Department of Computer Science

CPCS331- Artificial intelligence

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The Tourism System

Knowledge-base Expert System

Team members

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Task Assignment

Member Name	Tasks Performed	% of Contribution
Razan Aljuhani	1- Gathering Information for building Knowledge base 2- System Rules Acquire knowledge techniques Knowledge Base 3- System Diagram 4- Writing Report 5- Code implementation Code Output format by prolog	100%
Haya Alsheikh	1- Gathering Information for building Knowledge base 2- System Rules Acquire knowledge techniques Knowledge Base 3- System Diagram 4- Writing Report 5- Code implementation Code Output format by prolog	100%
Wejdan Alzahrani	1- Gathering Information for building Knowledge base 2- System Rules Acquire knowledge techniques Knowledge Base 3- System Diagram 4- Writing Report 5- Code implementation Code Output format by prolog	100%
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1. Introduction

In artificial intelligence, an Expert System is an interactive and reliable computer-based decision-making system, used to solve complex decision-making problems and It is considered at the highest level of human intelligence and expertise, it can resolve many issues which require a human expert. It based on knowledge acquired from an expert. In this report we will going to implement an expert system for Tourism .

1.1 Purpose of the Expert System

The Tourism system works to help people wishing to travel to a specific country to decide which city should to visit in that country through the tourist's answers.

Therefor, we will write a set of questions for the tourist about his interest in this trip and the places wants to visit, that help us to decide the expected city. The system will be written as an AI code agent in the prolog program.

1.2 Users(Clients) of the system

The Tourists who wishes to visit a specific country and wants to determine a city from that country.

1.3 System's Experts

The knowledge of the correct city to visit from that county.

1.4 Resources to use

Websites to gather cities attributes .

