DEVELOPMENT OF AN AI-POWERED SMART MENU RECOMMENDATION CHAT APPLICATION FEATURING ALLERGENS AWARE ALGORITHM FOR ENHANCING SAFE HOTEL DINING EXPERIENCE.

## Project Title

**PROJECT TITLE**: “Development of an AI-Enabled Menu Recommendation Chatbot for the Hotel Industry”

**MODULE CODE**: 7COM1039

**MODULE TITLE**: Advanced Computer Science Master’s Project

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## **Introduction**

The hospitality industry is a sizable one that makes a lot of money from providing services like lodging, dining, and other features. The tourism sector spends a lot of money on menu planning, involving expenses for menu development, ingredient sourcing, staff training, and menu updates. Manual menu management procedures may be labour- and time-intensive, increasing expenses related to operation. An economy's revenue generation and overall tourism sector are significantly influenced by the hotel industry.

## **Aim of the project**

The main aim of this project comprises into 2 crucial points

1. Implementation of technical aspects such as Machine Learning, AI take over on manual work to provide utmost guest satisfaction by reducing their wastage of time
2. Creation of AI chat Bot which can serve as an interactive interface between customers and the hotel, providing menu recommendations and considering allergen information.

## **Implementation of Technology in Hotel Industry:**

The hotel industry is experiencing a growing demand for advanced technologies such as machine learning and AI chatbots to address the diverse needs and preferences of customers. The primary objective of this project is to enhance guest comfort and satisfaction by minimizing manual work and mistakes done which led to guest discomfort to usage of machine learning technology to assist them personally.

## **AI Chat Bot Creation:**

Mainly this project focus on menu management and allergens consideration. In UK for every year nearly 60% of guests who stayed in hotels reviews food service and menu maintenance as very poor because of allergens consideration. In order to fill the bridge proposal of this project is by developing this AI chatbot system, hotels can significantly alleviate the challenges associated with menu management, allergen considerations, and guest satisfaction. Additionally, this project aligns with the current trends in the hotel industry, where the integration of AI technologies is becoming increasingly prevalent. The utilization of machine learning, natural language processing, and database management will enable the chatbot to intelligently process customer inputs, provide accurate recommendations, and ensure a high level of guest satisfaction.

Throughout this project, we will explore various technical components, including programming languages such as Python, machine learning algorithms, natural language processing techniques, chatbot frameworks, and database management systems. By conducting thorough research in the areas of menu recommendation systems, allergen considerations, and chatbot development, we aim to create an AI chatbot that revolutionizes the menu selection process in the hotel industry

## **Research Question:**

Many hotels struggle with effectively managing menu recommendations and allergen considerations for their guests, leading to guest discomfort, potential health risks, and reduced customer satisfaction.

How can the hotel sector improve client happiness and operational effectiveness by implementing an AI chatbot system for menu recommendations and allergies considerations?

This study question focuses on the project's main goals, which include increasing client satisfaction and operational efficiency in the hotel business by utilising an AI chatbot system. By answering this question, the study intends to examine the impact of adopting the AI chatbot on guest experiences, identify the benefits it delivers in terms of personalised menu recommendations and allergen considerations, and evaluate its effectiveness in optimising operational operations. This research question emphasises the project's practical relevance and prospective contributions, which may resonate with your supervisor and demonstrate the significance of your work in the context of the hotel sector.

## **Objectives:**

In this Project various objectives are considered in the creation

* Create an AI chatbot system tailored to the hotel industry.
* Increase guest satisfaction by making personalised menu suggestions.
* To ensure guest safety and comfort, improve allergen considerations.
* Using automation and AI algorithms, streamline the menu planning process.
* Reduce menu planning and allergen management operational costs.
* Automate repetitive tasks and inquiries to increase efficiency.
* Collect and analyse guest feedback to improve menu offerings over time.
* Insights and reports on guest preferences, popular menu items, and allergen trends should be generated.
* Improve conversation understanding and response accuracy by implementing natural language processing (NLP) techniques.
* Use machine learning algorithms to improve the chatbot's performance and recommendations on a continuous basis.
* To protect guest information, keep data privacy and security protocols in place. Analyse the AI chatbot system's impact on guest satisfaction and operational efficiency and helpful in overall revenue generation

These goals centre on enhancing the AI chatbot system's ability to take guests with dietary restrictions or allergies into account when choosing menu items, ensuring that they receive accurate information and suitable menu options.

