BAHIR DAR UNIVERSITY

IOT

Computer Science and Engineering

Course: Artificial Intelligence (AI)

Requirment Specification & Design Document on Tour and Travel Guide Expert System

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Contents

[**1. Abstract 3**](#_Toc314065504)

[**2. Introduction 3**](#_Toc314065505)

[**2.0. Purpose 4**](#_Toc314065506)

[**2.1. Document Conventions 4**](#_Toc314065508)

[**2.2. Scope 4**](#_Toc314065509)

[**2.3. Product Perspective 5**](#_Toc314065510)

[**2.4. Project Limitations 5**](#_Toc314065511)

[**3. Existing System 5**](#_Toc314065512)

[**4. Objective 6**](#_Toc314065513)

[**5. Requirements 7**](#_Toc314065514)

[**5.0. Functional Requirement 7**](#_Toc314065515)

[**5.1. Non – Functional Requirement 8**](#_Toc314065516)

[**6. Actors list and definition 9**](#_Toc314065525)

[**7. Use case Diagram 10**](#_Toc314065526)

[**8. Use case Description 11**](#_Toc314065527)

[**9. Data Design 22**](#_Toc314065528)

[**10. Facts and Rules 23**](#_Toc314065529)

[**10.0. Facts 23**](#_Toc314065530)

[**10.1. Rules 24**](#_Toc314065531)

[**11. User Interface Design 25**](#_Toc314065532)

[**12. Knowledge Based System Design 26**](#_Toc314065533)

[**13. Tour and Travel Guide Knowledge-Based System Architecture 27**](#_Toc314065534)

[**14. Class Diagrams 28**](#_Toc314065535)

[**15. Conclusions and Recommendations 29**](#_Toc314065536)

# Abstract

This coursework task was to choose and develop an intelligent system for a special domain. According to coursework we are intended to development an artificial intelligence agent that can recommends and guide the tourist after the input of specific properties of our country. This expert system managed by the cultural and tourist agency. This project mainly uses the capital city Addis Ababa as a reference point to travel to different parts of the country. it is implemented in Prolog, a programming language for artificial intelligence.

# Introduction

This project is implemented in Prolog, which is a programming language for artificial intelligence. Our project will deal with tour and travel guidance expert system; it will focus on recommending a tourist where he/she should go for tour from the tour sites (cities) located in Ethiopia. This intelligent expert system will help the tourists on the first place, tourism bureau simplifying their advertisement and other jobs connected to them, the country will also be benefited from this system because this enough information availability will motivate the tourists to have a tour or travel somewhere by using their specifications they require to make schedules on their time and money and other resources.

This intelligent system affects the travel agencies, tourists, tourism office/ bureau and anyone who is willing in moving from one city to other cities. We are interested with the specific organizations like national tourism office, different travel agencies, city navigators, different cities as a starting city instead of using the capital city for the future.

There are major challenging issues in our area of interest that can be mentioned as the fluctuation of the travel cost of travel as the oil cost fluctuates, unexpected weather distortion can also be problem on tourists, on the way of collecting necessary data the reliabilities of the input data (data source) and distance imperfectness can be a problem too.

##  Purpose

## The purpose of this software requirements specification (SRS) is to establish the major functional and non-functional requirements which are necessary to develop the Tour and Travel guidance expert system.

## Document Conventions

While writing this software requirement documentation, bold face and with 14 font size is used for the general topics of the document. The description for each general topic will be written using a standard font which is a Calibri theme font, with font size of 12 and 1.5 line spacing.

##

## Scope

The scope contains the coverage areas or portions that are planned to be covered or problems planned to solve using the expert system and the scope of the travel guide expert system are listed below.

* The system should print out a list of all available sample cities list in the knowledge base.
* A city will be defined with the Name, distance, Region, Description, travel Cost, Season, Contact information, Travel agency, Path, tour type, hotels and reservations and tour place categories.
* A menu will be used to choose different operations like to list cities with special properties.
* The system will use the capital city of the country which is Addis Ababa as a reference point for the tourists who are willing in having tour.
* The user will able to search the information such as season, cost, city, tour place, hotels and reservations, explanations about the tour places, distance, contact information, tour type, travel agencies and path of cities that will be passed through while going to destination.