2. Program implementation
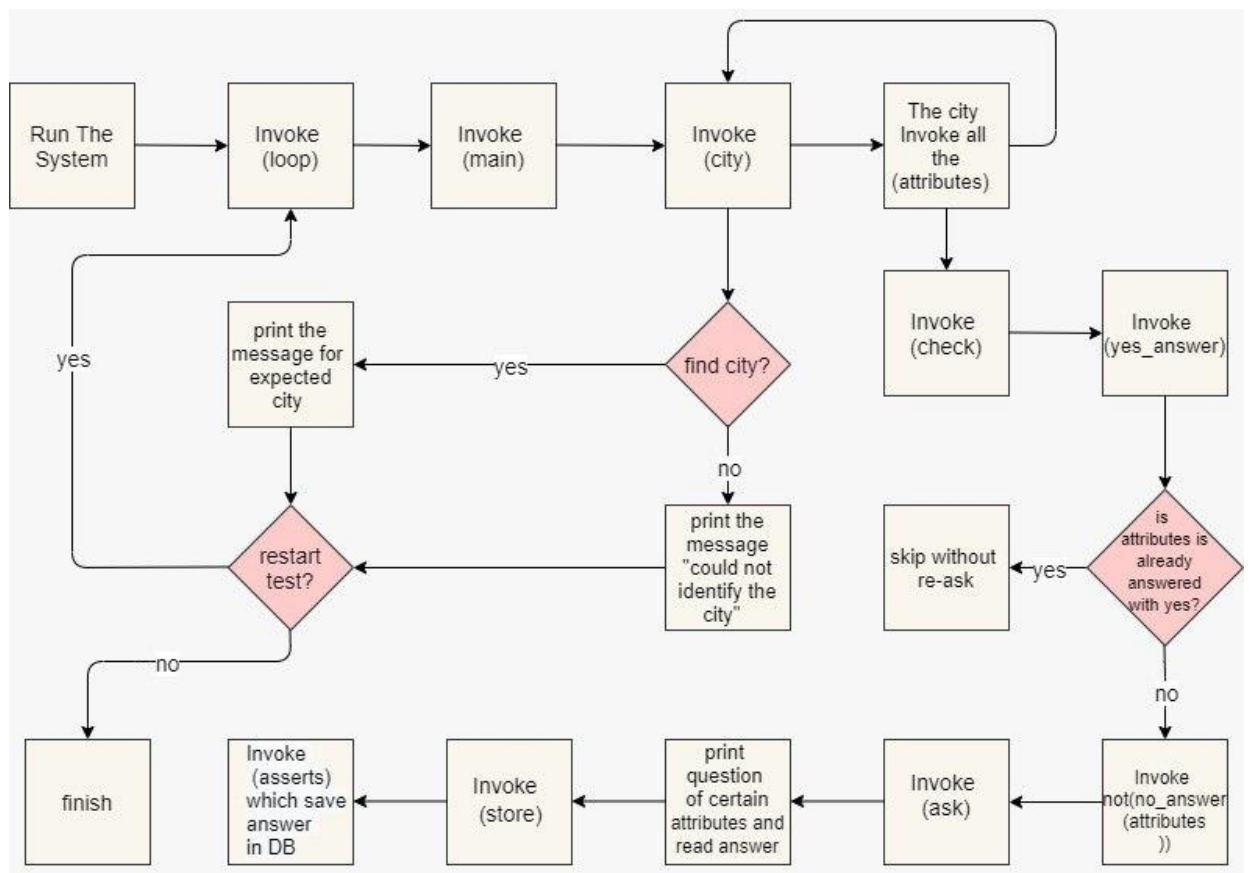
2.1 List of Domain Rules

1. **display:** used to start the system and print the welcome message, then invoke (loop).

2. **main:** works by invoke (city) and start the test , after that show result, otherwise in the case there isn't matching -fail- , go with main -next clause- to print that the city cannot be determined.

3. **loop:** used to repeat the test, it works by invoke the (main) that include the test. then invokes clear_yes_answer, clear_no_answer and continuo with recursion, Also, it repeat the test, if the user want . otherwise go to the next loop clause that exit from the system.

4. **clear_no_answer:** it works by invoke the built-in predicate (retract) with argument retract(no_answer(_)), to delete facts from the database.

5. **clear_yes_answer:** it works by invoke the built-in predicate (retract) with argument retract(yes_answer(_)), to delete facts from the database.

6. **city(symbol):** It works by invoke all the (attributes) that related to this city and symbol argument for the city name.

7. **attributes(symbol):** It works by invoke (check) and send argument that is (attributes question, and attributes name).

8. **ask(question,attributes):** it works by printing the question of the certain attributes and read the answer from the user either "y" or "n", then invoke store(Attributes,Answer).

9. **check(question,attributes):** it works by invoke yes_answer(attributes) to check if user already answered for this attributes in the pre-questions with yes. If not, go with next clause of check, then invoke not(no_answer(attributes)) to check if it's not already have answered with no, then invoke (ask).

10. **store(attributes,symbol):** it works by invoke the built-in predicate (asserta), and symbol argument will be either "y" or "n" answer, depend on that it will add to the database as facts in either asserta(no_answer(Attributes)) or asserta(yes_answer(Attributes)) .

2.2 The technique used to acquire knowledge

To acquire knowledge from the system We used two kind of techniques, **Backtracking** and **Recursion** that help us to build our system .

2.2 System Flowchart

3. References

- Logic Programming with Prolog, Max Bramer .
- https://app.diagrams.net
- https://www.planetware.com/tourist-attractions-/pyramids-of-giza-egy-giza-giza.htm
- https://tourflag.com/%D8%AA%D8%B1%D9%83%D9%8A%D8%A7/%D8%A7%D9%84%D8%B3%D9%8A%D8%A7%D8%AD%D8%A9-%D9%81%D9%8A-%D8%AA%D8%B1%D9%83%D9%8A%D8%A7/
- https://tourflag.com/%D8%A7%D9%84%D9%8A%D8%A7%D8%A8%D8%A7%D9%86/%D8%A7%D9%84%D8%B3%D9%8A%D8%A7%D8%AD%D8%A9-%D9%81%D9%8A-%D8%A7%D9%84%D9%8A%D8%A7%D8%A8%D8%A7%D9%86/

