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ENHANCING TOURISM PROMOTION BY ENRICHED WEB-BASED PORTAL

Abstract: Every country is interested in tourism development for its general contribution to national income and economic growth. Since attracting bigger number of tourists is not a trouble-free process, particularly in times of ever-changing environment, tourism promotion is detected as a way-out. The paper argues the importance of creating personalized tourism recommender. Moreover, it attempts to justify the necessity of designing web-based portal in order to assist tourists and travelers in identification of their holiday. The case of Macedonia as an empirical evidence reports on practical experience gained from a successful implementation of recommendation system in tourism promotion purposes.

Key words: Tourism; Promotion; Recommender; Macedonia.

JEL Classification Codes: L83, L84, L86

1. Introduction

Since tourism has emerged as one of the major industries in the world economy, each country insists in developing it and making a profit from its variety of impacts. Moreover, everyone is interested in increasing the number of incoming visitors since it serves as a

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source of economic growth. In 2011 tourism contributed almost EUR 4.5 trillion to the world global economy, or 9% of global gross domestic product (GDP), 100 million direct jobs and EUR 500 billion investments in tourism (WTTC, 2011a).

However, attracting a bigger number of tourists is not a trouble-free process, particularly in times of ever-changing travel preferences. Despite the variety of options regarding tourist destination or attraction, tourists frequently are not capable to cope with such a huge volume of choice. Moreover, they need advice about where to go and what to see. In a tourism domain, recommendations may indicate cities to go to, places to visit, attractions to see, events to participate in, travel plans, road maps, options for hotels, air companies, etc. So, solution is seen in personalization of the information delivery to each traveler, together with the travel history. Over the past two decades Internet became the leading source of information and promotion particularly important in times of increased number of competitors in tourism market. The way out is detected in application of recommenders as a promising way to differentiate a site from the competitors.

Generally, the contribution of this paper lies in the fact that it enriches the poorly-developed academic work within this scientific area in Macedonia. Moreover, the empirical investigation may alarm the relevant tourism-actors in the country, that the time has changed and that the on-line experience has shifted from searching and consuming to creating, connecting and exchanging. Previously passive consumers and web surfers are now generating content, collaborating and commentating. So, this research proposes development of tourism recommender as a sophisticated way for tourism promotion.

2. Background materials

One may argue that tourism in Macedonia is far behind the competition due to the lack of overall concept for development, as well as adequate general economic policy, especially development policy for supplementary sectors necessary for tourism follow-up development. The presence of uncoordinated activities, the lack of organisational forms functioning on horizontal and vertical line, unclear set of goals, aims and field of interest within the public, as well as the private tourism sector, resulted in poorly developed tourism in Macedonia (Petrevska, 2010). In order to cope with all serious challenges, obstacles and difficulties, Macedonia has just recently started to work on creating the foundations for increasing its competitiveness in tourism (USAID, 2006).

Consequently, all the efforts and attempts undertaken are directed toward promoting Macedonia as an attractive tourism destination. In this respect, attractiveness may be evaluated from the point of view of emotions, experiences, adventures and satisfaction of tourists (Hu and Ritchie, 1993), with respect to the meaning of tourism attractions and business environment (Enright and Newton, 2004) or, by evaluation of different supporting factors which create tourism supply (Dwyer and Kim, 2003). Initially, the concept of tourism competitiveness was related to prices (Dwyer *et al.*, 2000), and later on, econometric models were used for the purpose of ranking (Song and Witt, 2000). It is highly believed that competitiveness determines the success of a sustainable tourist destination (Ritchie and Crouch, 2003). Undoubtedly, the most comprehensive approach is the one which, beside the competitive advantages, takes into consideration the comparative advantages as significant factors which determine tourism competitiveness of a certain destination (Ritchie *et al.*, 2001). There is a variety of definitions and approaches, none being correct or false, but rather helpful in formulating hypothesis for proving different aspects of tourism destination competitiveness (Mazanec *et al*., 2007).

2.1. Overview on Macedonian Tourism

Macedonia identified tourism as a mean for generating various micro and macro-economic effects (Government of Macedonia, 2009). Up-to-date, tourism has accomplished an average growth of 4.64% per year, which is higher than the average growth of the entire economy (3.12%). In this respect, the participation of tourism in the creation of the GDP has probably moderate average of 1.7 % per year, but the impression is completely opposite when compared to the average for Central and Eastern Europe (CEE) of 1.6% (WTTC, 2009). With regards to the participation of tourism employees in the total workforce in Macedonia, the national average is 3.1%, which is more than twice bigger than the average of the CEE being 1.4% in 2009 (WTTC, 2009).

