



IRSTI 27.39.21

DOI: <https://doi.org/10.26577/JMMCS2024-v123-i3-9>

A.N. Murzakhmetov , A.A. Bapanov* 
M.Kh. Dulaty Taraz Regional University, Kazakhstan, Taraz
*e-mail: a.bapanov@dulaty.kz

CREATION OF INFORMATION SYSTEM MODEL FOR THE ASSESSMENT OF TOURISM OBJECTS

The paper presents a model of information system designed to evaluate tourism objects based on information from web resources and social networks. When describing the model, the main entities such as data object, user, option, comment, tourism object, tourism organization and tone definition term were identified and described in detail. The relationships between the above entities of the information system are also defined. The core of the model is a data object, which stores complete information about the resource and is described to a greater extent through metadata. The main stages of model realization are given, which includes four steps: creation of tourism object database, collection and processing of comments, creation of tone definition dictionary and stage of tourism object evaluation. The paper also touches upon the issues related to the definition of the needs of tourists and tourism organizations.

Key words: information system model, tourism object, comment, tone definition terms, tourism sphere.

А.Н. Мурзахметов, А.А. Бапанов*
М.Х.Дулата атындағы Тараз Мемлекеттік Университеті, Қазақстан, Тараз қ.
*e-mail: a.bapanov@dulaty.kz

ТУРИЗМ ОБЪЕКТІЛЕРІН БАҒАЛАУ ҮШІН АҚПАРАТТЫҚ ЖҮЙЕ МОДЕЛІН ҚҰРУ

Жұмыста веб-ресурстар мен әлеуметтік желілердегі ақпарат негізінде туризм объектілерін бағалауға арналған ақпараттық жүйенің моделі ұсынылған. Модельді сипаттау кезінде деректер объектісі, пайдаланушы, опция, комментарий, туризм объектісі, туристік ұйым және тоналдылықты анықтау термині сияқты негізгі субъектілер анықталды және егжей-тегжейлі сипатталды. Ақпараттық жүйенің жоғарыда аталған субъектілерінің арасындағы байланыстар да анықталған. Модельдің өзегі ресурс туралы толық ақпаратты сақтайтын және негізінен метадеректер арқылы сипатталынатын деректер нысаны болып табылады. Модельді іске асырудың негізгі кезеңдері келтірілген, ол төрт кезеңді қамтиды: туризм объектілерінің деректер базасын құру, пікірлерді жинау және өңдеу, тоналдылықты анықтау сөздігін құру және туризм объектісін бағалау кезеңі. Жұмыста туристер мен туристік ұйымдардың қажеттіліктерін анықтау мәселелері де қарастырылған

Негізгі сөздер: ақпараттық жүйе моделі, туризм объектісі, комментарий, тонды анықтау терминдері, туризм саласы, гомоморфты шифрлау

А.Н. Мурзахметов, А.А. Бапанов*

СОЗДАНИЕ МОДЕЛИ ИНФОРМАЦИОННОЙ СИСТЕМЫ ДЛЯ ОЦЕНКИ ОБЪЕКТОВ ТУРИЗМА

Таразский государственный университет имени М. Х. Дулати, Казахстан, г. Тараз
*e-mail: a.bapanov@dulaty.kz

В работе представлена модель информационной системы, предназначенной для оценки объектов туризма на основе информации из веб-ресурсов и социальных сетей. При описании модели были выделены и подробно описаны основные сущности, такие как объект данных, пользователь, опция, комментарий, объект туризма, туристическая организация и термин определения тональности. Также определяются отношения между вышеперечисленными сущностями информационной системы. Ядром модели является объект данных, который хранит в себе полную информацию о ресурсе и в большей степени описывается через метаданные. Приведены основные этапы реализации модели, который включает в себя четыре шага: создание базы данных объектов туризма, сбор и обработка комментариев, создание словаря определения тональности и этап оценки объекта туризма. Также в работе затрагиваются вопросы касательно определения потребностей туристов и туристических организаций

Ключевые слова: модель информационной системы, объект туризма, комментарий, термины определения тона, сфера туризма..