4. Appendices

4.1 Source Code

include "cpcs331_ear_project_tourismsystem.inc"

domains

city=symbol

attributes=symbol

question=symbol

facts

yes_answer(attributes)

no_answer(attribtes)

predicates

nondeterm display

nondeterm loop

nondeterm main

nondeterm city(symbol)

nondeterm attributes(symbol)

nondeterm clear_yes_answer

nondeterm clear_no_answer

check(question,attributes)

store(attributes,symbol)

ask(question,attributes)

clauses

display:-

write("**
*******************************\n"),

write("   Welcome to Tourism System
\n"),

```prolog
write("**********************************************
*******************************\n\n\n"),

write("Please answer the following test questions with yes or no (y/n), To
determine the expected city. "),loop.


%loop to can repeat the test

loop:-

nl,nl, main,

write("\n**********************************************
*******************************\n"),

write("\nDo you want to restart the test? (y/n) "),

readchar(Ans), write(Ans),Ans><'n',!,

nl,clear_yes_answer,clear_no_answer,loop.

loop:-

write("\n\nThank you for using Tourism System :) ...\n\n").


% main to start testing

main:-

city(City),!,

write("\nThe test have been finished.. \n"),

write("The best city you can visit in the country  ",City).

% In pre-main when can't determine the city

main:-

write("\nWe could not identify the city").

% check for pre-answer about Attributes

check(_,Attributes):-

yes_answer(Attributes),!.

%check for pre-answer,and ask user
```

```prolog
check(Question,Attributes):-

not(no_answer(Attributes)),ask(Question,Attributes).

% ask user and get the answer

ask(Question,Attributes):-

write(Question), readln(Answer),

store(Attributes,Answer),Answer="y".

% store the pre-answers of Attributes

store(Attributes,"y"):-

asserta(yes_answer(Attributes)). %store yes answers

store(Attributes,"n"):-

asserta(no_answer(Attributes)). %store no answers


%clear all the saved answers from system

clear_yes_answer:-retract(yes_answer(_)),fail.

clear_yes_answer.

clear_no_answer:-retract(no_answer(_)),fail.

clear_no_answer.


%_____
_____

%Attributes

%common Attributes

attributes(have_children):- check("Are there children with you on this
trip? (y/n) ",have_children).

attributes(natural_places):- check("Do you prefer to spend time in quiet,
natural places? (y/n) ",natural_places).

attributes(shopping):- check("Do you want to spend your time shopping?
(y/n) ",shopping).
```

attributes(traditional_places):- check("Do you prefer visiting traditional places? (y/n) ",traditional_places).

attributes(beaches):- check("Do you like to go to the beaches? (y/n) ",beaches).

attributes(museums):- check("Do you like visiting historical monuments and ancient museums? (y/n) ",museums).

attributes(cold_weather) :- check("Do you like the cold weather? (y/n) ",cold_weather).

%Special attributes for Saudi Arabia

attributes(saudi_arabia):- check("Do you interested to visit Saudi Arabia? (y/n) ",saudi_arabia).

attributes(umrah_hajj):- check("Do you want to perform Umrah or Hajj? (y/n) ",umrah_hajj).

attributes(kaaba) :- check("Do you want to pray in the mosque near the kaaba ? (y/n) ",kaaba).

attributes(prophet_mosque):- check("Do you want to visit the Prophet's Mosque? (y/n) ",prophet_mosque).

attributes(honorable_kindergarten) :- check("Do you want to pray at the honorable kindergarten? (y/n) ",honorable_kindergarten).

attributes(mount_Uhud) :- check("Do you want to visit the Uhud mount ? (y/n) ",mount_Uhud).

attributes(fountain):- check("Do you want to see the largest fountain in the wourld? (y/n) ",fountain).

%Special attributes for Egypt

attributes(egypt):- check("Do you interested to visit Egypt? (y/n) ",egypt).

attributes(pyramids):- check("Do you want to visit the Pyramids ?(y/n) ",pyramids).

%Special attributes for United Arab Emirates

attributes(uae):- check("Do you interested to visit United Arab Emirates(UAE)? (y/n) ",uae).

attributes(ferrari):- check("Do you want to visit Ferrari theme park? (y/n) ",ferrari).

attributes(gardens):- check("Are you interested in gardens? (y/n) ",gardens).

%Special attributes for Turkey

attributes(turkey):- check("Do you interested to visit Turkey? (y/n) ",turkey).

attributes(houses):- check("Do you like simple, wooden houses? (y/n) ",houses).

%Special attributes for East Asia

attributes(east_asia):- check("Do you interested to visit East Asia? (y/n) ",east_asia).

attributes(music):- check("Do you like music? (y/n) ",music).

attributes(parks):- check("Do you like to spend your time in water amusement parks?(y/n) ",parks).

attributes(seafood):- check("Do you like seafood? (y/n) ",seafood).