Furthermore, the importance of tourism to national economy can be evaluated by the tourism inflows which in 2009 represented 26% of total inflows of services and 8% of exports of goods in Macedonia. In the same line, the tourism inflows were 20% higher than the foreign direct investments. In the frames of services, tourism inflows were the second biggest item (just a little bit lower compared to the inflows of transport services), which is 1.3 times higher than the inflows of business services and 2.4 times larger than communication services inflows. Accordingly, the net tourism inflows in Macedonia have an average of 1% of GDP (Petrevska, 2010). Such condition indicates high potential to increase the tourism effects in economic activity in Macedonia.

The forecasts regarding tourism development in Macedonia are very optimistic. Namely, the estimated results are encouraging and by 2021 it is expected that the direct contribution of tourism to the GDP will reach to 1.6 % thus bringing revenue of EUR 170 mil. according to the constant 2011 prices; the total contribution of tourism to GDP will rise to 6.0%; the visitor exports are expected to generate EUR 76 mil. (5.1% of total exports); and the investment in tourism is projected to reach the level of EUR 76 mil. representing 2.8% of total investment. Additionally, it is expected that the number of employees that indirectly support the tourism industry in Macedonia will have an upward trend and will reach 35000 jobs in 2021, representing 5.4% of the total workforce (WTTC, 2011b).

In the line of the international tourist arrivals, the upward trend is expected to continue in the next period (Petrevska, 2011a, 2011b, 2012). This optimistic view is supplemented additionally with the fact that the number of user ratings is permanently increasing by 15% monthly growth rate. Supportive and not surprising is another fact noting an upward trend of web portal users which complements the positive general conclusion referring tourism income in Macedonia. The average tourism consumption of EUR 50 per day (WTTC, 2010) is anticipated to note an increase of one third of a euro, which may be misinterpreted as insignificant to national economy. However, on long-term horizon based on these projections the tourism contribution to the GDP may note an increase of more than 1%.

In addition, it is worth noticing that the travel and tourism economy in the country incorporates broad spectrum of tourism-oriented activities and results with multiplicative impacts. Hence, the tourism multiplier effects in Macedonia is calculated to 4, meaning that every euro generated as direct tourism income results in four euros of the global income including the direct and indirect income as well (WTTC, 2010).

2.2. Overview on the Competitiveness of Macedonian Tourism

The budget expenditures allocated for tourism promotion in Macedonia are very modest, though their constant every year increase. From approximately EUR 100000 in 2005 (Government of Macedonia, 2009) to EUR 120000 in 2011 (Government of Macedonia, 2010). However, being ranked low on the list of the most attractive destinations for travel and tourism, illustrates the need for improvement of tourism promotion. So, Macedonia was ranked as 83rd out of 124 countries in 2007, the same position, but this time out of 130 countries in 2008 and small progress was made in 2009, i.e. Macedonia was ranked 80th out of 133 countries (Blanke and Chiesa, 2009). Finally, a slight improvement was made in 2011, when Macedonia was ranked at the 76th place out of 139 countries. However, it should be mentioned that the majority of the countries in the region are significantly better ranked than Macedonia: Slovenia - 33rd place, Croatia - 34th place, Montenegro - 36th place, Bulgaria - 48th place and Albania - 71st place (Blanke and Chiesa, 2011). Concerning the neighboring countries, only Serbia, and Bosnia and Herzegovina are ranked lower than Macedonia.

In order to strengthen tourism competitiveness of Macedonia, the first national web tourism portal (www.exploringmacedonia.com) was created in 2005 as a public-private partnership between an international donor and the Ministry of economy. In this regard, several other private initiatives act as additional tourism portals, thus supporting country's tourism profile, like: www.travel2macedonia.com, www.go2macedonia.com, www.simplymacedonia.com, www.macedonialovesyou.com, www.mysticalmacedonia.com, www.macedonia-timeless.com etc.

3. Literature review

One may argue the inevitable relationship between tourism and information. Moreover, it is a widely-recognized fact that information and decision-making have become the foundation for the world economy (Wang, 2008). Consequently, recommenders have been applied successfully in tourism and, more specifically in tourism promotion purposes.