1 Introduction

The advent of modern information technology has had a profound impact on nearly every stage of the tourist process, leading to a shift in the information needs of both tourists and tourist organizations [1]. In the contemporary era, a modern tourist equipped with a smartphone cannot be content with a mere mode of searching for information about tourist destinations, whether they be tourist sites or applications. It is extremely demanding for search and evaluation systems, so it needs to be equipped with intelligent services that take into account relevant information not only from the websites of tourism organizations, but also information from social networks. Social networks have become integral to the tourism industry, shaping how people discover, plan, and share their travel experiences. Travelers often share their experiences on social platforms, creating a rich repository of authentic content. User-Generated Content provides potential travelers with real-life insights. All of these social media posts serve as a tool for travelers to gather information about destinations, accommodations, events, and restaurants. Travel reviews, recommendations, and blogs on platforms like Facebook, Twitter, and Reddit help you make informed decisions [2, 3]. Therefore, the role of social networks in the tourism industry is becoming increasingly significant. They facilitate the targeting of specific demographic groups and provide insights into the needs and behaviors of tourists. A substantial quantity of social media data is currently available and continues to grow at a rapid pace. The organization and categorization of accessible information sources is a crucial undertaking, not only in the context of tourism but also across a multitude of other domains. In tourism, a lot of time is consumed in the process of searching for a place of stay, studying comments and comparing information. In order to solve this task, it is necessary to support the task of systematization of resources [4, 5]. To date, the world has developed a huge number of information systems that were aimed at meeting the needs of the tourist [6-9]. The weaknesses of which are the need to process a large volume of comments, not correlation of comments to the information object and the lack of methods of objective evaluation of the tourism object based on user comments. This is inconvenient for most users (tourists, tourist organizations), because the user needs to find specific information describing a particular tourist object and get an objective assessment of the object.

2 Materials and methods

An information system model is a description of the underlying entities and the rules of relationships between them. It is often a division of entities, a method of abstraction and generalization. The main task of IS model creation is to develop a model with detailed description of entities, stages and architecture for further creation of software application [10-12]. At the moment, a large number of models have been created in the world [13-16], which are necessary in the creation of a particular information system. But most of the information systems are created without building a model, which in turn causes the problems of data exchange, integration and expansion of the information system. From the works of recent years it is necessary to note the work of the author Gomilevskaya G.A. [17], where the neural network model for assessing tourist satisfaction is presented. This model of tourist service quality assessment system is based on a specially designed neural network that processes the opinions (comments) of users. Without taking into account this work, the authors are not aware of a model that would fully meet the demands and expectations of tourists in the field of evaluation of the tourist object.

3 Concept of resource

The resource of an information system is one of the basic concepts that can be used to describe all the components of a given model. Tourist objects, comments, tone definition terms and many other things in the model are resources and are expressed through data objects. According to the works [10, 15] in the created model the resource has its own set of data for identification. A resource is organized by description and can have a specific structure or it can be complex. A resource can be divided into (smaller) levels. Resources can also be considered in a group or as a separate entity. A resource is coordinated by various options, has its own attributes and methods, which are necessary to build relationships with other resources, and as stated earlier is expressed through a data object (Fig. 1).

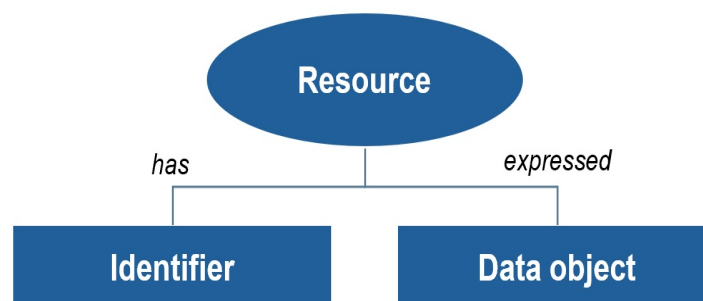


Figure 1: IS resource

In the model, a data object is a secondary object that stores the data of a resource; in other words, data objects store information about all objects in the system. A data object

inherits from a resource a set of data for identification and all of the above properties. (Fig. 2)..

