, город Семей, цифровой паспорт объекта.*

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ӨҢІРДІҢ ТАРИХИ НЫСАНДАРЫН ЦИФРЛЫҚ ПАСПОРТТАУҒА АРНАЛҒАН АҚПАРАТТЫҚ ЖҮЙЕНІ ӘЗІРЛЕУ

Мақалада Семей қаласының тарихи нысандарын цифрлық паспорттауға арналған веб-бағдарланған ақпараттық жүйені әзірлеу мәселесі қарастырылады. Зерттеудің өзектілігі тарихи-мәдени мұра нысандары туралы мәліметтердің әртүрлі дереккөздерде шашыраңқы сақталуына және оларды құрылымдалған түрде жинақтайтын, іздеуге, жаңартуға және көрнекі түрде ұсынуға мүмкіндік беретін бірыңғай цифрлық ортаның қажеттілігіне байланысты. Зерттеу объектісі – тарихи нысандар туралы ақпаратты цифрлық түрде есепке алу және ұсыну процесі, ал зерттеу пәні – осы мәліметтерді сақтау мен өңдеуге арналған ақпараттық жүйені әзірлеу әдістері мен бағдарламалық құралдары. Зерттеу барысында пәндік саланы талдау, деректерді модельдеу, дерекқорды жобалау, модульдік бағдарламалау және функционалдық тестілеу әдістері қолданылды. Нәтижесінде тарихи нысанның цифрлық паспортының құрылымы әзірленді. Ол сәйкестендіру, жіктеу, кеңістіктік, тарихи-сипаттамалық, визуалды және қызметтік деректерді қамтиды. Ұсынылған құрылым негізінде веб-қосымшаның архитектурасы мен дерекқордың логикалық моделі жасалып, Python, Flask, SQLite, HTML, CSS және JavaScript технологиялары арқылы бағдарламалық прототип іске асырылды. Жүйе жазбаларды қосу, өңдеу, қарау, іздеу және жою, фотоматериалдарды жүктеу, идентификаторларды автоматты түрде қалыптастыру және уақыт белгілерін тіркеу функцияларын орындайды. GIS-интеграция және QR-негізіндегі сәйкестендіру жүйені одан әрі дамыту бағыттары ретінде қарастырылады және қазіргі кезеңде толық іске асырылған функционалдық модульдер емес, ұсынылған деректер құрылымы деңгейінде қамтамасыз етіледі. Жұмыстың ғылыми құндылығы жергілікті қалалық контекске бейімделген цифрлық паспорттаудың құрылымдық-функционалдық моделін ұсынуымен айқындалады. Практикалық маңызы жүйені білім беру, музей, архив және өлкетану қызметінде, сондай-ақ Семей қаласының тарихи-мәдени мұрасының цифрлық инфрақұрылымын дамытуда қолдану мүмкіндігімен байланысты.

Түйін сөздер: *цифрлық паспорттау, тарихи нысандар, ақпараттық жүйе, веб-қосымша, дерекқор, цифрлық мұра, Семей қаласы, нысанның цифрлық паспорты.*

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СУМЕН ЖАБДЫҚТАУДЫ АВТОМАТТАНДЫРУ ЖӘНЕ ДИСПЕТЧЕРЛЕУГЕ АРНАЛҒАН ЖОҒАРЫ ТИІМДІ, ЖОҒАРЫ СЕНІМДІ ТАРАТЫЛҒАН ЖҮЙЕЛЕРДІ МОДЕЛЬДЕУ

Аңдатпа: *Сумен жабдықтауды автоматтандыру және диспетчерлеуге арналған таратылған жүйелерді модельдеу қазіргі кездегі су тапшылығы проблемасы мен апаттық жағдайды дер кезінде болдырмау, сонымен бірге апаттық жағдайды алдын ала болжау,*

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