Numerous researchers made efforts in their introducing. In this respect the need for developing intelligent recommenders which can provide a list of items that fulfill as many requirements as possible is elaborated (Mirzadeh *et al.*, 2004; McSherry, 2005; Jannach, 2006). Also, a recommender dealing with a case-based reasoning is introduced in order to help the tourist in defining a travel plan (Ricci and Werthner, 2002; Wallace *et al.*, 2003). However, as the most promising recommender in the tourism domain are the knowledge-based and conversational approaches (Ricci *et al.*, 2002; Thompson *et al.*, 2004). Yet, some other variants of the content-based filtering and collaborative filtering are engaged for recommendation, like knowledge-filtering, constraint-based and casebased approaches (Kazienko and Kolodziejski, 2006; Ricci and Missier, 2004; Zanker *et al.*, 2008). In the same line, the recommender based on a text mining techniques between a travel agent and a customer through a private Web chat may easily find an application (Loh *et al.*, 2004).

Additionally, one may refer to introducing of a personalized tourist information provider as a combination of an event-based system and a location-based service applied to a mobile environment (Hinze *et al.*, 2009); investigation on sources and formats of online travel reviews and recommendations as a third-party opinions in assisting travelers in their decision making during the trip planning (Zhang *et al.*, 2009); findings regarding development of a web site in order to enable Internet users to locate their own preferred travel destinations according to their landscape preferences (Goossen *et al.*, 2009) and similar. Furthermore, the usage of the orienteering problem and its extensions to model the tourist trip planning problem was elaborated as efficient solution for number of practical planning problems (Vansteenwegen and Wouter, 2011). Daramola *et al*., 2010 extended the research by improving the dependability of recommendations with certain semantic representation of social attributes of destinations. Moreover, most of the recommenders focus on selecting the destination from a few exceptions (Niaraki and Kim, 2009; Charou *et al.*, 2010).

4. Scope of work

The paper argues the importance of creating personalized recommender for tourism promotion purposes. Moreover, it attempts to justify the necessity of designing web-based portal elaborated as empirical evidence. The main aim of the research is to develop and propose national tourism web portal which will assist and support tourists and travelers visiting Macedonia by helping them to identify relevant tourist objects that match to their personal interests.

4.1. Methodology and data

The research methodology was prepared in terms of creation of efficient and accurate personalized recommender based on novel algorithms. Specifically, it applies one of the most prevailing and efficient techniques - collaborative filtering. This technique implements the idea for automating the process of "word-of-mouth" by which people recommend items to one another. It uses the known preferences of a group of users who have shown similar behavior in the past to make recommendations of the unknown preferences for other users.

The data was collected between October 2011 and January 2012, by the mixed research group composed of researchers from the faculties of Computer Science and Tourism at the "Goce Delcev" University from Macedonia. The data set was consisted of 9840 ratings from 265 users for 445 tourist objects. Additionally, each user rated at least 25 objects, and each object has been rated at least once.

To accomplish the main objective of the research, a several step methodology was developed. The first step foresees tourist and tourist objects profiling. The system uses tourist types taken from the scientific tourism literature to model the tourist personal profile. The tourist profile indicates the degree to which tourists identify themselves with the given types. Typically, individual tourist cannot be characterized by only one of these archetypes but has unique combination of these personalities, although to varying degrees. Thus, tourist types model the tourists' generic interests in an abstract form. Vectors are suited to model such tourist profile, whereby each dimension corresponds to a certain tourist type while the value indicates how much the tourist identifies him- or herself with the corresponding type.

4.2. Analysis and Discussion

Tourist profiling is a two-step process which involves creating the profile and then reviewing the profile to make any necessary adjustments. The initial tourist profile for each system user is created by the user himself during the process of registration, by determining the degree of membership to each of the tourist types. Considering the fact that the human preferences change over time due to various factors, the tourists might change their behavior too. To make the system capable to cope with these changes, we have enabled tourist profile adjustment. It is based on the ratings the tourist give for each tourism object that he visits after his journey (Eq. 1)

$$Uij_{t+1} = \frac{1}{2}(Uij_t + Rik_{t+1} * w * Okj) \qquad (1)$$

where *Ui* represents the *i-th* user and $Ui \in U$, *U*- is the set of users registered to the system, Uij_t is the degree of membership in the moment *t* of the *i-th* user to the tourist type T_j and $Tj \in T$, T – is the set of tourist types according to literature (Gibson and Yiannakis, 2002). $Ok \in O$ represents the *k-th* object in the set of all objects *O* registered in the system, w-is the weighting factor and R_{ik} is the rating of the *k-th* tourism object given by *i-th* user.

