AI in TOURISM

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Abstract:-

This report proposes an abstract model of a touring guide to help a tourist optimise time and money to visit maximum places by finding shortest path from the hotel to the tourist spots depending upon their priority(field of interest). The proposed AI model takes data of hotels, data of tourist spots and applies genetic algorithm to solve a problem of finding the shortest path of the tour. The genetic algorithm tries to optimise the solution by reducing the time and distance complexity.

1.0 Problem Statement

Tourism industry is a big sector for employment and revenue generation. Tourist visiting a new place misses out many important place of interest due to lack of time, knowledge and purpose of visit. A tour guide can't always provide the best lead for different types of tourist. A tourist's interest may vary or might be diverse from the other.

2.0 Market/Customer/Business need Assessment

Tourism industry is one of the largest industry with a contribution of 4.67 trillion US dollars worldwide. AI in travel industry mostly does AI Assistants For Travel Booking, Robots For Face-to-Face Customer Services, AI-Driven Applications For Flight Forecasting etc.

A tourist travelling to a certain place might have varying interest to to explore hotspots. He might prefer adventure hotspots over history and culture, religious places over shopping and vice versa. Thus, it becomes very essential that his goals are fulfilled. A tourist always has a plan of covering as many places as possible within a stipulated time and reasonable cost.

In the existing system, a tourist guide fails to come up to every tourist expectation as people have varying taste. Thus, the proposed system will act like a tour guide to help tourist navigate and visit as many places as possible for a given time duration.

3.0 Target Specifications and Characterisation

Our primary targets are tourists from different places who are visiting a new place for the first time. Our final product should have the following specifications:-

- To change the traditional touring guide method to make it more time and cost efficient.

- Exploring the area of interest for the tourist.
- Travel routing from hotel for a round trip though the primary places top visit best on interest.

The above mentioned targets can be achieved by-

- Sorting places based on tourist interest.
- Finding an optimised path for the travel to be time efficient. Hence, reducing the cost as well.
- Applying genetic algorithm to solve the travelling salesman problem.

4.0 External Searches(Information Sources)

- Data set used in the implementation can be found at:https://www.kaggle.com/ishikajohari/jaipur-attractions-and-hotels. The data set contains Jaipur's main Attractions (around 70) and Hotels (around 250) along with their Prices, Timings, Place Types, and Geo-Coordinates.
- The data contains the following fields:
  - ID - (PID and HID) Place IDs to identify them uniquely
  - Name - (POIs and Hotel)
  - Price
  - Geographical Coordinates - (Lat and Lng)
  - Timings- (In-time(s) and Out-time(s))
  - Place Types (With Priority)
  - Reviews - (Number of Reviews)
- Understanding Traveling Salesman Problem using Genetic Algorithm : 1. https://www.geeksforgeeks.org/traveling-salesman-problem-using-genetic-algorithm/ 2. https://en.wikipedia.org/wiki/Genetic_algorithm
- Haversine formula : https://en.wikipedia.org/wiki/Haversine_formula

5.0 Bench marking alternate products

The traditional system of tourism has no such concept of routing through the places of interest in a time and cost efficient way. The proposed system allows the user to freely choose according to his point of interest.

6.0 Applicable Patents

Patents related to traveling salesman problem using Genetic Algorithm may be applicable.

7.0 Applicable Regulations

- Normally there is no restriction on Indian and foreign nationals for movement within India. But in case of Border States and the two groups of island (Andaman and Lakshadweep), a visitor requires a special permit. This permit is valid for 15 days only.

8.0 Applicable Constraints

- Continuous data collection and maintenance.
- High storage space to store and pre-process the real time data.
- For a complete tour, the route must start from the hotel and end at the hotel.
- The tourist will never visit a same place twice.
- An application to gather the tourist duration of travel, his budget and his field of interest.
- A scheduler to keep track of in-time and out-time.

9.0 Business Opportunities

This new AI in tourism will mark a new beginning of proper utilisation of cost, time and resources.

- Substantial amount of revenue can be generated by routing through the tourist point of interest.
- Hotel recommendation according to budget can be made on basis of tourist interest to travel so that the travel time and cost is minimised.
- According to reports the global tourism had a 4% upturn in 2021, compared to 2022.
- Travel will be made possible at various budget so that everyone gets a chance to travel.

10.0 Concept Generation

I, being a travel enthusiast always visit new places. Whenever I'm in a new place, I usually google to find my places of interest and the individually locate each place and the distance form the place I'm staying. I follow a strict budget and time which sometimes make me miss out important places due to lack of knowledge and time.