## Product Perspective

The tour and travel guidance expert system is a system that will help tourists in giving enough and correct or reliable information to enable them decide where, when, how (including the transportation mechanism, the travel agency , the qualities of the services), why (providing reasons according to their requests it may consider distance to destination, cost, tour type which is the main interest or favorite of the tourist )

## Project Limitations

**Cost**: a tour or travel cost may fluctuate based on different factors such as the oil price and other economic factors directly or indirectly. This may cause a problem on getting reliable and correct information for the users.

**Weather condition**: some unexpected weather condition is another limitation which may cause cancellation of tours and travels which may bring the conflict on the tourist’s time and financial schedule.

# Existing System

Our country is in a deep problem of advertisement there is no well defined and organized existing system on tour and travel guidance. The tourists are in a problem of information scarcity there is no information provider for the tourists.

The tourists are only getting some information from some web sites available on the internet, although these web sites does not provide full information for the tourists and some tourists get information by asking and hire someone to do the guidance system which is unadvisable.

The existing system main problems are:

* Highly expensiveness due to many expenses
* Unscheduled
* There is no enough information provided for the tourist
* Tourists are cannot make financial arrangements easily
* Tourists are not able to make easy decisions on where to go

#

# Objective

The objective of this system will intend to give guidance information for tourist or any guest who wants to travel to different parts the country, the system also provide information for the region he/she wants to travel, because in the system knowledge base each region cities define with their properties like endemic animals, holidays, traditions and customs, historical heritages, and other more interesting things of that city in that region. It also avoid any kind of confusion and misguidance, this system provided brief clue information about the available guidance for that city for different region, in addition to this, the guidance becomes more computerized this, one lead to more tourist offer in our country. Here are the general functionalities that our system will provide:

* Enabling the user to search for available cities by name.
* Helping the guest to know the distance from the central city (Addis Ababa) to that city he/she wants to travel and path clue.
* Informing the guest to know the season, general characteristics of that city and public carnival for that city he/she wants to travel.
* Supporting the guest to get information like reservation, contact information each available city.
* Each city defined with specific properties in the system knowledge base so, the traveler gets information for where he/she intended to travel and the way of how to get there (by plane or by car) and other necessary information.
* Deciding the most typical or comfortable season to travel depending on the occasion of the tour and travel comfort.

# Requirements

## Functional Requirement

1. The system shall accept user’s or tourist’s requests

The system shall accept the requests from the user the requests may be city name, description, season travel cost, tour site (place), hotel and reservations, distance, contact information, tour type, travel agency, path and travel agent type (governmental or non-governmental)

1. The system shall display the nearest tour site as the user’s requests
2. The system shall display list of cities available in the country
3. The system shall display list of cities under a given region
4. The system shall display list of cities using the users specifications
5. The system shall display the comfortable season for each city’s tour site
6. The system shall display the contact information for each city and the tour sites in that city
7. The system shall display the tour site with the smallest travel cost
* When the primary goal of the tourist is to have a cheap tour
1. The system shall able to display the sites available with different types of tour type
* The type may be cultural heritages, museums, holiday celebrations, traditional heritages and customs, natural resources, natural landscapes,
1. The city shall display explanations and information about the city and the tour sites available in that city
2. The system shall display the full city’s information using the categories of the cities
3. The system shall display the travel agencies available for each city and tour sites
4. The system shall display the nearby hotels and reservations to a tour site in a city

## Non – Functional Requirement

## Workability

The system should be Suitable for the variety of users. It should be accurate in performing its functions. Moreover, and it should be complete i.e. it should be fully functional in terms of providing all the functions expected it to perform.

## Reliability

The system should be available all hours of a day and 7 days a week.

The system should be reliable and matured enough in giving its service. It should have a fault tolerance mechanism in which it can recover faster from problems that may occur. The system should support backup in case the original was accidentally damaged or erased.

## Usability

The system should be understandable by the variety of its users from naïve users to amateurs and IT professionals. The interface should be easy to use and be easy to learn, operate and it should provide alternatives to different tasks.

## Efficiency

The system should be efficient and the response time should be minimal. It should be capable of running on minimum hardware requirements and with the almost all dominant operating systems.

## Maintainability

The System should be easily maintainable in case of problems, changeable if the need of incorporating new components arises from either the client’s side or technological changes.

## Portability

The system should be portable in running on different platforms, adaptable with other systems, installable on different machines architectures, and replaceable if the need arises.

##

## Error Handling

The system should handle exceptions and extreme conditions and behave accordingly. It should notify the users about the type and location of exception and appropriate action to be taken.