Similarly, we may generate profiles for attractions and in the same way as the tourist profile is represented in form of a vector, every tourism object is modeled through a vector as well. Thereby, this vector describes in a quantitative way how much the object is related to the given types. For example, the famous monastery Saint Panteleimon in the city of Ohrid known as a birthplace for Cyrillic alphabet and used by Saint Clement for teaching the Cyrillic alphabet, might be highly relevant for sightseeing tourists but not for such kind of tourists that would like to do some risky activities.

In the developed system a manual process to link the given tourist types to appropriate tourism objects is proposed. Therefore, for each of the tourism objects, the degree of relationship to each of the tourist types is specified by domain experts. In order to prevent information overload of the tourist and provide only relevant information, the system should recommend a subset of tourism objects according to the personal experiences individual tourist desire and those he/she prefer to avoid. This in turn might lead to an increase of the tourist's satisfaction of experiencing a relaxed sightseeing trip.

According to this, the next step of the methodology aims to match tourist profiles against the set of tourism objects on the basis of tourist types, thus producing a ranked list of objects for each given tourist and reducing the set of objects. If a tourist profile matches the characteristics of an object, this object should be recommended to the respective tourist. Therefore, the matchmaking algorithm has to examine whether they share similar structures. The more similarities they have in common, the more contributes the tourism object to the tourist’s satisfaction and therefore should be ranked higher.

To estimate the similarity degree between tourist profiles and tourism objects, the system contains a special module based on a vector-based matchmaking function, whereby a given profile and each tourism object constitute vectors and are compared in a vector space model. A common method to obtain the similarity is to measure the cosine angle between two vectors. If the vector space is non-orthogonal, kernel based algorithms can be applied to measure the similarity in such a space. The dimensions of the vector space model correspond to selected tourists types literature (Gibson and Yiannakis, 2002), such that each distinct tourist type (e.g., adventure or cultural type) represents one dimension in that space (Eq. 2).

$$SIM_{\cos}(Ui,Oj) = \frac{\sum_{k=1}^{N} Ui_k \cdot Oj_k}{\sqrt{\sum_{k=1}^{N} {Ui_k}^2}\sqrt{\sum_{k=1}^{N} {Oj_k}^2}} \qquad (2)$$

where Ui_k is the degree of membership of the *i-th* user to the tourist type T_k, Oj_k is the degree of membership of the *j-th* tourism object to the tourist type T_k, and N is the number of tourist types. According to the previous equation, the degree of similarity between tourist profiles and tourism objects will be calculated. Tourism objects will be ordered by the value of the matchmaking function for a given user, and only those objects that have positive value for this function will be considered for recommendation (Eq. 3).

$$Oi_{rec} = \{Oj, where\ SIM_{\cos}(Ui, Oj) > 0\} \qquad (3)$$

Considering the five point Likert scale for rating the objects, to each object in the constructed set, a recommendation mark is assigned (Eq. 4).

$$Ri_{rec} = \{R(Oj) = 5 * SIM_{\cos}(Ui, Oj),\ \forall Oj \in Oi_{rec}\} \qquad (4)$$

Another very important fact is considered related to the tourists' behavior willing to plan a trip. In everyday life, while planning a vacation or trip, people also rely on recommendations from reference letters, news reports, general surveys, travel guides, and so forth. In addition, they desire personal advice from other people with similar preferences or people they trust. In fact, over 80% of travelers participating in a TripAdvisor.com survey agree that "reading other travelers' online reviews increases confidence in decisions, makes it easier to imagine what a place would be like, helps reduce risk/uncertainty, makes it easier to reach decisions, and helps with planning pleasure trips more efficiently" (Gretzel, 2007).

Experimental findings show that there exists a significant correlation between the trust expressed by the users and their similarity based on the recommendations they made in the system. The more similar two people are, the greater the trust between them (Ziegler and Golbeck, 2006). Different methodologies can be used to calculate the similarity between the users in the system.

As one of the most prevailing and efficient techniques to building recommender systems, collaborative filtering (CF) implements the idea for automating the process of "word-of-mouth" by which people recommend items to one another. It uses the known preferences of a group of users who have shown similar behavior in the past to make recommendations of the unknown preferences for other users. CF is facing many challenges, among which the ability to deal with highly sparse data and to scale with the increasing numbers of users and items, are the most important in order to make satisfactory recommendations in a short time period. Sparsity of ratings data is the major reason causing poor recommendation quality. It occurs when available ratings data is rare and insufficient for identifying the similar neighbors. This problem is often very significant when the system is in its early stages. On the other hand, when numbers of existing users and items grow tremendously, traditional CF algorithms will suffer serious scalability problems, with computational resources grown nonlinearly and going beyond practical or acceptable levels.