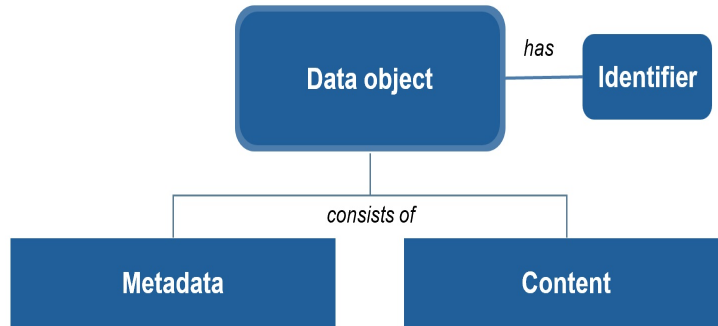


Figure 2: Data object

All data objects in the model consist of metadata and content. A resource is described through metadata, the main task of the latter is to provide information about the resource. Content is a separate type of resource, which can be present and used if necessary, and can also be absent. Data object characterizes any element of a model or information system and is a basic concept. Data objects include in their boundary key entities of the tourism space, such as tourism object, comment, tourism organization, option, user, as well as relationships between data objects.

4 Key entities of the model

The form of the model is set by the central elements - key entities. The key entities of the data object are Information, User, Option. All above-mentioned key entities of the model have a data set and can have relations both within one key entity and within several entities

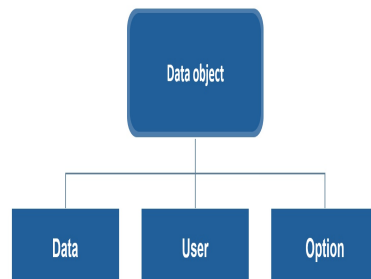


Figure 3: Data object

One of the important data objects with which an information system interacts is - data. This is an indivisible element that characterizes a real entity according to a certain scheme. Data give form to the content of the information system, has a certain composition of attributes, characterized through metadata and options. Data in the model can be easily identified through identifiers. The data consists of: comments, tourism objects, tourism organization and tone definition term. All of the above classes can have types. For example, the data element - Comment is categorized into types such as positive, negative, and other (undefined).

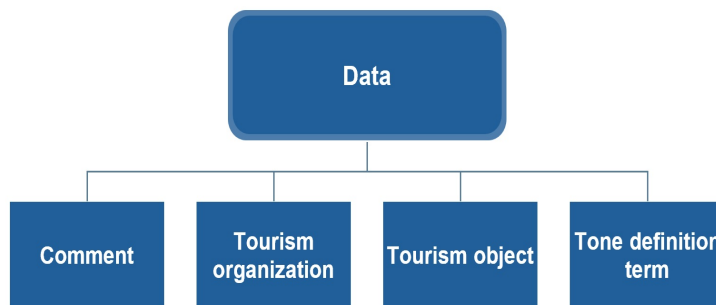


Figure 4: IS Data classes

User - an active person who takes part in the operation of the information system (processing/receiving information or performing a certain option (data search, data sorting, etc.). An actor can be a person or a program. In our model, users are categorized into administrators and users. In the model, each user has a profile (account). The profile contains basic and information about the user, as well as information necessary for user authorization: full name, e-mail address, access rights, login and password. Users can also be members of certain groups, which are created to simplify the management of access to the IS resource. (Fig. 5)

A function represents a specific processing task that can be performed with the assistance of one or more resources as a consequence of the actions of an individual user. This component of the model is the most comprehensive and flexible, encompassing all resource processing and user actions within the information system (Fig. 6).

In the created model, the options are divided into three: Access to the resource, Resource management, IP management. A specific user interacts with each option class. The resource management option includes the following steps:

- 1) Identifying and retrieving (saving) resources (comments) from social networks that are relevant to tourism and tourism object.
- 2) Filtering and pre-processing of data (comments) obtained during integration from other databases
- 3) Data analysis work, which may include such options as semantic analysis, ontology and dictionary building, tone detection, etc.

