

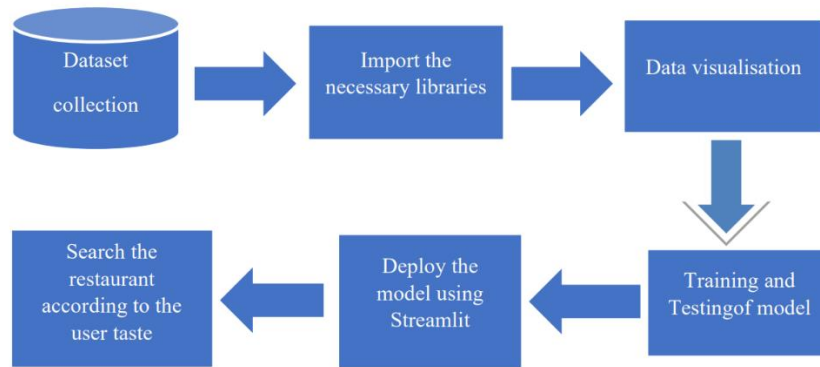
Project Design Phase-I
Solution Architecture

Date	23 October 2023
Team ID	NM2023TMID 592388
Project Name	Project - RESTAURANT RECOMMENDATION SYSTEM
Maximum Marks	5 Marks

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- The best tech solution to solve existing business problems , which could be achieved by :
 - **User Segmentation:** Segment users based on their behavior and preferences using clustering techniques.
 - **Model Building:** Building a recommendation model using techniques like collaborative filtering or matrix factorization.
 - **Monitoring and Updating:** Monitor the performance of the system in the production environment and update the model periodically with new data.
- **Structure of the project :** The system is structured into several key components:
 1. **Data Collection :** In this we collect data from various sources such as restaurant details, user details, and user-restaurant interactions.
 2. **Data Preprocessing:** In this we clean the collected data and transforms it into a suitable format for analysis.
 3. **Feature Engineering:** This creates new features from the preprocessed data that can improve the performance of the recommendation model.
 4. **Model Building:** Then we use machine learning algorithms to build a recommendation model.
 5. **Recommendation Generation:** Ultimtaly we Train model to generate restaurant recommendations for users.
- **Characteristics:**
 1. **Scalability:** The system is designed to handle large amounts of data and can scale as the number of users and restaurants increases.
 2. **Personalization:** The system provides personalized restaurant recommendations based on user preferences and behaviour.
 3. **Real-time Recommendations:** The system can generate recommendations in real time,by regularly updating data and training the model.
- **Behaviour:**



• Other Aspects:

1. **Deployment:** The recommendation system is deployed in a production environment where it can serve real-time recommendations to users.
2. **Monitoring and Updating:** The performance of the system is continuously monitored and the model is updated periodically with new data.

It aims to provide users with personalized restaurant recommendations, thereby enhancing their dining experience and helping restaurants attract more customers. It leverages data science techniques to analyse user behaviour and preferences, and uses this information to generate accurate and relevant recommendations.

Example - Solution Architecture Diagram:

