

Vivekanand Education Society's Institute of Technology

Department of Computer Engineering

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Project Synopsis Template (2023-24) - Sem V

TravelSage: An AI-based system for Tourists

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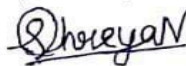


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Abstract :

Right from ancient times, traveling has been a matter of interest for almost all people. Be it for trade ,spiritual or any other purpose , traveling is an important aspect in every individual's life.Tourism is developing day by day. Tourists are interested in traveling to various beautiful places. This project presents the development of an innovative tourism website that harnesses the power of Artificial Intelligence (AI) to elevate the travel planning and exploration process. The goal is to provide users with personalized and enriching travel experiences, seamlessly integrating AI-driven features into every aspect of their journey. The website incorporates cutting-edge AI technologies to optimize destination recommendations, itinerary planning, real-time assistance, and budget optimization,recommending the best time to visit, basically transforming the way travelers embark on their adventures.

Introduction:

The rapid growth of the global tourism industry has led to an increasing demand for innovative technologies that can enhance the tourist experience. Traditional travel guides and information sources often fall short in meeting the diverse needs of modern travelers. An AI-based system has the potential to revolutionize how tourists explore and interact with new destinations by providing intelligent, data-driven solutions.

This cutting-edge AI tourism website is seamlessly integrated into the travel planning process, optimizing destination recommendations, itinerary planning, real-time assistance, and budget optimization. With AI-driven features, this website transforms the way the users embark on its tourism adventures, crowd analysis and peak time, recommending the best time to visit, suggesting hostels and other accommodations, offering virtual tours, and even providing a voice assistant and chatbot for real-time assistance.

Problem Statement:

Developing an AI-powered platform that analyzes users' preferences, travel history, and interests to suggest personalized travel destinations, itineraries, and activities. The system will use machine learning algorithms to continuously refine recommendations based on user feedback. Also developing algorithms that predict crowd sizes and peak times at popular tourist spots. This could help travelers avoid crowded periods, enhancing their overall experience.

The platform will collect and analyze user data, including past travel destinations, activities, and preferences. Machine learning algorithms will process this information to generate personalized travel recommendations. These recommendations could include suggestions for destinations, landmarks, cultural events, and local experiences that align with the user's interests.

Proposed Solution:

To implement the innovative tourism website harnessing the power of Artificial Intelligence (AI) with Django, following are the steps to be followed:

- Project Setup:

Installing Django and setting up a new Django project with the necessary configurations. Create Django apps for different components like review system, destination recommendation, virtual tours, etc.

- Frontend Development:

Designing and implementing the frontend using HTML, CSS, and JavaScript. Using Python Framework Django for the implementation.

- Database Design:

Design the database schema to store user data, reviews, destinations, and other relevant information.

Setting up models in Django to represent the database tables and their relationships.

- Review System and Chatbot :

Review System is used to give the recommendations to the user regarding the tourist destinations. Chatbot will provide the assistance and solve their queries and provide the users the right suggestions with best possible algorithms with the help of AIML libraries. Utilize NLP libraries like NLTK or spaCy to create a chatbot that understands user queries and responds appropriately.

- Virtual Tours:

It provides a 360 view of the tourist place using an AI model to get the clear and deep insights of the tourist destination which the user wants to visit.

- Voice Assistant:

Implement a speech-to-text module using libraries like Google Speech-to-Text or Mozilla DeepSpeech.

Develop a voice assistant using NLP libraries like NLTK or spaCy to process user voice commands and provide real-time assistance.

- User Authentication and Authorization:

Implement Django's built-in authentication system for user registration and login.
Manage user permissions and access to various features of the website.