%_____

% cities in Saudi Arabia

city(makkah):-

attributes(saudi_arabia),attributes(kaaba),attributes(umrah_hajj).

city(madinah):-

attributes(saudi_arabia),attributes(prophet_mosque),attributes(honorable_
kindergarten),attributes(mount_Uhud).

city(abha):-

attributes(saudi_arabia),attributes(natural_places),attributes(cold_weather
).

city(jeddah):-

attributes(saudi_arabia),attributes(shopping), attributes(fountain).

% cities in Egypt

city(cairo):-

attributes(egypt),attributes(shopping).

city(giza):-

attributes(egypt),attributes(natural_places),attributes(traditional_places),a
ttributes(pyramids).

city(sharm_elsheikh):-

attributes(egypt),attributes(natural_places),attributes(beaches).

% cities in United Arab Emirates(UAE)

%---------

city(dubai):-

attributes(uae),attributes(beaches),attributes(shopping).

city(abu_dhabi):-

attributes(uae),attributes(beaches),attributes(gardens),attributes(ferrari).

city(ajman):-

attributes(uae),attributes(beaches),attributes(gardens),attributes(traditiona
l_places).

% cities in Turkey

city(istanbul):-

attributes(turkey),attributes(museums),attributes(shopping).

city(antalya):-

attributes(turkey),attributes(museums),attributes(beaches),attributes(houses).

city(trabzon):-

attributes(turkey),attributes(beaches),attributes(natural_places).

% cities in East Asia

city(japan):-

attributes(east_asia),attributes(seafood),attributes(museums),attributes(natural_places) .

city(korea):-

attributes(east_asia),attributes(seafood),attributes(have_children),attributes(museums),attributes(music).

city(malaysya):-

attributes(east_asia),attributes(seafood),attributes(have_children),attributes(parks).

goal

display.

4.2 Sample Output

- **Cities in Saudi Arabia**

```
C:\VIP52\BIN\WIN\32\Obj\goal$000.exe                              —    □    ×
*********************************************************************************
              Welcome to Tourism System
*********************************************************************************


Please answer the following test questions with yes or no (y/n), To determine the expected city.

Do you interested to visit Saudi Arabia? (y/n) y
Do you want to pray in the mosque near the kaaba ? (y/n) y
Do you want to perform Umrah or Hajj? (y/n) y

The test have been finished..
The best city you can visit in the country  makkah
*********************************************************************************

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) y
Do you want to pray in the mosque near the kaaba ? (y/n) n
Do you want to visit the Prophet's Mosque? (y/n) y
Do you want to pray at the honorable kindergarten? (y/n) y
Do you want to visit the Uhud mount ? (y/n) y

The test have been finished..
The best city you can visit in the country  madinah
*********************************************************************************

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) y
Do you want to pray in the mosque near the kaaba ? (y/n) n
Do you want to visit the Prophet's Mosque? (y/n) n
Do you prefer to spend time in quiet, natural places? (y/n) y
Do you like the cold weather? (y/n) y

The test have been finished..
The best city you can visit in the country  abha
*********************************************************************************

Do you want to restart the test? (y/n) y
```

```
Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) y
Do you want to pray in the mosque near the kaaba ? (y/n) n
Do you want to visit the Prophet's Mosque? (y/n) n
Do you prefer to spend time in quiet, natural places? (y/n) n
Do you want to spend your time shopping? (y/n) y
Do you want to see the largest fountain in the wourld? (y/n) y

The test have been finished..
The best city you can visit in the country  jeddah
*********************************************************************************
```

- **Cities in Egypt**

Do you want to restart the test? (y/n) y

Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) y
Do you want to spend your time shopping? (y/n) y

The test have been finished..
The best city you can visit in the country cairo
****

Do you want to restart the test? (y/n) y

Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) y
Do you want to spend your time shopping? (y/n) n
Do you prefer to spend time in quiet, natural places? (y/n) y
Do you prefer visiting traditional places? (y/n) y
Do you want to visit the Pyramids ?(y/n) y

The test have been finished..
The best city you can visit in the country giza
****

Do you want to restart the test? (y/n) y

Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) y
Do you want to spend your time shopping? (y/n) n
Do you prefer to spend time in quiet, natural places? (y/n) y
Do you prefer visiting traditional places? (y/n) y
Do you want to visit the Pyramids ?(y/n) n
Do you like to go to the beaches? (y/n) y

