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## ESTJ: An Expert System for Tourism in Jordan

Nada S. Hussein<sup>a</sup>, Musbah J. Aqel<sup>b</sup>

<sup>a</sup>Department of Computer Science, Faculty of Information Technology, Applied Science Private University, Amman, Jordan

<sup>b</sup>Department of Computer Science, Faculty of Information Technology, Applied Science Private University, Amman, Jordan

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### Abstract

**An expert system for tourism in Jordan (ESTJ) was developed to recommend a suitable travel schedule that satisfies the tourist's interest. The system is useful for tourists, and tourism agencies to select the best package based on the proper time, budget, and preferences of required tourist places. The system was designed as a rule based expert system and implemented with a prolog language. The system was evaluated and tested with a specialist and the results concluded were up to the level of human expert.**

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### 1.1. Introduction

Recently many organizations have shown a great interest in using information technology for smoothing their business and to compete with competitors [1]. One of the major of information technology areas that finds a lot of interest is artificial intelligence. Expert systems are one of artificial intelligence fields that use a specialized knowledge to achieve high performance decision in a particular area [2]. Expert systems found many applications in many fields, like, science, business, and medicine [3]. Tourism is the act of travel for predominantly recreational or leisure purpose and also refers to the provision of services in support of this act. However, it has also importance in terms of economic (tourism revenue), and governments are trying to attract tourists to the country by providing an appropriate atmosphere for tourists and tourism programs that attract people. The expert systems play a vital role in tourism industry. Many expert systems were developed for supporting this area. For example, an expert system for tourist information

management was developed to recommend a suitable travel schedule that satisfies user input constraints such as time period, budget and preferences. The system can provide tourists with information on the route and the distance between any two towns in the region [4]. While Moisuc Diana-Aderina, et. al., designed an expert system for rural tourism in Maramures. The system was developed to evaluate the countryside hotels and ranking them. Moreover, the user can evaluate the benefits of tourist destinations from several points of view and obtain information useful for decision making [5]. However, Yunus Dogan, et. al., developed an expert system to support tourism sector in Turkey, where tourists will be able to select the most suitable holiday places for themselves [6]. However, Sindhu B., et. al., designed an expert system for rating the ecotourism destination [7].

In this research, an expert system will be developed to assist tourists and tourist agencies in Jordan to select the best package according to the given budget, and preferred tourist places. Khakzad developed an expert system that containing more than 20 cities and 150 rules for helping tourists to choose best destination town that has maximum matching with their important request [8].

Tourism industry at Jordan plays significant role in its economy. Since human expertise plays an important part in the activities of many sectors of the tourist industry. An expert system is developed to assist The system is useful for tourists, and tourism agencies to select the best package based on the proper time, budget, and preferences of required tourist places.

### *1.2. Tourism in Jordan*

Jordan attracted travellers since ancient times. Today it is more charming and beautiful with its modern state, due to progress and prosperity. It allows visitors to enjoy their taste differently as they wanted. It is the lives of simplicity and unspoiled nature calm and charming area. Jordan is one of the most important tourism countries in the world in general and in the Middle East in particular because of its features and environment which makes it a country with a high tourist attraction [9].

However, the tourism in Jordan can be classified into the following categories:

- 1- Historical
- 2- Religion
- 3- Beaches and water sports
- 4- Reserves
- 5- Entertainment
- 6- Shopping
- 7- Medical Treatment.

### *1.3. Expert System Design for Tourism in Jordan*

The proposed system, i.e., Expert System for Tourism at Jordan (ESTJ), is a rule based expert system which is implemented using Prolog program. The system makes use of backward chaining for the inference engine and search in the knowledge base. The system has a graphical user interface where the user can interact with the system through this interface. The user is presented with a series of questionnaire in the window which the user has the option to answer in yes or no. The set of questions are prepared according to the type of tourist's trip to the required destination. Now, according to the feedback given by the user, the search in the knowledge base for possible pattern matches. If there is a rule in the knowledge base which matches the given facts by the user, the system shows the possible diagnosis in the same window.

