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**Trip Planning Expert System using Prolog**

**Enseignant**

Mr Shiam Beeharry

**Soumit par**

Yoann Dayvid Lutchmeenaraidoo

For this project we have taken into account the most popular countries visited for trips around the world, here is the list of the countries:

1. United States
2. Spain
3. France
4. Italy
5. China
6. Mexico
7. United Kingdom
8. Turkey
9. Germany
10. Thailand
11. Malaysia
12. Canada
13. Russia
14. Japan
15. Australia
16. Greece
17. Brazil
18. India
19. South Africa
20. Argentina
21. Egypt
22. Indonesia
23. Netherlands
24. Peru
25. Vietnam
26. Portugal
27. Colombia
28. New Zealand
29. Sweden
30. Austria
31. Switzerland
32. Belgium
33. Morocco
34. Denmark
35. Ireland
36. Norway
37. Czech Republic
38. Israel
39. Hungary
40. Finland
41. Croatia

42. Singapore
43. Poland
44. Philippines
45. Chile
46. Iceland
47. Saudi Arabia
48. United Arab Emirates
49. South Korea
50. Romania
51. Ukraine
52. Jamaica
53. Bulgaria
54. Cyprus
55. Costa Rica
56. Tunisia
57. Estonia
58. Slovenia
59. Lithuania
60. Latvia
61. Malta
62. Slovakia
63. Luxembourg
64. Qatar
65. Bahrain
66. Oman
67. Panama
68. Uruguay
69. Kuwait
70. Andorra
71. Belarus
72. Serbia
73. Georgia
74. Armenia
75. Lebanon
76. Moldova
77. Albania
78. Montenegro
79. North Macedonia
80. Bosnia and Herzegovina
81. Kazakhstan
82. Azerbaijan
83. Ecuador
84. Paraguay
85. Nepal

86. Dominican Republic
87. Sri Lanka
88. Tanzania
89. Kenya
90. Ghana
91. Cameroon
92. Botswana
93. Uganda
94. Zambia
95. Maldives
96. Zimbabwe
97. Ethiopia
98. Madagascar
99. Rwanda
100. Namibia

We then defined attributes for these countries for our expert system to work with:

1. United States: ['diverse landscapes', 'metropolitan cities', 'cultural diversity', 'national parks']
2. Spain: ['vibrant culture', 'beaches', 'architecture', 'tapas', 'fiestas']
3. France: ['art and culture', 'historical landmarks', 'gastronomy', 'wine', 'fashion']
4. Italy: ['ancient ruins', 'artistic heritage', 'culinary delights', 'coastlines', 'fashion']
5. China: ['rich heritage', 'ancient landmarks', 'cuisine', 'diverse landscapes', 'modern cities']
6. Mexico: ['ancient civilizations', 'beaches', 'culinary delights', 'festivals', 'colorful traditions']
7. United Kingdom: ['historical sites', 'royal heritage', 'theater', 'pub culture', 'countryside']
8. Turkey: ['historical sites', 'breathtaking landscapes', 'hospitality', 'cuisine', 'bazaars']
9. Germany: ['rich history', 'castles', 'beer', 'festivals', 'technological innovation']
10. Thailand: ['buddhist temples', 'exotic cuisine', 'tropical beaches', 'elephant sanctuaries', 'night markets']
11. Malaysia: ['diverse cultures', 'beaches', 'rainforests', 'street food', 'modern architecture']
12. Canada: ['breathtaking landscapes', 'wildlife', 'multicultural cities', 'outdoor activities', 'parks']
13. Russia: ['world-class museums', 'historical landmarks', 'vast landscapes', 'ballet', 'winter sports']
14. Japan: ['ancient traditions', 'technology', 'temples', 'onsen', 'sushi']
15. Australia: ['stunning beaches', 'outback landscapes', 'diverse wildlife', 'surfing', 'vibrant cities']
16. Greece: ['ancient ruins', 'island hopping', 'Mediterranean cuisine', 'beaches', 'history']
17. Brazil: ['vibrant culture', 'Carnival', 'beaches', 'rainforests', 'samba music']
18. India: ['rich history', 'spirituality', 'diverse cuisine', 'monuments', 'colorful festivals']
19. South Africa: ['wildlife safaris', 'adventure sports', 'wine regions', 'diverse cultures', 'breathtaking landscapes']
20. Argentina: ['tango music and dance', 'steakhouses', 'glaciers', 'wine regions', 'Patagonia']
21. Egypt: ['ancient civilizations', 'pyramids', 'Nile River', 'sphinx', 'historical sites']