## **Short Description of Project Idea:**

In this scenario, an AI chatbot will be created to interact with customers and learn about their preferences for vegetarian or non-vegetarian food, beverages, and considerations for allergens. A pre-uploaded database of menu items will be suggested by the chatbot based on the information you provide. By making individualised menu suggestions, the aim is to lessen allergic reaction-related problems and improve guest comfort. The chatbot will understand customer inputs, process the data, and produce the appropriate recommendations using machine learning and natural language processing techniques.

The project's goal is to create an AI-powered chatbot system for the hotel industry to help with menu selection and allergen consideration. The concept revolves around developing an intelligent chatbot interface that interacts with hotel guests by inquiring about their dietary habits, allergen restrictions, and menu options. The chatbot will analyse guest responses and recommend appropriate menu items based on their preferences and allergen requirements using natural language processing (NLP) techniques.

The system will use algorithms based on machine learning to gather data from conversations with guests constantly enhance its precision of menu suggestions for improvement. It will make use of an extensive database that included details about menu items such as ingredients, nutritional values, and allergen information. This database will be updated on a regular basis to ensure that the most recent information is available.

Guests will be able to communicate with the chatbot at their leisure by using a variety of platforms, including web and mobile applications. The chatbot will make menu recommendations based on the guest's preferences and allergen restrictions. It will also provide comprehensive details on allergens present in each menu item, as well as potential cross-contamination risks, allowing guests to make informed decisions.

The project will necessitate the integration of numerous technologies, which includes natural language processing algorithms, artificial intelligence models, and management systems for databases. An extensive gathering of information and preliminary processing will be carried out in order to create a robust menu and allergen database. The development process will include coding in programming languages such as Python and utilising frameworks such as TensorFlow or PyTorch for machine learning implementation.

## **Technologies used in this Project:**

* Python Programming
* Machine Learning and Deep Learning of Artificial Intelligence and chat systems
* Chatbot Frameworks
* User Interface Design analysis
* Menu recommendation Systems
* Integrated Development of Systems
* Natural Language Processing
* Web Development and Technologies
* Data Base Management
* Data sets sourcing and Process
* Microsoft Office
* Adobe XD and Design
* Trello and Jira Software for Project Management

## **Methodology used in this Project**

* Establish the objectives and extent of the project with a focus on the hotel industry's consideration of menu options and allergies.
* Conduct an in-depth literature review on chatbots with artificial intelligence, NLP, menu suggestion systems, and allergen management in the hotel industry.
* Find and collect pertinent datasets that include details about the ingredients, nutritional content, and allergens on the menu.
* Ensure data consistency and accuracy by pre-processing and cleaning the dataset.
* Create a database schema that will be used to store the menu and allergen information while taking effective management and retrieval into account.
* Natural language processing, or NLP, techniques are used to design and implement the chatbot interface.
* Utilise the dataset to train machine learning models that analyse guest preferences and provide customised menu recommendations.
* Utilise allergen recognition computations to identify allergen-friendly food choices according to guest the inputs.
* In order to facilitate obtaining data and information display, integrate the chatbot system with the menu and allergen database.
* Make sure the chatbot's functionality is thoroughly tested, taking allergens into account and providing accurate menu recommendations.
* Increase the chatbot's functionality by adding elements like alternative menu suggestions and advice on ingredient swaps.

## **Plan to Conduct this Project**

I have classified this whole project into four phases in order to complete it with a successful note

* Phase 1: Learning the basics of all software’s including Python Programming, chat bot models, web-based technologies
* Phase 2: Implementing all technical aspects to start creating chat bot using all literature papers.
* Phase 3: Deployment and testing of chat bot using existed machine learning models
* Phase 4: Testing Chat Bot in real time scenarios using real time data sets.

All these phases are distinctively classified by day-to-day learning in all aspects.

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