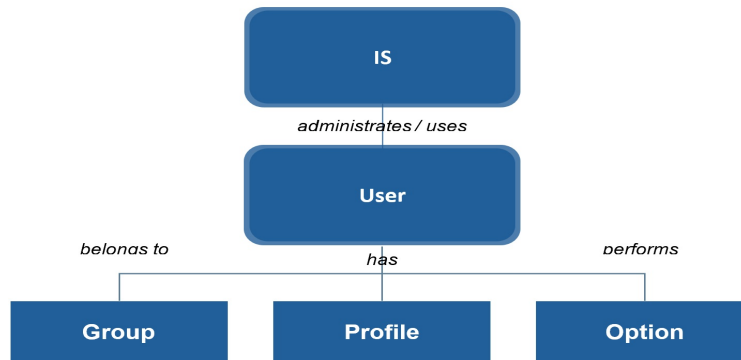


Figure 5: IS Users

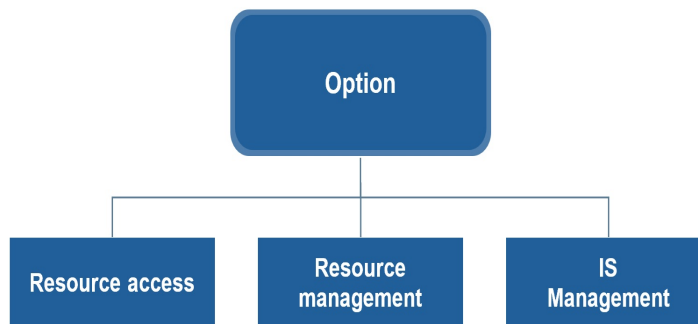


Figure 6: IS Users

4) Publication (visualization) of the results - the option to provide reports.

Within resource management, an important task of the data analysis phase is - semantic analysis. Semantic analysis is one of the important components of natural language processing, the steps of automatic understanding of texts, which are necessary for the extraction of relations and the formation of semantic representation of texts. [18-21] In most cases the course of text analysis goes through several processing steps: tokenization to identify word forms, morphological, syntactic analysis.

5 Metadata

As mentioned earlier in this model, entities are characterized by metadata. Metadata can be thought of as perfectly organized information that characterizes a data object [14]. In addition to the task of informing about the data object, metadata is responsible for importing and classifying, selecting the data object by parameters, considering internal and external tasks of the information system. According to [14] metadata can be: system, structural and descriptive. Descriptive metadata is mostly responsible for object identification. Structural metadata provides information on the structure of the object. As for system metadata, the

importance is explained by the issues of object administration. During program realization of the created model descriptive and system metadata will be applied to a greater extent.

6 Relationships

Relationships as a non-standard type of metadata characterizes connections and relations between data objects. The number of relations is identified according to the tasks of the information system and in general their number has no limits. Proceeding from the purposes and tasks of model building the relations "Comment - Comment", "Comment - Tourist organization", "Comment - Tone definition term" and so on will be considered. Relationships are present between all classes of information.

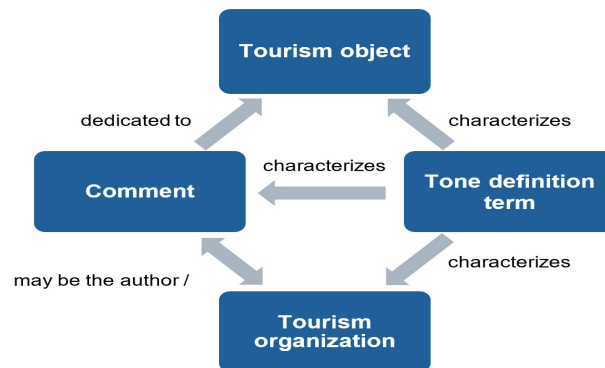


Figure 7: Relationships between class Information

By their nature, relations are categorized into: associative, thesaurus and semantic [16]. Figure 7 summarizes the main relationships between the entities of the data object. Most of the relations in the model are semantic, they are the relation "Comment is dedicated to the Tourism Object" and the relation "Tourism organization is the author of the Comment". The model also does not exclude the use of associative and thesaurus relations. The latter is necessary to improve the search option.

The realization of the model will be carried out in 4 stages (Fig. 8). The first step will be to create a database of tourism objects. Then, for these tourism objects the work will be done to collect and pre-process information (comments) from tourist websites and social networks. Semantic analysis of the collected information will be conducted to form a dictionary of tone definition terms with the involvement of experts. In the end, an assessment will be given to the tourism objects. To achieve the goals of the last stage it is planned to apply AI capabilities.