22. Indonesia: ['tropical paradise', 'temples', 'beaches', 'volcanoes', 'traditional arts']
23. Netherlands: ['canals', 'windmills', 'cycling culture', 'art museums', 'tulip fields']
24. Peru: ['Incan ruins', 'Amazon rainforest', 'Machu Picchu', 'traditional culture', 'culinary delights']
25. Vietnam: ['breathtaking landscapes', 'ancient temples', 'street food', 'rice terraces', 'cultural heritage']
26. Portugal: ['historic cities', 'coastal beauty', 'vineyards', 'pastries', 'fado music']
27. Colombia: ['colorful cities', 'coffee plantations', 'Caribbean beaches', 'salsa music', 'emerald mines']
28. New Zealand: ['adventure sports', 'spectacular landscapes', 'Maori culture', 'wineries', 'hiking trails']
29. Sweden: ['scenic landscapes', 'medieval architecture', 'design', 'fika culture', 'Northern Lights']
30. Austria: ['imperial history', 'Alpine landscapes', 'music', 'coffeehouses', 'Christmas markets']
31. Switzerland: ['Alpine beauty', 'skiing', 'chocolate', 'watchmaking', 'efficiency']
32. Belgium: ['chocolate', 'beer', 'medieval towns', 'architecture', 'comic strips']
33. Morocco: ['vibrant markets', 'desert landscapes', 'mosques', 'traditional crafts', 'tagine']
34. Denmark: ['cozy hygge concept', 'bicycle-friendly cities', 'fairy-tale castles', 'Nordic cuisine', 'design']
35. Ireland: ['lush landscapes', 'castles', 'pub culture', 'traditional music', 'friendly locals']
36. Norway: ['fjords', 'Northern Lights', 'viking history', 'outdoor adventures', 'scenic train rides']
37. Czech Republic: ['medieval architecture', 'beer culture', 'music festivals', 'cultural heritage', 'bohemian crystal']
38. Israel: ['religious sites', 'historical landmarks', 'beaches', 'culinary delights', 'innovation']
39. Hungary: ['thermal baths', 'historic sites', 'ruin pubs', 'goulash', 'folklore']
40. Finland: ['Midnight Sun', 'saunas', 'Arctic beauty', 'design', 'winter sports']
41. Croatia: ['Adriatic coastline', 'historical cities', 'island hopping', 'seafood', 'Game of Thrones filming locations']
42. Singapore: ['modern architecture', 'shopping', 'cultural diversity', 'street food', 'gardens']
43. Poland: ['historical landmarks', 'medieval cities', 'pierogi', 'vibrant festivals', 'natural beauty']
44. Philippines: ['tropical islands', 'beaches', 'diving spots', 'rice terraces', 'friendly locals']
45. Chile: ['diverse landscapes', 'Patagonia', 'Atacama Desert', 'wine regions', 'Easter Island']
46. Iceland: ['glaciers', 'volcanoes', 'waterfalls', 'geothermal hot springs', 'northern lights']
47. Saudi Arabia: ['ancient history', 'Islamic culture', 'desert landscapes', 'mosques', 'traditional arts']
48. United Arab Emirates: ['luxury', 'modern architecture', 'desert safaris', 'shopping', 'beaches']
49. South Korea: ['K-pop culture', 'historical palaces', 'technology', 'spicy cuisine', 'shopping']
50. Romania: ['medieval castles', 'Transylvania', 'carpathian mountains', 'folklore', 'traditional villages']