To reduce the dimensionality of data and avoid the strict matching of attributes in similarity computation the cloud-model CF approach has been adopted. It is constructing the user's global preference based on his perceptions, opinions and tastes, which are subjective, imprecise, and vague (Palanivel and Siavkumar, 2010), and it seems to be an appropriate paradigm to handle the uncertainty and fuzziness on user preference.

The main goal of the cloud model CF is to construct the global preference for each user by calculating a triple of three digital characteristics: the expected value Ex, the entropy En and the hyper-entropy He (Zhang *et al.*, 2009) (Eq. 5).

$$\begin{aligned} Ex &= \frac{1}{n}\sum_{i=1}^{n} r_{u,i} \\ En &= \sqrt{\frac{\pi}{2}} \times \frac{1}{n}\sum_{i=1}^{n} \left| r_{u,i} - Ex \right| \\ He &= \sqrt{S^2 - \frac{1}{3}En^2}, where\, S = \frac{1}{n-1}\sum_{i=1}^{n}(r_{u,i} - Ex)^2 \end{aligned} \tag{5}$$

The *k* similar (neighbor) users, for an active user are selected based on the cloud model similarities between the active user and the users that already rated the object $Oj \in Oi_{rec}$. A likeness similarity method based on cloud model using the cosine measure was proposed in Zhang *et al.*, 2009. Given two cloud models in terms of the characteristic vectors, the similarity between them is defined (Eq. 6) as well as the recommendation function (Eq. 7).

$$sim(u,v) = \cos(\vec{V}_u, \vec{V}_v) = \frac{Ex_u Ex_v + En_u En_v + He_u He_v}{\sqrt{Ex_u^{\,2} + En_u^{\,2} + He_u^{\,2}}\sqrt{Ex_v^{\,2} + En_v^{\,2} + He_v^{\,2}}} \qquad (6)$$

$$R_{u,j} = \bar{r}_u + \frac{\sum_{v \in N(u)} (r_{v,j} - \bar{r}_v) \times sim(u,v)}{\sum_{v \in N(u)} sim(u,v)} \qquad (7)$$

where *N(u)* is the *k* most similar users to active user *u* and r_u and r_v are the average rating of user *u* and *v*, respectively. The value of rating $r_{v,j}$ is weighted by the similarity of user *v* to user *u*; the more similar the two users are, the more weight $r_{v,j}$ will have in the computation of the recommendation function.

According to the value of the total recommendation functions the objects are further ordered and classified in five categories. The outcome is developed national tourism web portal structured in the form of a social network. The suggested portal is a significant improvement on existing travel websites and provides tourists with a customized, unique, and enriching travel experience. It incorporates some standard plugins typical for social networks like Facebook. But, it advances the concept by including custom plugins, like the recommended objects plugin which is the core of the portal. It is using the Google Map of Macedonia, to visualize both: static tourism objects (object that are not temporary, like churches, museums, archeology localities, etc.) and dynamic object (object that have limited time duration, like events, expositions, etc.). They are displayed on the map according to their geographical location being grouped into municipalities.

Municipalities are recommended to the user in the form of circles as displayed on the map (Figure 1). The size of the circle indicates the user's affinity for the municipality; therefore, a large circle indicates a municipality with many tourism objects with high recommendation marks i.e. that match the user profile. By displaying the user's affinity through the size dimension of the circle, users can easily observe which municipalities would be of most interest to them.