7 Conclusion

The paper proposes a model of information system designed to evaluate tourism objects. The model is built on the basis of key entities, namely: tourism object, comment, tone

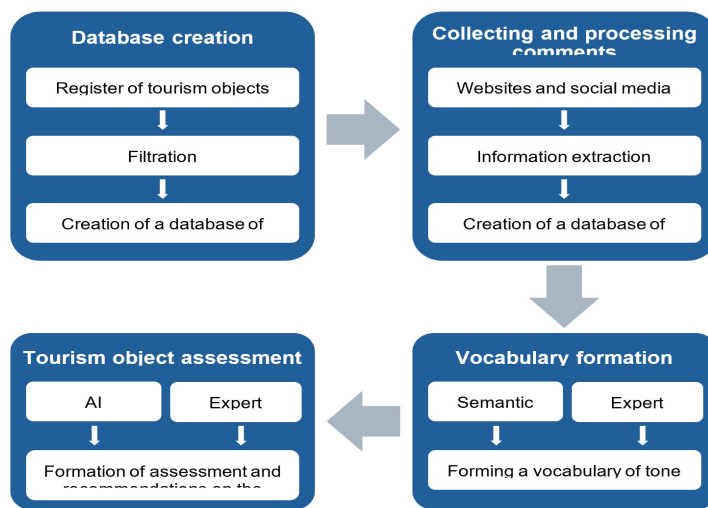


Figure 8: Stages of model realization

definition terms. The relationship between these data entities is clearly described. The distinctive characteristics of this model include multilingualism, the use of various options for semantic analysis, as well as the presence of an option to evaluate the tourism object using AI.

The proposed model will be implemented within the framework of the project AP22786059 "Development of a method and algorithm of semantic analysis in web resources to determine the preferences and interests of tourists on the basis of artificial intelligence" of the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan.

Список литературы

- [1] Tonino Pencarelli The digital revolution in the travel and tourism industry.// Information Technology Tourism 22(5) September 2020 P. 455-476.
- [2] Liu, B., Meng, F., Luo, C., Jiang, H. User Interactions in Online Travel Communities: A Social Network Perspective. Journal of Hospitality Tourism Research, 48(7), 1149-1163. <https://doi.org/10.1177/10963480221141616>.
- [3] Samuel, J. E., Shrinivas, D., Jayaraman, R. Examining opinions using likelihood reasoning using Twitter information. 020151. <https://doi.org/10.1063/5.0217129>.
- [4] Tang, R., Moon, J., Heo, G. R., Lee, W. S.). Exploring the knowledge structure and potential research areas of sustainable tourism in sustainable development: Based on text mining and semantic network analysis. Sustainable Development, 32(4), 3037-3054. <https://doi.org/10.1002/sd.2823>.