## Availability

The system should be available freely and easily from different organizations or individuals to provide simple and enough information for the tourists.

# Actors list and definition

Travel agency: is a governmental or non-governmental organization involved in travel and tour business

Tourist: a person who is willing to have a tour around a historic, holiday celebrations etc.( a person who is the main reason for the expert system development)

Hotel and reservation: is a governmental or non-governmental firm which supplies different services such as food, drink, tour, reservation and make some booking for users.

## Use case Diagram

The use case diagram shown below shows how the actors of the system and the use cases are connected to each other based on the function they provide to the user.



Figure 1. Use case diagram

# Use case Description

These are the main use cases that the system will use to develop the expert system are Search for Information, Hotel and Reservation Arrangement, Providing Travel Service and Give Information. The description of this use cases are shown below.

|  |  |
| --- | --- |
| Use case Id: | **BUC-001** |
| Use Case Name: | Search for Information |
| Description | In this use case users of the tour and travel guidance expert system will search any kind of information he/she need. |
| Priority  | High  |
| Actors: | Primary Actors:* Tourist
* Travel Agency
 |
| Preconditions: | The travel agency should be legal. |
| Basic course of action  | User action* The users login into the system.
* The users search the information he/she need.
 | System response* The system displays the information, if it is available.
* If not, display no message.
 |
| Triggers: | * Whenever the users want to search.
 |
| Flow of Events: | 1. Tourists login to the system.
2. Tourists search what they want.
3. Tourists get what they want.
 |
| Post condition: |  The Tourists gets the information what they want. |
| Alternate Flow: | None |
| Exceptions: | None  |
| Information Requirements: | * Region
* Reservation
* Cost
* Specific property of that region
* Season
* Contact information
* General specifications
 |
| Assumptions: | All information seekers are legal. |
| Notes and Issues: | When we are saying users it includes tourist, visitors or any traveller. |
| Activity diagram  |  |

Table 1: Search for Information Use case Model

|  |  |
| --- | --- |
| Use case Id: | **BUC-02** |
| Use Case Name: | Get services  |
| Description | In this use case tourist will get the information for what kind of services that he/she gets. |
| Priority  | High  |
| Actors: | Primary Actors:* Tourist
 |
| Preconditions: | Travel agencies should be legal. |
| Basic course of action  | **User action** * The user login to the system.
* Then users can ask the information that he/she need.
 | **System response** * The system refers its knowledge database and if the information related to services that he/she wants, available displays that information to the users.
* If not it say this information is not available.
 |
| Triggers: | * Whenever the tourists or the visitors want services.
 |
| Flow of Events: | 1. Tourists, Travel guidance login to the system.
2. Tourists or visitors ask what they want.
3. Tourists or visitors get the information that he/she need, if the services information is available.
4. If, not the system display no message.
 |
| Post condition: |  The travel agency or the system should provide the required information related to any services what tourist or visitors want. |
| Alternate Flow: | None |
| Exceptions: | There is no exception to give information other that the legal body’s. |
| Information Requirements: | * Reservation
* Region
* Distance(Km)
* Trip type(by plane, by car)
* Cost
* Path
* Specific property for that region he/she want to go
* Season
 |
| Assumptions: | All information providers are legal. |
| Notes and Issues: | None |
| Activity Diagram: |  |

Table 2: Get Services Use case Model

|  |  |
| --- | --- |
| Use case Id: | **BUC-03** |
| Use Case Name: | Provide Travel Services |
| Description | In this use case the travel agency, should provide travel service. |
| Priority  | High  |
| Actors: | Primary Actors:* Travel agency
 |
| Preconditions: | Travel agencies should be legal. |
| Basic course of action  | **User action** * The users login to the system.
* The users give information where he/she want to go.
* Then users can ask the services he/she wants.
 | **System response** * The system gives information where to get those services, if those services are available in the system knowledge base.
* If no, display no message.
 |
| Triggers: | * Whenever the tourists available.
 |
| Flow of Events: |  1. Tourists, give information where he/she want to travel. 2. Tourists or visitors can get the service what they want. |
| Post condition: |  Tourists or visitors should get the services he/she needs. |
| Alternate Flow: | None |
| Exceptions: | No exception provides travel service, as long as the tourist agrees on the cost, asked by the travel agency. |
| Information Requirements: | * Reservation
* Trip type(by plane, by car)
* Cost
* Season
 |
| Assumptions: | All service providers are legal. |
| Notes and Issues: | None  |
| Activity Diagram: |  |

