# Report On


## Restaurant Recommendation System Using

## Expert Systems


## By

Name:                                    ID:

Varun Konkimalla                     2020B2A42393H

Balusa Mahima                        2020B2A42478H

AVLN Raghu                           2020B2A12598H

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE,

Hyderabad

# Report On


## Restaurant Recommendation System Using

## Expert Systems

By

Varun Konkimalla 2020B2A42393H

Balusa Mahima 2020B2A40974H

AVLN Raghu 2020B2A12598H

Prepared in fulfillment of the Lab Project in

CS F407

Under the guidance of Professor Aneesh Chivukula

# Table of Contents(Crispdm format)

## Acknowledgment

We extend our sincere gratitude to Professor Aneesh Chivukula for his invaluable support and guidance throughout this AI project. His expertise and unwavering belief in our capabilities have been instrumental in our successful journey. His passion for teaching and dedication to mentoring have enriched our understanding of artificial intelligence and its practical applications. Whenever we faced challenges, Professor Chivukula was there to offer solutions and encouragement, pushing us to explore new possibilities and think critically. Without his constant presence and assistance, this project would not have been as fulfilling and rewarding as it has been. Under his guidance, we not only developed technical skills but also gained confidence in our abilities to tackle complex problems in the AI domain

**Abstract**

The restaurant recommendation system has become an increasingly popular and sophisticated service, leveraging technology to deliver personalized and useful information. With the rapid growth of online businesses and the abundance of information on the internet, recommender systems have gained widespread popularity across various domains, including E-commerce, music, movies, books, and restaurant recommendations.

In this era of advanced technology, access to these systems has become readily available to every customer, allowing them to obtain relevant information wherever and whenever they need it. Our restaurant recommendation system focuses on filtering and suggesting establishments based on their ratings and cost, ensuring that users receive tailored recommendations that align with their preferences. By utilizing this effective approach, we aim to enhance the dining experience and provide users with a seamless and satisfying restaurant selection process.

**Business Understanding:**

**Project Objective:**

The Restaurant Recommendation Expert System aims to suggest users the best food to eat in a given city based on their preferences. The application targets everyone who wishes to go to a restaurant to eat and have an outing.

**Introduction**

Dining options not only fulfill our basic needs but also encapsulate our culture, traditions, and values.

When exploring new places, one of the key considerations that captivate our senses is the diverse range of dining options available. However, the ever-growing number of restaurants often leaves people uncertain about the best-suited establishment that caters to their preferences, making it challenging to find the perfect place to indulge in a delightful meal. To address this predicament, we have developed the Restaurant Recommendation Expert System—a rule-based expert system meticulously crafted to offer users personalized food recommendations based on their individual preferences. This innovative application is designed to cater to all individuals seeking to discover exceptional restaurants and embark on a memorable culinary journey.

By taking into account the user's food preferences, the application provides tailored food suggestions. Through a series of predefined questions, the system updates its knowledge base based on the user's responses. Utilizing forward-chaining, the CLIPS system deduces the most fitting solution by searching the existing knowledge base and asserting new facts as each rule is executed.

**Data Understanding:**

The Restaurant Recommendation Expert System is specifically designed to cater to users' preferences by providing them with a comprehensive list of restaurants based on their individualized criteria, including the city, veg/non-veg food type, cuisine, budget, and restaurant rating. The expert system operates on a database that contains crucial information for two distinct locations: BitsHyd and Hyderabad, each offering a diverse culinary landscape.

For each of these locations, the database is meticulously curated with data for two hand-picked restaurants. Each restaurant within the dataset is thoughtfully classified into various categories, based on the characteristic features outlined in the Restaurant Class. These classifications enable the system to present users with tailored and relevant recommendations, ensuring a delightful dining experience.

**Data Preparation:**

To ensure smooth and efficient management of the restaurant information, the Restaurant Recommendation Expert System employs the use of a CSV file for database handling. This approach offers numerous benefits, including seamless updates, effortless insertion of new restaurants, and hassle-free deletion of outdated or non-relevant entries. As a result, the system can effortlessly keep the restaurant database up-to-date and accurately reflect the latest dining options available in BitsHyd and Hyderabad.

**Data Modeling:**

The database of the expert system encompasses crucial fields that characterize each restaurant, thereby facilitating precise and personalized restaurant recommendations:

1. **Location:** This field captures the specific city where the restaurant is situated, presenting users with choices in either the vibrant location of BitsHyd or the culturally diverse city of Hyderabad.

2. **Food Type:** The expert system thoughtfully categorizes the food offerings at each restaurant as either Vegetarian or Non-Vegetarian, catering to the varied dietary preferences of the users.