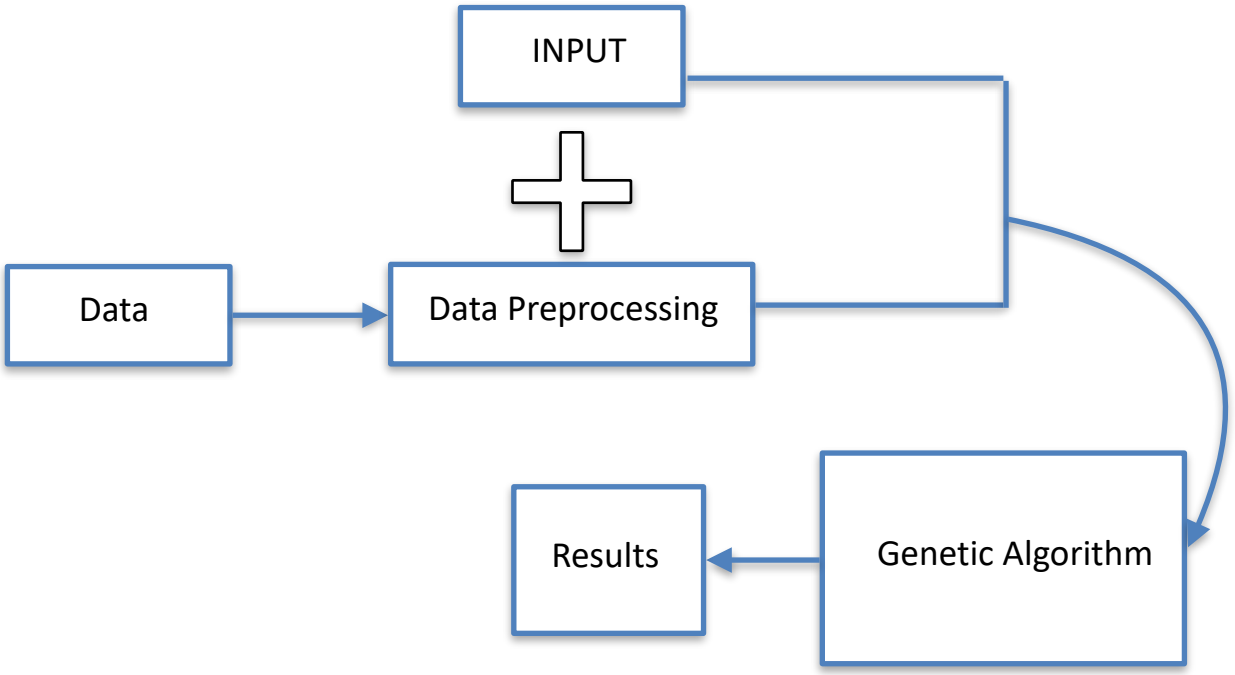
To solve this problem of tourist routing, we will use Genetic Algorithm to solve the traveling salesman problem and generate an efficient route. A dataset form Kaggle which shows tourism in Jaipur will act as the dataset for the prototype. Haversine function is used to determine the distance between the places using latitude and longitude.

11.0 Concept Development

- The product will take a form of an application which will take user inputs.
- Existing data from dataset will be used for data preparation and pre-processing. Upon completion, the inputs from the user will be fetched to sort the data to make it more efficient.
- Processed data will be fetched to the genetic algorithm to find the best route for the user

12.0 Final Product Prototype with Schematic Diagram

The final product uses the data set and user inputs to process it using genetic algorithm to fetch the best route for travel to make it time and cost effective.



13.0 Product Details (Working)

Steps of Implementation:

- Taking inputs from the user - duration of travel, area of interest in travel, budget etc.
- The prototype will take data from the dataset having all necessary features.
- Data pre-processing is done and the distance between the places and also distance between hotel and places are found to store it in another data frame using Haversine function.
- Route must be generated in such a manner that the distance between each place is minimised.
- To achieve this data is fetched to genetic algorithm with chromosome size=no. of places, population size= total available places, selection operator=roulette-wheel operator, crossover operator= single-point operator, mutation operation= Swap bit.
- Result generated is a combination of places of interest in an order how they might be traversed to minimise time and cost.

Algorithms and formulas used:

1. Genetic Algorithm to solve the traveling salesman problem
2. Haversine formula to find the distance between the places using latitude and longitude.

14.0 Conclusion

AI in the field of tourism will make tourist feel more comfortable and will invite more tourist to visit India. Hence, generating more and more revenue from tourism. People will find it easy and confident to travel to new places. People will be able to discover places of their own interest. Hence, uplifting the tourism industry.