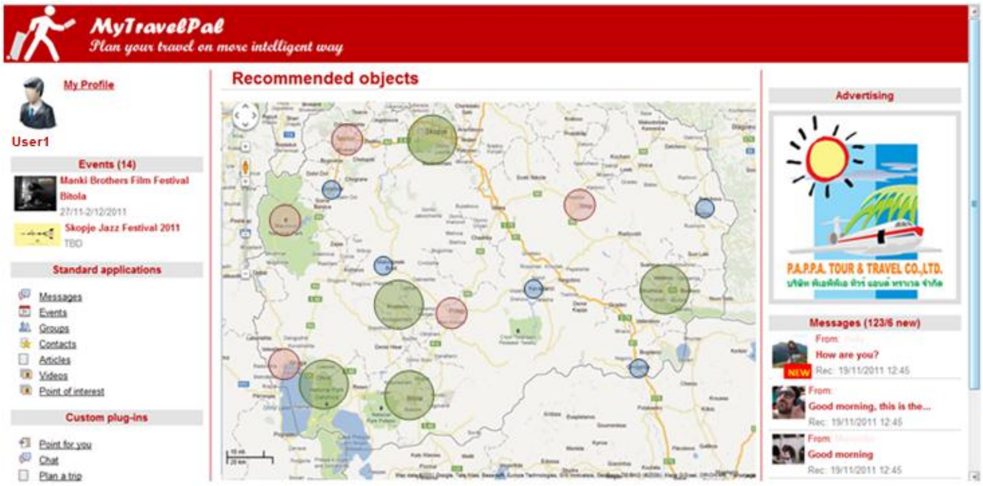

Figure 1. Recommended municipalities

Furthermore, the tourism objects are displayed as icons in the location of the correspondent object as shown in Figure 2.

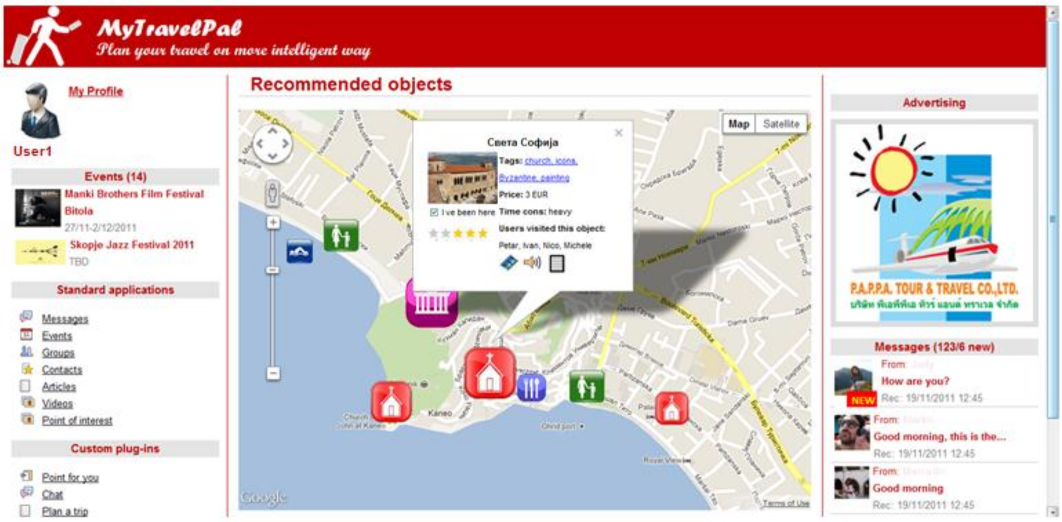

Figure 2. Recommended tourism objects

The image of the icon indicates the type of tourism objects such as a museum, church, or restaurant. The size indicates how closely the object meets the user's interests. Each attraction also has an information window as displayed in Figure 2. The information window usually includes the name and picture of the attraction, an icon of an umbrella indicating that the attraction is accessible in the rain, and tags. The information window also displays a general idea of the time consumption of the attraction, friends who have visited the attraction, and an option to view narratives in either video, audio, or text format. Through this window, the user can also rate the object. This operation is recommended to be done after visiting the object and according to the personal experience and satisfaction. The goal is two-fold: to help updating the user profile, and to make the process of recommendation more accurate.

The recommendation accuracy was tested by application of information-retrieval classification metrics, which evaluate the capacity of the recommender in suggesting a list of appropriate objects to the user. The results pointed out that the recommender is robust as it achieved good outcomes. Moreover, the testing showed that the proposed approach can provide satisfactory performance even in a sparse dataset.

5. Conclusion and future work

Although the designed web-based tourism portal is in its initial phase, it resulted in accurate recommendations and guidelines for tourists and travelers. So, the development of such software module contributes generally in increasing the awareness for Macedonia as a tourism destination. It assists all interested parties in planning their travel on more intelligent way by generating a personalized list of favorable and tailor-made items. Since this portal assists tourists and travelers in identification of their ideal holiday place within Macedonia, it contributes to improvement of tourism promotion in more qualitative manner. Hence, this empirical investigation underlines the high priority importance of creating this kind of tourism recommender which will consequently enable the country to strengthen its tourism promotion. Yet, the discussed results and findings should be interpreted as selected samples to underline the usefulness of the proposed approach in contribution to advertising and promotion. So, the future work may include additional insights on the improvement in the presented web-based national tourism portal.

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