3. **Cuisine:** The rich and enticing array of cuisines available at the restaurants is meticulously documented, encompassing diverse culinary delights, such as Indian,

Italian, Chinese, and more.

4.  **Budget:** For each restaurant, the average per-person price of the delectable fare is categorized into three convenient ranges: under 150 Rupees, 150 to 300 Rupees, and over 300 Rupees. This empowers users to make dining choices that align with their budgetary constraints.

5.  **Restaurant Rating:** To further enhance the dining experience, each restaurant is thoughtfully rated according to the prestigious 3-star Zomato Rating system, ensuring that users can select dining venues based on the level of culinary excellence they desire.

Leveraging this comprehensive dataset, the expert system seamlessly matches user preferences with suitable restaurants, generating relevant and tailored recommendations that promise a memorable and delightful dining experience.

**Modelling:**

Real-Time Expert System

The Restaurant Recommendation Expert System utilizes a rule-based recommendation technique to provide personalized restaurant suggestions based on user preferences. This system functions as a recommendation engine, guiding users to discover their ideal dining choices through a series of tailored questions. By exploring and analyzing user inputs, the inference engine triggers predefined rules to generate optimal restaurant recommendations. The underlying architecture of the expert system is built upon the CLIPS shell, which provides essential components for its operation:

1. Working Memory: This component encompasses a fact-list and an instance-list, storing relevant information and data throughout the recommendation process.
2. Knowledge Base: The knowledge base comprises a collection of rules derived from a combination of online surveys, statistics, and restaurant information specific to different cities.
3. Inference Engine: As the core of the system, the inference engine governs the overall rule execution, applying them to user inputs to deduce suitable restaurant choices.
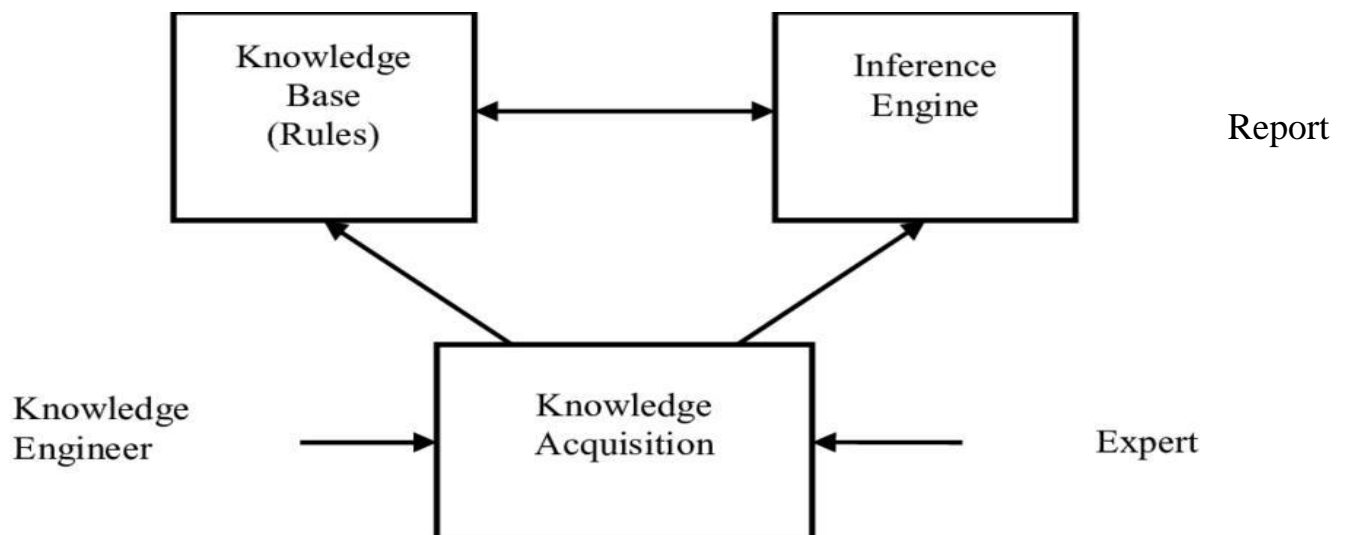


Knowledge Base To create the knowledge base, the system incorporates data obtained from online surveys and statistics, which are transformed into a set of rules serving as the foundation for generating restaurant recommendations. Additionally, information from online sources is organized into a CSV file and loaded into the CLIPS shell during software execution.

9

Inference Engine The inference engine plays a pivotal role in processing user inputs and filtering them through the established rules in the knowledge base. When user preferences align with specific attributes in the knowledge base, the system promptly delivers relevant restaurant recommendations. In instances where not all user input attributes find a direct match, the inference engine employs a strategic process of eliminating the least significant attributes one by one. Subsequently, it reevaluates the knowledge base to provide alternative recommendations that best align with the user's preferences.