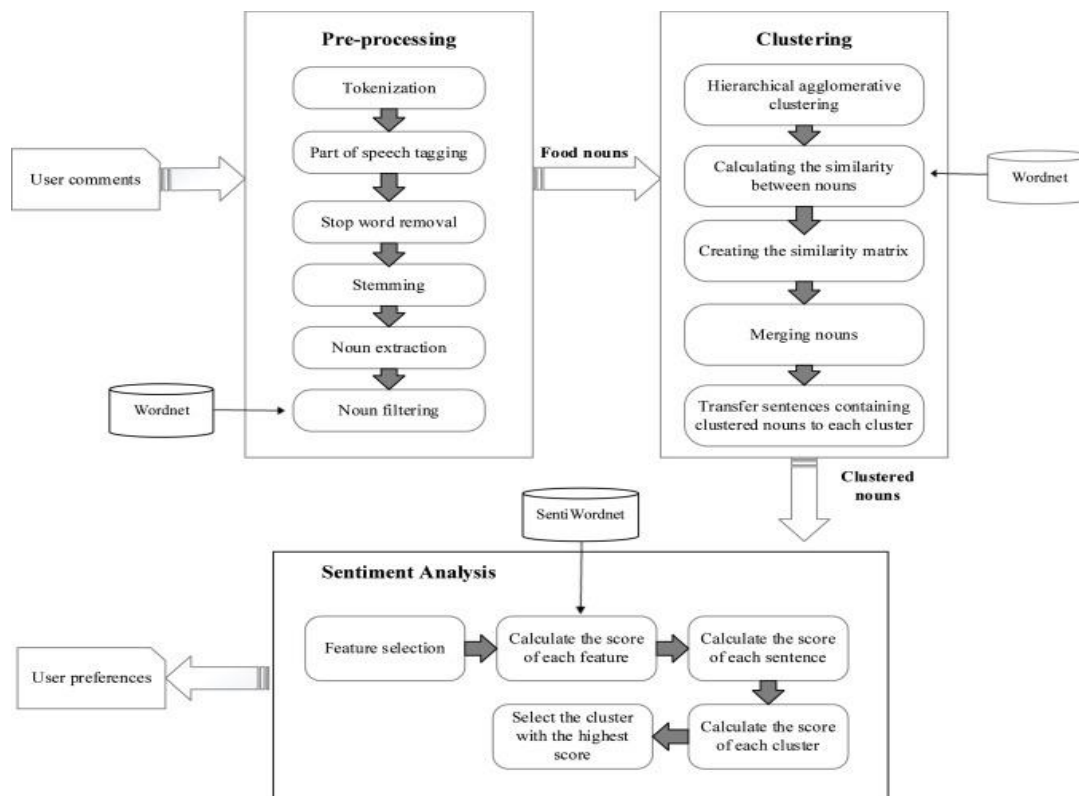
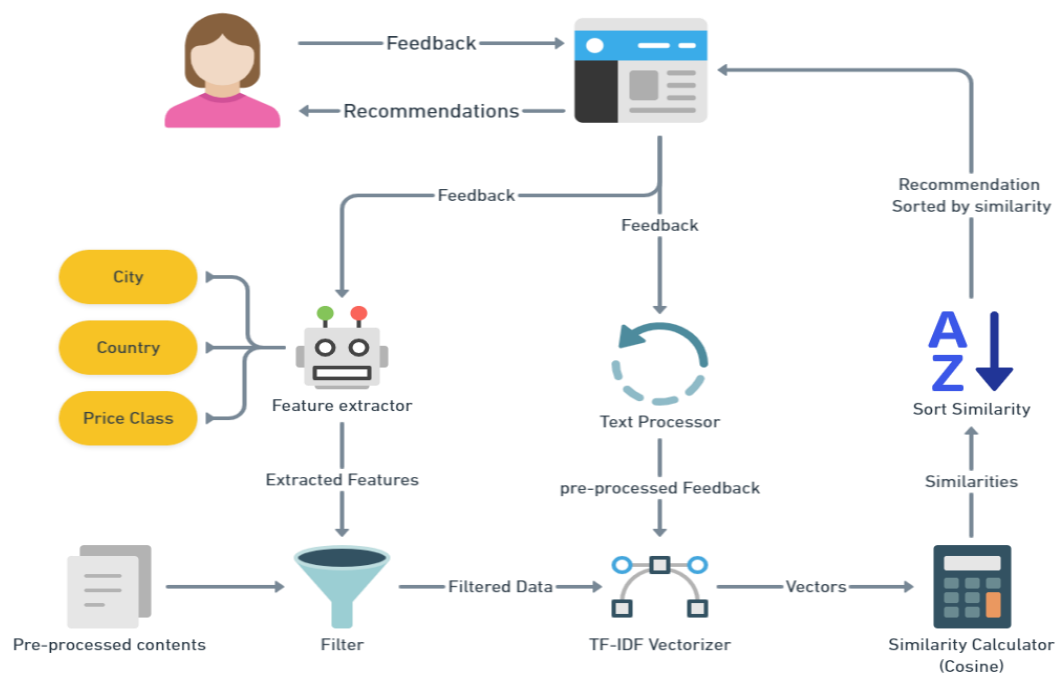


Figure 1: Architecture and data flow of the restaurant recommendation system sample application

- **Features:**

1. **Personalized Recommendations:** The system should provide personalized restaurant recommendations based on user preferences and behaviour.
2. **Real-time Recommendations:** The system should be capable of generating recommendations in real time.
3. **User Segmentation:** The system should be able to segment users based on their behaviour and preferences.
4. **Location-based Recommendations:** The system will provide recommendations based on the user's current location.

- **Development Phases:**



- **Solution Requirements:**

1. **Scalability:** The system will be designed to handle large amounts of data and scale as the number of users and restaurants increases.
2. **Accuracy:** The recommendations provided by the system should be accurate and relevant to the user's preferences.
3. **Efficiency:** The system should be able to generate recommendations quickly and efficiently.
4. **Usability:** The system should be user-friendly and easy to use.

- **Specifications according to which the solutions is defined managed and delivered.**

1. Data Collection:

The system should be capable of collecting data from various sources such as restaurant details, user details, and user-restaurant interactions. The data collection process should be automated and scalable.

2. Data Preprocessing:

The system should clean the collected data by handling missing values, removing duplicates, and transforming data into a suitable format for analysis. The preprocessing steps should be documented and reproducible.

3. Feature Engineering:

The system should create new features from the preprocessed data that can improve the performance of the recommendation model. The feature engineering process should be based on sound reasoning and should be documented.

4. Model Building:

The system should build a recommendation model using machine learning algorithms. The choice of algorithm should be justified based on the characteristics of the data and the requirements of the project.

5. Model Evaluation:

The system should evaluate the performance of the model using appropriate metrics. The evaluation process should be thorough and should consider various aspects such as accuracy, precision, recall, etc.

6. Recommendation Generation:

The system should use the trained model to generate restaurant recommendations for users. The recommendations should be personalized and relevant to the user's preferences.

7. Deployment:

The recommendation system should be deployed in a production environment where it can serve real-time

recommendations to users. The deployment process should ensure that the system is scalable and robust.

8. Monitoring and Updating:

The performance of the system in the production environment should be continuously monitored and the model should be updated periodically with new data.

References :

https://sist.sathyabama.ac.in/sist_naac/documents/1.3.4/b.e-cse-batchno-340.pdf

<https://scholarworks.calstate.edu/downloads/nv9356056>