51. Ukraine: ['historical landmarks', 'Orthodox churches', 'Carpathian Mountains', 'cultural heritage', 'borscht']
52. Jamaica: ['reggae music', 'beaches', 'waterfalls', 'rum', 'laid-back vibes']
53. Bulgaria: ['historic cities', 'Black Sea coast', 'ski resorts', 'rose oil', 'traditional music and dance']
54. Cyprus: ['Mediterranean charm', 'beaches', 'ancient ruins', 'hospitality', 'Cypriot cuisine']
55. Costa Rica: ['biodiversity', 'rainforests', 'beaches', 'adventure activities', 'ecotourism']
56. Tunisia: ['Mediterranean beaches', 'ancient ruins', 'souks', 'traditional music', 'desert landscapes']
57. Estonia: ['medieval towns', 'Baltic Sea coast', 'technology', 'saunas', 'song and dance festivals']
58. Slovenia: ['Lake Bled', 'mountain landscapes', 'caves', 'wine regions', 'Ljubljana']
59. Lithuania: ['Baltic coast', 'medieval architecture', 'amber', 'folklore', 'curonian spit']
60. Latvia: ['Riga', 'Baltic Sea coast', 'Art Nouveau architecture', 'festivals', 'traditional cuisine']
61. Malta: ['historic sites', 'Mediterranean charm', 'beaches', 'cultural festivals', 'Azure Window']
62. Slovakia: ['castles', 'carpathian mountains', 'caves', 'folk traditions', 'spa towns']
63. Luxembourg: ['medieval castles', 'picturesque towns', 'European Union institutions', 'Moselle wine', 'multilingualism']
64. Qatar: ['modern architecture', 'desert landscapes', 'cultural heritage', 'luxury', 'traditional souqs']
65. Bahrain: ['modern architecture', 'pearl diving', 'cultural heritage', 'formula 1 racing', 'spice markets']
66. Oman: ['desert landscapes', 'ancient forts', 'wadis', 'traditional culture', 'Frankincense']
67. Panama: ['Panama Canal', 'tropical rainforests', 'beaches', 'indigenous culture', 'cosmopolitan capital']
68. Uruguay: ['beaches', 'gauchos', 'tango music and dance', 'wine regions', 'colonial architecture']
69. Kuwait: ['modern architecture', 'desert landscapes', 'shopping', 'Islamic culture', 'souqs']
70. Andorra: ['ski resorts', 'mountain landscapes', 'duty-free shopping', 'hiking trails', 'Romanesque architecture']
71. Belarus: ['Soviet-era architecture', 'museums', 'national parks', 'traditional cuisine', 'hospitality']
72. Serbia: ['rich history', 'Orthodox monasteries', 'music festivals', 'rakija', 'traditional folklore']
73. Georgia: ['ancient churches', 'mountain landscapes', 'wine regions', 'traditional cuisine', 'hospitality']
74. Armenia: ['ancient monasteries', 'mountain landscapes', 'cultural heritage', 'apricots', 'hospitality']
75. Lebanon: ['historical sites', 'Mediterranean cuisine', 'nightlife', 'beaches', 'Roman ruins']
76. Moldova: ['wine regions', 'cultural heritage', 'monasteries', 'traditional crafts', 'hospitality']
77. Albania: ['Mediterranean beaches', 'historical sites', 'mountain landscapes', 'traditional culture', 'hospitality']

78. Montenegro: ['Adriatic coastline', 'Bay of Kotor', 'mountain landscapes', 'historical towns', 'outdoor activities']
79. North Macedonia: ['historical sites', 'lakes', 'mountain landscapes', 'traditional cuisine', 'hospitality']
80. Bosnia and Herzegovina: ['historic cities', 'natural beauty', 'cultural heritage', 'Balkan cuisine', 'hospitality']
81. Kazakhstan: ['vast landscapes', 'mountains', 'steppe, nomadic culture', 'modern architecture', 'hospitality']
82. Azerbaijan: ['historic landmarks', 'fire temples', 'Caspian Sea coast', 'mud volcanoes', 'hospitality']
83. Ecuador: ['diverse landscapes', 'Galapagos Islands', 'Amazon rainforest', 'indigenous culture', 'adventure activities']
84. Paraguay: ['Iguazu Falls', 'riverside towns', 'mate tea', 'Guarani culture', 'chaco region']
85. Nepal: ['Himalayas', 'mountain trekking', 'Buddhist temples', 'cultural heritage', 'hospitality']
86. Dominican Republic: ['beaches', 'tropical landscapes', 'merengue music and dance', 'rum', 'adventure sports']
87. Sri Lanka: ['ancient ruins', 'tea plantations', 'beaches', 'wildlife safaris', 'spices']
88. Tanzania: ['wildlife safaris', 'Mount Kilimanjaro', 'Zanzibar beaches', 'Maasai culture', 'Serengenti National Park']
89. Kenya: ['wildlife safaris', 'Maasai Mara', 'beaches', 'mountain landscapes', 'cultural heritage']
90. Ghana: ['cultural heritage', 'forts and castles', 'beaches', 'traditional music and dance', 'hospitality']
91. Cameroon: ['diverse landscapes', 'mountain trekking', 'wildlife', 'traditional culture', 'hospitality']
92. Botswana: ['wildlife safaris', 'Okavango Delta', 'Chobe National Park', 'traditional culture', 'hospitality']
93. Uganda: ['mountain gorillas', 'wildlife safaris', 'Rwenzori Mountains', 'Lake Victoria', 'cultural heritage']
94. Zambia: ['Victoria Falls', 'wildlife safaris', 'river cruises', 'adventure activities', 'cultural heritage']
95. Maldives: ['tropical paradise', 'beaches', 'snorkeling', 'luxury resorts', 'underwater dining']
96. Zimbabwe: ['Victoria Falls', 'wildlife safaris', 'Great Zimbabwe ruins', 'adventure activities', 'hospitality']
97. Ethiopia: ['ancient civilizations', 'rock-hewn churches', 'Simien Mountains', 'coffee culture', 'cultural heritage']
98. Madagascar: ['unique wildlife', 'rainforests', 'beaches', 'baobab trees', 'traditional culture']
99. Rwanda: ['mountain gorillas', 'volcanoes', 'Lake Kivu', 'cultural heritage', 'hospitality']
100. Namibia: ['desert landscapes', 'wildlife safaris', 'skeleton coast', 'tribal culture', 'scenic beauty']