For example, suppose a user expresses preferences for vegetarian cuisine, a budget-friendly option, and a restaurant with high ratings. The inference engine would analyze the knowledge base and recommend restaurants that offer excellent vegetarian dishes, fit within the specified budget, and have garnered positive reviews from previous customers.

The efficient functioning of the inference engine, in conjunction with the comprehensive knowledge base, ensures that the Restaurant Recommendation Expert System delivers valuable and relevant dining suggestions tailored to individual user preferences.

Implemented Modules

1. **PyCLIPS:** PyCLIPS serves as the Python wrapper for CLIPS (C Language Integrated Production System) and plays a pivotal role in the functioning of the Restaurant Recommendation Expert System. With PyCLIPS, seamless integration between Python and CLIPS is achieved, allowing the system to utilize CLIPS' powerful rule-based recommendation technique for generating personalized restaurant suggestions. PyCLIPS provides an efficient and flexible interface, enabling the inference engine to trigger predefined rules based on user inputs and derive optimal restaurant recommendations accordingly.

2. **Tkinter:** Tkinter is the standard GUI (Graphical User Interface) library in Python, chosen as the primary tool for creating the user interface of the Restaurant Recommendation Expert System. This versatile library offers a wide range of widgets and tools that make it easy to develop a user-friendly and interactive interface for users. Through Tkinter, users can provide their preferences for city, veg/non-veg, cuisine,

budget, and restaurant rating, and the system can efficiently process this information using PyCLIPS to deliver personalized restaurant recommendations. Tkinter's robust capabilities ensure that the GUI is visually appealing, making it convenient for users to interact with the system and receive tailored restaurant suggestions.

**Evaluation:**

The Restaurant Recommendation Expert System offers a user-friendly and interactive Graphical User Interface (GUI) that allows users to conveniently interact with the system. Users will provide answers to various questions, such as their preferred location, cuisine, budget, and other factors. After collecting the necessary inputs, the expert system will apply predefined rules and perform inference from the knowledge base. Subsequently, the system will present a comprehensive list of restaurants that meet the specified constraints and align with the user's preferences.

Features of the System

The Restaurant Recommendation Expert System is equipped with the following key features:

1. **Graphical User Interface (GUI):** A visually appealing and intuitive GUI is provided to enhance the user experience. The interactive interface facilitates seamless communication between the user and the expert system, making it effortless for users to input their preferences and receive personalized restaurant recommendations.

2. **Easy Restaurant Updation:** The system allows for effortless updation of restaurant data through a simple CSV file. This feature empowers administrators to modify the restaurant database easily, ensuring that the information presented to users is always up-to-date and accurate.

3. **Recommendations based on Multiple Factors:** Users have the flexibility to specify various factors for their ideal restaurant, such as location, food type, cuisine, budget, and restaurant rating. The system utilizes these preferences to generate tailored recommendations that align with the user's unique requirements.

4. **Enhanced Recommendations with Best Value:** In addition to presenting restaurants that exactly match the user's preferences, the system goes the extra mile by offering enhanced recommendations that provide the best value for the same budget. For

instance, if a user requests a restaurant with a specific rating, the system will also display restaurants with higher ratings within the same budget range, ensuring users have a wider selection of options to choose from.

By incorporating these robust features, the Restaurant Recommendation Expert System aims to provide users with an enjoyable and efficient dining experience, making it easier for them to discover the perfect restaurant that meets their preferences and desires.

**Conclusion:**

In conclusion, the development of the Restaurant Recommendation Expert System has been driven by a meticulous consideration of various criteria to accurately classify each restaurant into its respective category. By leveraging factors such as location, cuisine, budget, and restaurant rating, the system has successfully delivered personalized and optimal dining suggestions to users, enhancing their overall dining experience.

Looking ahead, there is ample potential for the system's future scope. To further refine and tailor restaurant recommendations, the integration of additional criteria, such as ambiance, dietary preferences, and specific dish availability, can be explored. This expansion will provide users with a broader array of options to choose from, ensuring that their preferences are even more closely matched.

Additionally, implementing a user review system for each restaurant can greatly enhance the recommendation process. By incorporating user-generated reviews and ratings, the system can offer valuable insights to other users, validating its suggestions and aiding in their decision-making process. These advancements will enable the Restaurant Recommendation Expert System to continuously evolve and remain at the forefront of assisting users in discovering the perfect dining experiences that perfectly align with their unique preferences and expectations.