Table 3: Providing Travel Service Use case Model

|  |  |
| --- | --- |
| Use case Id: | **BUC-04** |
| Use Case Name: | Get Hotel And Reservation Booking |
| Description | In this use case the tourist or the travel agency both can make Hotel And Reservation Booking. |
| Priority  | High  |
| Actors: | Primary Actors:* Travel agency
* Tourist
 |
| Preconditions: | Travel agencies should be legal. |
| Basic course of action  | **User action** * The users login to the system.
* Then the tourists give information the region where to travel.
 | **System response** * The system will display the available reservation hotel place.
* If no, display no message.
 |
| Triggers: | * Whenever the tourists should be available.
 |
| Flow of Events: |  1. Tourists, give information the region, where he/she want to travel. 2. Tourists or visitors can get or can make the reservation. |
| Post condition: |  Tourists or visitors should get the services he/she needs. |
| Alternate Flow: | None |
| Exceptions: | No exception Reservation arrangement, as long as the tourist agrees on the cost, requirement. |
| Information Requirements: | * Region
* Cost
* Season
* Specification
 |
| Assumptions: | All service providers are legal. |
| Notes and Issues: | None  |
| Activity Diagram: |  |

Table 4: Get Hotel And Reservation Booking Use case Model

|  |  |
| --- | --- |
| Use case Id: | **BUC-04** |
| Use Case Name: | Provide Hotel And Reservation Booking |
| Description | In this use case the hotel should provide Hotel And Reservation Booking. |
| Priority  | High  |
| Actors: | Primary Actors:* Hotel And Reservation
 |
| Preconditions: | Travel agencies should be legal. |
| Basic course of action  | **User action** * The users login to the system.
* Then the tourists give information the region where to travel.
 | **System response** * The system will display the available reservation hotel place.
* If no, display no message.
 |
| Triggers: | * Whenever the tourists and travel agency need booking.
 |
| Flow of Events: |  1. Tourists, give information the region, where he/she want to travel. 2. Tourists or visitors then can order booking for reservation. |
| Post condition: |  Tourists or visitors should get the services he/she needs. |
| Alternate Flow: | None |
| Exceptions: | No exception Reservation arrangement, as long as the tourist agrees on the cost, requirement. |
| Information Requirements: | * Region
* Cost
* Season
* Specification
 |
| Assumptions: | All service providers are legal. |
| Notes and Issues: | None  |
| Activity Diagram: |  |

Table 5: Provide Hotel And Reservation Booking

# Data Design

This portion of the document contains the data or the knowledge that is provided to the knowledge based expert system.

This system needs data to implement the facts and the rules to develop the expert system. These data includes:

City Name: name of the city with tour sights

Season: comfortable season at which the tour site would be best to tour on

Description: brief explanations about the city and its tour sites, reservations etc…

Travel cost: the cost required for transportation on car

Hotels and Reservations: hotels and reservations for the tourists

Distance: distance from the capital city to different cities of the country

Contact information: information describing whom to contact after a travel to the city or the tour site when the tourists are interested to drive by themselves.

Tour type: the tour may be historical sites, traditions and customs, holiday celebrations, museums, parks, natural land escapes and other tour sites.

Travel agency: an organization dealing with tourist guidance business

Path: refers to the city passed through passing to the destination city

# Facts and Rules

## Facts

* The region fact contains all the available tour palaces region arguments

region(region1, region2, region3 , region4, region5, region6, region7, region8, region9).

* The tour fact contains the city name, season, description, travel cost, hotel and reservation name, distance, contact information, tour type, travel agency and other data are included as arguments

tour(cityName,season,description,Travel\_cost,hotelReservation,distance,contactInformation,tour\_type,traveAgency,path)

* The city fact contains the city name, tour site, tour site type, region arguments

city(cityName,tourSite,tourSiteType,region).

* The reservationHotel fact contains the reservation and hotel name, description, tour site, arguments

reservation(cityName,reservationName,region,tourSite,description)

* The travelAgency fact contains the travel agency name, contact information, branch number arguments

travelAgency(travelAgencyName,contactInfo,branch).

* The fact called park contains the city name, season, description, travel cost, hotel and reservation name, distance, contact information, tour type, travel agency and other data are included as arguments

park(cityName,season,description,Travel\_cost,hotelReservation,distance,contactInformation,tour\_type,traveAgency,path).