The expert system was designed as a rule based expert system architecture and it is consisted from three parts as shown in figure (1). These parts are as follows:

1. Knowledge base
2. Inference engine
3. User interface

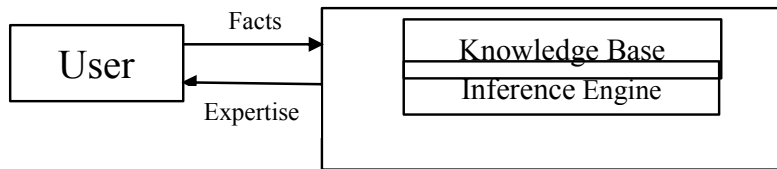


Fig.1: Expert System Architecture

### 3.1 KNOWLEDGE ACQUISITION

The knowledge base can be considered as the heart of the Expert system as all the required facts for building the rules are contained in the knowledge base. Taking this knowledge as the source, rules for the Expert System can be formed. The primary source for knowledge acquisition for the ESTJ System was consultation with tourism's experts, internet, journals and tourism books.

### 3.2 KNOWLEDGE REPRESENTATION

The knowledge base contains facts and rules about tourism in Jordan that acquired from specialists, tourism books, and journals issued from ministry of tourism. The knowledge in the knowledge base is represented as a set of rules. Each rule specifies a relation, recommendation and has IF part (condition) and THEN part (conclusion). Whenever the condition part is true, then the conclusion part will be executed. These rules is then represented as a predicate logic and converted to a program as follows:

Rule representation

#### **IF**

The tourist likes to have a short trip (one day)  
 AND likes to visit historical places  
 AND likes to visit Romans civilization places

#### **THEN**

The recommended package starting from Amman by bus  
 Jerash: An ancient city built by Romans  
 Ajloun Castel a nice historical place built by Arabs

The inference engine performs the reasoning process while the expert system finds a solution. It connects the rules given in the knowledge base with the facts provided in the knowledge base. The inference process is carried out in an interactive mode with the user providing input queries and responses to questions through the user interfaces that stored as dynamic information in the working memory. It tries to derive new information about the given situation using the rules in the knowledge and the situation specific knowledge in the working memory.

#### *1.4. Expert System results and discussion*

The system provides a friendly user interface where the system starts its session by inquiring about the tourist programs by prompting the following questions during the consultation session:

1. Trip duration (shot trip-one day) or multiple days.
2. Trip type (e.g. historical, scuba diving, shopping, religion, etc.)
3. Trip budget: minimum price, and maximum price for the total trip expenses

4. Trip destination: tourist sites that will be visited.
5. Trip services: in case of multiple days trip (rank of hotel, single or double room, etc.)

Assume a tourist approached a tourist agency for a trip from Amman—capital of Jordan to a given destination like Petra which is a historical site. There are two packages for this site. The short trip is one day trip directly to Petra, while the other one is three days trip which includes visiting Petra, Wadi Rum that located at the heart of desert where the tourists enjoy camping overnight, and Aqaba city that has a beach and provides scuba diving entertainment. Types of tourist's agent will consult the expert system for the best package for this trip with minimum price. The system starts asking the following:

Do you plan to have one day trip, or long trip? (Select:

1. One day trip
  2. Multiple days
- Select: 2

Does the place you want to visit have historical places (Y/N)? Y

Which ancient civilizations do you like to see at Jordan? (Select:

1. Romans
2. Nabataean
3. Arabian) 2

Do you like camping at desert (Y/N) ? Y

Do you like to visit religious places (Y/N)? N

Do you like to visit places with beaches and that provide water sports (Y/N) Y

Do you like to visit places with shopping mall facilities and provides personal entertainment (Y/N)? Y

Do you like to stay in a hotel with one of the following ranks ? (Select:

1. Five star hotel
2. Four star hotel
3. Three star hotel) 1

Do you like to stay in a single or double room with your partner? (Select:

1. Single
2. Double) 1

The expert system accordingly will conclude the best package for the tourist with minimum cost as shown in figure (2).

The best choice for you is the following route:

Starting from Amman by bus:

1. visiting Petra for one night
2. Camping one night at Wadi Rum
3. Visiting Aqaba city for one day
4. The cost of the trip is (\$500) which includes the following:
  - 4.1 Transportation
  - 4.2 Entry fees to the historical place – Petra
  - 4.3 Camping one night at Wadi Rum
  - 4.4 Staying at five stars hotel with a breakfast meal.



Fig.2: Consultation Session with Expert System

### Conclusion

An expert System for Tourism in Jordan (ESTJ) was developed using rule based expert system architecture. The system was designed to assist the tourist, and the tourist agencies to select the best package for the tourist according to the tourist's preferences. The system was evaluated by specialist and the results were very satisfying and up to the level of human expertise.

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