The test have been finished..
The best city you can visit in the country sharm_elsheikh
****

- **Cities in United Arab Emirates(UAE)**

```
C:\VIP52\BIN\WIN\32\Obj\goal$000.exe                        —    □    ×

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) y
Do you like to go to the beaches? (y/n) y
Do you want to spend your time shopping? (y/n) y

The test have been finished..
The best city you can visit in the country  dubai
********************************************************************************

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) y
Do you like to go to the beaches? (y/n) y
Do you want to spend your time shopping? (y/n) n
Are you interested in gardens? (y/n) y
Do you want to visit Ferrari theme park? (y/n) y

The test have been finished..
The best city you can visit in the country  abu_dhabi
********************************************************************************


Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) y
Do you like to go to the beaches? (y/n) y
Do you want to spend your time shopping? (y/n) n
Are you interested in gardens? (y/n) y
Do you want to visit Ferrari theme park? (y/n) n
Do you prefer visiting traditional places? (y/n) y

The test have been finished..
The best city you can visit in the country  ajman
********************************************************************************
```

- **Cities in Turkey**

```
C:\VIP52\BIN\WIN\32\Obj\goal$000.exe                                    —    □    ×

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) y
Do you like visiting historical monuments and ancient museums? (y/n) y
Do you want to spend your time shopping? (y/n) y

The test have been finished..
The best city you can visit in the country  istanbul
**************************************************************************

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) y
Do you like visiting historical monuments and ancient museums? (y/n) y
Do you want to spend your time shopping? (y/n) n
Do you like to go to the beaches? (y/n) y
Do you like simple, wooden houses? (y/n) y

The test have been finished..
The best city you can visit in the country  antalya
**************************************************************************


Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) y
Do you like visiting historical monuments and ancient museums? (y/n) n
Do you like to go to the beaches? (y/n) y
Do you prefer to spend time in quiet, natural places? (y/n) y

The test have been finished..
The best city you can visit in the country  trabzon
**************************************************************************
```

- **Cities in East Asia**

```
C:\VIP52\BIN\WIN\32\Obj\goal$000.exe                    —  □  ×
Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) n
Do you interested to visit East Asia? (y/n) y
Do you like seafood? (y/n) y
Do you like visiting historical monuments and ancient museums? (y/n) y
Do you prefer to spend time in quiet, natural places? (y/n) y

The test have been finished..
The best city you can visit in the country  japan
*****************************************************************************

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) n
Do you interested to visit East Asia? (y/n) y
Do you like seafood? (y/n) y
Do you like visiting historical monuments and ancient museums? (y/n) n
Are there children with you on this trip? (y/n) y
Do you like to spend your time in water amusement parks?(y/n) y

The test have been finished..
The best city you can visit in the country  malaysya
*****************************************************************************


Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) n
Do you interested to visit East Asia? (y/n) y
Do you like seafood? (y/n) y
Do you like visiting historical monuments and ancient museums? (y/n) y
Do you prefer to spend time in quiet, natural places? (y/n) n
Are there children with you on this trip? (y/n) y
Do you like music? (y/n) y

The test have been finished..
The best city you can visit in the country  korea
*****************************************************************************
```

- **Example of case (could not identify the city)**

```
[Inactive C:\VIP52\BIN\WIN\32\Obj\goal$000.exe]
***********************************************************************
                        Welcome to Tourism System
***********************************************************************


Please answer the following test questions with yes or no (y/n), To determine the expected city.

Do you interested to visit Saudi Arabia? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) n
Do you interested to visit East Asia? (y/n) n

We could not identify the city
***********************************************************************

Do you want to restart the test? (y/n) y


Do you interested to visit Saudi Arabia? (y/n) y
Do you want to pray in the mosque near the kaaba ? (y/n) n
Do you want to visit the Prophet's Mosque? (y/n) n
Do you prefer to spend time in quiet, natural places? (y/n) n
Do you want to spend your time shopping? (y/n) n
Do you interested to visit Egypt? (y/n) n
Do you interested to visit United Arab Emirates(UAE)? (y/n) n
Do you interested to visit Turkey? (y/n) n
Do you interested to visit East Asia? (y/n) n

We could not identify the city
***********************************************************************

Do you want to restart the test? (y/n) n

Thank you for using Tourism System :) ...

yes
```