* The holiday fact contains the city name, holiday type, season or date,

holiday(cityName,holidayType,season).

The facts mentioned above are some of the facts with their data for the expert system development.

Keep in mind that the facts will contain the ID (identification) numbers by which some of the requested or needed categories are selected from the knowledge base facts available in the system.

## Rules

If city is inside a region

Then display the city under the region

If the city’s travel cost is minimum

Then the city with the minimum travel cost is displayed

If the city’s distance from the capital city is minimum

Then the city with a minimum distance is displayed

If the cities contain the same ID

Then all the available cities are displayed with their respective information

#  User Interface Design

The system will display the “Start.” word to type on the prolog interface when the program is run.

Type the word and press “enter” key from the keyboard. The menu list will be displayed.

The list will contain the following lists

* Enter 1 to search by region.
* Enter 1 to display available regions.
* Enter 2 to display all the cities available in a region.
* Enter 3 to display reservations available in a region.
* Enter 2 to search by city.
* Enter 1 to display all available cities.
* Enter 2 to display all the cities with available information.
* Enter 3 to display tour sights available in a city.
* Enter 4 to display reservations available in a city.
* Choose 3 display the cities and their tour site/s near to the capital city.
* Choose 4 display the city with the least travel cost.
* Choose 5 display tour site type(whether the tour is holiday celebration, natural land escape, historical places, sanctuaries and parks, historical places, museum or other type).This list will contain the a sub-list :
* Choose 1 to display all historical tour sites available with their information.
* Choose 2 to display the holiday celebration tour sites.
* Choose 3 to display all museum tour sites.
* Choose 4 to display all sanctuaries and parks tour sites.
* Choose 5 to display all natural land escape tour sites.
* Choose 6 to add some knowledge to the system.

Choose from the list and press “enter” key.

All lists will contain the option “Continue?” , type “y.” to continue or “n.” to abort and press the “enter” key.

*NB*. Don’t forget to add “.” after choosing a list and before pressing the “enter” key.

#  Knowledge Based System Design

A process which is applied to design and develop a knowledge-based system in this research is called knowledge engineering as shown in Figure 1. Knowledge engineer is a person who searches knowledge source, designs and selects development tools, develops, tests and adjusts the system before using in practical. The process of design system can describe in following:-

**User Menu**

This menu used for this expert system as user interface and let the users to choose different option.

**Inference Engine**

The inference engine is used for interactive work between database and the user option selection.

**Knowledge Acquisition**

Knowledge acquisition is a process of acquiring, organizing and studying knowledge. In this research, the knowledge is acquired from culture and tourist agency for testing system.

**Knowledge Base Design**

The production of rule-based knowledge system representation it consists of list of rule, facts.

#  Tour and Travel Guide Knowledge Based System Architecture

The system contains 5 components which are user menu, inference engine, explanation module, knowledge acquisition unit, and knowledge base as shown below shown in Figure 1. This system is needed to support to manage the knowledge, such as creating and editing facts of cities and regions .Furthermore, it can explanation of facts .

USERS MENU

EXPLANATION MODULE

KNOWLEDGE ACQUISITION

knowledge base

User

 Figure 2. Expert system structural overview

#  Class Diagrams

UML class diagrams are the mainstay of object-oriented analysis and design. It show the classes of the system, their interrelationships (including inheritance, aggregation, and association), and the operations and attributes of the classes. Class diagrams are used for a wide variety of purposes, including both conceptual/domain modeling and detailed design modeling.  Thus, here is our expert system available class’s.



Figure 3. UML class diagram

#  Conclusions and Recommendations

This tour and travel guide expert system intended to provide general information for those who want to travel different part of our country. The traveler may tourist, or any other visitor. So, this expert system assists those visitors where, and when to travel and it provides other necessary information. If this expert system fully implement, I hope that it alleviate a lots of works of culture and tourist agency.

We can conclude that this system is well defined and developed tour and travel guide expert system which mainly focus on the removing the problems of the tourists such as providing time saving guidance, providing cost saving guidance, providing reliable information and guidance, eliminate confusion and misguidance, Computerizing travel and tour guidance, information scarcity elimination and so many advantages are provided by the system.

It is recommended that if the tourists use this expert system they will be able to achieve on the management of their time, money, interest and fun, travel comfort and other advantages will be achieved by using the tour and travel expert system.