**Abstract:** The Trip Planning Expert project aims to assist users in selecting their travel destinations based on their preferences. The project utilizes Prolog, a logic programming language, to implement a rule-based system that suggests destinations matching the user's desired attributes. This report presents the design, implementation, and usage instructions for the Trip Planning Expert system.

1. **Introduction:** The Trip Planning Expert system is designed to provide users with personalized travel destination recommendations. By considering the user's preferences and matching them with the attributes of various destinations, the system suggests the most suitable travel options. The project utilizes Prolog's rule-based programming capabilities to implement the decision-making logic. Additionally, a Python GUI is implemented to enhance user interaction and ease of use.
2. **Design:** The Trip Planning Expert system follows a rule-based design approach. The core components of the system include:
  - Destination knowledge base: Contains a list of destinations and their associated attributes.
  - Preference matching rules: Evaluate the user's preferences against the attributes of destinations to determine suitable matches.
  - Recommendation generation: Provides the suggested destination based on the user's preferences.
  - Python GUI: Allows users to enter their preferences through an intuitive graphical interface.
3. **Implementation:** The Trip Planning Expert system is implemented using Prolog for the rule-based logic and Python for the graphical user interface. The following steps were followed for implementation:  
Step 1: Destination Knowledge Base
  - The system starts by defining a knowledge base in Prolog that lists various destinations and their corresponding attributes.
4. **Step 2: Preference Matching Rules**
  - The system defines rules in Prolog to match the user's preferences with the attributes of destinations.
  - The `suggest_destination/2` predicate is implemented to suggest a destination based on the user's preferences.
5. **Step 3: User Interaction with Python GUI**
  - The system provides a user-friendly GUI developed using Python's Tkinter library.
  - The GUI allows users to input their preferences through an entry field.
  - Upon clicking the "Get Suggestions" button, the user's preferences are passed to the Prolog code for processing.
6. **Usage Instructions:** To use the Trip Planning Expert system, follow these steps:
  - Step 1: Set up the environment: Ensure that SWI-Prolog and Python are installed on your system.
  - Step 2: Load the Trip Planning Expert system: Run the Python script that incorporates both the Prolog and Python code.



- Step 3: Input Preferences: Enter your preferences in the GUI's preferences entry field, separated by commas.
  - Step 4: View the Suggested Destination: After entering your preferences, click the "Get Suggestions" button, and the GUI will display the suggested destination.
7. Conclusion: The Trip Planning Expert project demonstrates the application of Prolog's rule-based programming paradigm and Python's GUI capabilities to develop a personalized travel destination recommendation system. By allowing users to input their preferences through an intuitive interface, the system effectively matches them with the attributes of various destinations to suggest the most suitable options. The combination of Prolog and Python offers a powerful and user-friendly solution for travel planning.
8. Future Enhancements: The Trip Planning Expert system can be improved in the following ways:
- Incorporating a more extensive destination knowledge base to cover a wider range of countries and cities.
  - Implementing a rating system for destinations to consider user feedback and popularity.
  - Introducing additional criteria such as budget, travel duration, and transportation options to provide more comprehensive recommendations.
  - Enhancing the Python GUI with additional features such as destination images, interactive maps, and reviews.

#### References:

- SWI-Prolog Documentation
- Prolog Programming: A Do-it-Yourself Course for Beginners by James R. Fisher
- Python Documentation: Tkinter

#### Appendix:

- Prolog code for the Trip Planning Expert system.
- Python code for the Trip Planning Expert system, including the GUI implementation using Tkinter.
- Python code for the Trip Planning Expert System GUI