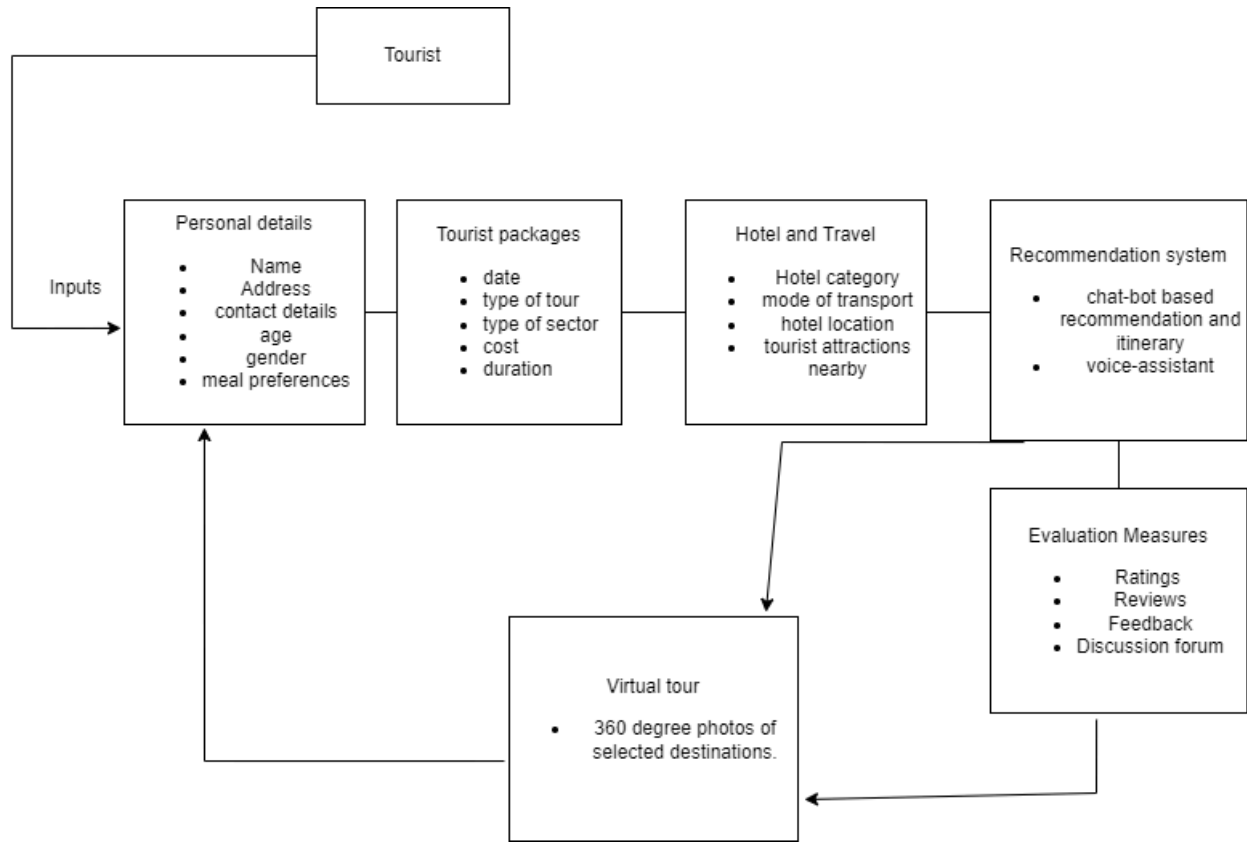
- Destination Recommendation:

Developing AI/ML models using TensorFlow, scikit-learn, or PyTorch to create destination recommendation algorithms. Integrating the AI models with Django to provide personalized recommendations based on user preferences, travel history, and other factors. Implement a database model to store the recommended destinations and their details

- Itinerary :

Allow users to set the duration of their trip and provide flexible options for scheduling.
Utilize AI algorithms to optimize the itinerary by considering travel times between destinations and the duration of stay at each location.

Block Diagram:



The following block diagram has certain components that are the core components that would be taken into consideration in this project. Initially after a user approaches the platform his personal details would be taken into account. Thereafter , the user would be required to specify the requirements about the tour like duration of the tour, type of destination the user would like to visit,etc. Based on the details entered there is a recommendation system that would recommend packages , itineraries , hotel details.Also the user can go through virtual tours that would be available for some destinations. The user will also be able to provide reviews and feedback of his/her experience.

Hardware, Software and Tools Requirements:

Software Requirements:

- Django(4.2.4): Using Django as the web framework for its robustness, security features, and ease of development. Django is a Python-based web framework that provides a high-level architecture to build web applications quickly and efficiently.
- Python (3.11.4): The core language for developing the AI components and integrating them with Django.
- AI/ML Libraries: Utilize AI and machine learning libraries such as TensorFlow, scikit-learn, or PyTorch to implement the AI-driven features like destination recommendations, itinerary, AI chatbot, planning, virtual tours and budget optimization.
- Natural Language Processing (NLP): For real-time assistance, you may need NLP libraries like NLTK or spaCy to process user queries and provide relevant responses.
- RESTful APIs: Design RESTful APIs in Django to communicate between the frontend and backend, allowing the AI functionalities to be integrated seamlessly with the website's user interface.
- Frontend Technologies: Using HTML5, CSS, and JavaScript-14 for building the user interface of the website with the help of Django.
- Authentication and Authorization: Implement Django's built-in authentication system for user registration, login, and personalized experiences.
- Google Maps API: To enhance the innovative tourism website with Google Maps API, you can integrate various features provided by the API to offer interactive maps, location-based services, and route planning.