-
- [5] Lee, K., Yen, A. Segmenting social media users in international tourism: Insights integrated from multi-homing theory and international visitor survey data. *International Journal of Tourism Research*, 26(4), e2693. <https://doi.org/10.1002/jtr.2693>
- [6] Buhalis, D., Law, R. Progress in information technology and tourism management: 20 years on and 10 years after the Internet-The state of eTourism research. *Tourism Management*, 29(4), 609-623. <https://doi.org/10.1016/j.tourman.2008.01.005>.
- [7] Cai, W., Richter, S., McKenna, B. Progress on technology use in tourism. *Journal of Hospitality and Tourism Technology*, 10(4), 651-672. <https://doi.org/10.1108/JHTT-07-2018-0068>.
- [8] Alves, P., Martins, A., Negr?o, F., Novais, P., Almeida, A., Marreiros, G. (2024). Are heterogeneity and conflicting preferences no longer a problem? Personality-based dynamic clustering for group recommender systems. *Expert Systems with Applications*, 255, 124812. <https://doi.org/10.1016/j.eswa.2024.124812>.
- [9] Kumar, A., Goyal, H. R., Sharma, S.). Sustainable Intelligent Information System for Tourism Industry. 2023 IEEE 8th International Conference for Convergence in Technology (I2CT), 1-6. <https://doi.org/10.1109/I2CT57861.2023.10126400>.
- [10] Fedotov A.M., Abdelieva M.N., Baidavletov A.T., Bapanov A.A., Sambetbaeva M.A., Fedotova O.A. Conceptual model of scientific and educational information system. *Vestnik NSU Series: Information Technologies*, 2015, 13(3), P. 89-104.
- [11] Bec, A., Moyle, B., Timms, K., Schaffer, V., Skavronskaya, L., Little, C. Management of immersive heritage tourism experiences: A conceptual model. *Tourism Management*, 72, 117-120. <https://doi.org/10.1016/j.tourman.2018.10.033>.
- [12] Reznichenko V.A., Proskudina G.Y., Ovdiy O.M. Conceptual model of scientific publication // *Proceedings of the 14th All-Russian Scientific Conference "Electronic Libraries: promising methods and technologies, electronic collections RCDL-2012. Pereslavl-Zalessky, 2012. P. 43-54.*
- [13] Fedotov, A.M.; Barakhnin, V.B.; Zhizhimov, O.L.; Fedotova, O.A. Model of the information system to support scientific and pedagogical activity // *Vestnik NSU Series: Information Technologies. 2014. T. 12, № 1. P. 89-101.*
- [14] Kogalovsky M.R. Metadata, their properties, functions, classification and means of representation // *Proceedings of the 14th All-Russian Scientific Conference "Electronic Libraries: promising methods and technologies, electronic collections"RCDL-2012. Pereslavl-Zalessky, Russia, 2012.*
- [15] D3.2b The Digital Library Reference Model Funded under the Seventh Framework Program, ICTProgramme - "Cultural Heritage and Technology Enhanced Learning"Project Number: 231551. April 2011. <http://www.dlorg.eu>.

- [16] Fedotov A. M., Idrisova I. A., Sambetbaeva M. A., Fedotova O. A. Using the thesaurus. A. The use of thesaurus in scientific and educational information system // Vestnik NSU Series: Information Technologies. 2015. T. 13, № 2. P.86-102.
- [17] Gomilevskaya, G.A.; Tarasov, V.S.; Evsyukov, M.V. Neural network as a tool for assessing tourist satisfaction (using the database of user feedback on tourist services and facilities from open sources) // Economics, Entrepreneurship and Law. - 2022. - Vol. 12. - № 5. - P. 1659-1672.
- [18] Kumar, A., Goyal, H. R., Sharma, S. An intelligent information recommender system (IIRS) for next generation sustainable social tourism industry. International Journal of Information Technology, 16(6), 3411-3418. <https://doi.org/10.1007/s41870-024-01941-8>.
- [19] Tang, R., Moon, J., Heo, G. R., Lee, W. S. Exploring the knowledge structure and potential research areas of sustainable tourism in sustainable development: Based on text mining and semantic network analysis. Sustainable Development, 32(4), 3037-3054. <https://doi.org/10.1002/sd.2823>
- [20] Ortu, M., Romano, M., Carta, A. Semi-supervised topic representation through sentiment analysis and semantic networks. Big Data Research, 37, 100474. <https://doi.org/10.1016/j.bdr.2024.100474>
- [21] Jia, M., Feng, J., Chen, Y., Zhao, C. Visual Analysis of Social Media Data on Experiences at a World Heritage Tourist Destination: Historic Centre of Macau. Buildings, 14(7), 2188. <https://doi.org/10.3390/buildings14072188>

Information about authors:

Murzakhmetov Aslanbek – PhD, M.Kh. Dulaty Taraz Regional University (Taraz, Kazakhstan, email: aslanmurzakhmetov@gmail.com);

Bapanov Arsenii – PhD, M.Kh. Dulaty Taraz Regional University (Taraz, Kazakhstan, email: a.bapanov@dulaty.kz).

Авторлар туралы мәлімет:

Мурзахметов Асланбек – PhD, М.Х. Дулати атындағы Тараз Мемлекеттік Университеті (Тараз қ., Қазақстан, электрондық пошта: aslanmurzakhmetov@gmail.com);

Бапанов Арсений – PhD, М.Х. Дулати атындағы Тараз Мемлекеттік Университеті (Тараз қ., Қазақстан, электрондық пошта: a.bapanov@dulaty.kz).

Received: September 16, 2024

Accepted: September 24, 2024