Hardware Requirements:

- CPU: A powerful CPU is essential for running AI algorithms efficiently. Consider using multi-core processors such as Intel Core i7 or i9, AMD Ryzen 7 or 9, or even server-grade processors for more intensive tasks.
- GPU: Many AI tasks, especially deep learning, can benefit significantly from GPU acceleration. NVIDIA GPUs, such as the GeForce GTX or Quadro series, are commonly used for AI projects. Alternatively, AMD GPUs with RDNA or RDNA2 architecture can also be considered.

- RAM: Sufficient RAM is crucial for handling large datasets and complex AI models. Aim for at least 16GB of RAM, but if your AI models and datasets are more extensive, consider 32GB or more.
- Storage: Fast storage is essential for quick data access and model training. SSDs (Solid State Drives) are preferred over traditional HDDs (Hard Disk Drives) for better performance.

Tool Requirements:

- An Integrated Development Environment (IDE) platform such as Visual Studio Code or Pycharm 2023.2 will be required to execute the code.
- Anaconda Distribution (V23. 5.0). : It provides a large variety of IDE's for executing different kinds of code and has wide applications.

Proposed Evaluation Measures:

The following evaluation measures are kept in mind while designing the project:

1. Accuracy : The given platform would be considered as accurate only when the user is provided with authentic information based on his city of origin and the tour/destination he has selected. For example: Suppose there is a group tour for Rajasthan . Tourists from multiple cities will like to join the tour. So based on the city of stay the user must be shown with appropriate details. A person traveling from Mumbai should be given details as per him than the person who is traveling from Delhi.

Formula:

$$\text{Accuracy} = (\text{Number of Correct Predictions}) / (\text{Total Number of Predictions})$$

In mathematical terms: $\text{Accuracy} = (\text{True Positives} + \text{True Negatives}) / (\text{True Positives} + \text{True Negatives} + \text{False Positives} + \text{False Negatives})$

Where:

- True Positives (TP): The number of correctly predicted positive instances.
 - True Negatives (TN): The number of correctly predicted negative instances.
 - False Positives (FP): The number of instances that the model incorrectly predicted as positive when they are actually negative.
 - False Negatives (FN): The number of instances that the model incorrectly predicted as negative when they are actually positive.
2. User satisfaction and feedback : This measure will ensure whether the user is satisfied with the information provided to him/her. User will be able to share his/her feedback based on the experience in the community forum.
 3. Root Mean Squared Error (RMSE): Root Mean Squared Error indicates how close the predicted values are to the actual values. In the case of this project, this parameter would be useful particularly in predicting the quantitative values such as travel costs,distance estimations, etc.

$$\text{Formula: RMSE} = \sqrt{(\sum(\text{predicted}[i] - \text{actual}[i])^2 / n)}$$

Where,

- Σ represents the sum across all data points.
- predicted is the predicted value from the AI model.
- actual is the actual observed value.
- n is the total number of data points.

4. F1 Score : This score can be useful in classification tasks such as categorizing tourist places into types such as historical, cultural, natural, etc. It balances the gap between precision and recall. Precision involves measurement of the positive predictions made by the model while recall involves the measurement of ability of the model to correctly identify the positive instances.

Formula: $F1\ Score = 2 * (Precision * Recall) / (Precision + Recall)$

Where,

- Precision = True Positives / (True Positives + False Positives)
- Recall = True Positives / (True Positives + False Negatives)
- True Positives (TP) are the cases where your model correctly predicts the positive class.
- False Positives (FP) are the cases where your model incorrectly predicts the positive class.
- False Negatives (FN) are the cases where your model incorrectly predicts the negative class.

Conclusion:

In conclusion, the development and implementation of an AI-based system for tourists represent a significant step forward in revolutionizing the travel and tourism industry. Through the integration of cutting-edge technologies such as machine learning, the project has successfully demonstrated the potential to enhance the tourist experience in several key aspects.

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