1. **Title of Project: AI-Driven Personalized Recipe Generator**

2. **Name of college: Yashoda Technical Campus, Satara**

3. **Name of Department: Computer Science & Enginnering**

4. **Name of students: 1. Neha Subhash Kumbhar**

   2. Namrata Dilip Pawar

   3. Ankita Dnyandev sanas

   4. Vaishanvi Santosh Mahamulkar

5. **Name of guide: Prof. Shital Waghmare**

6. **Relevance :**
   - **Caters to Dietary Needs:** It accommodates allergies and preferences (e.g., vegan, gluten-free).
   - **Saves Time:** Quickly generates meal ideas based on available ingredients.
   - **Promotes Healthy Eating:** Encourages nutritious choices and diverse diets.
   - **Enhances Culinary Skills:** Users can explore new cuisines and cooking methods.
   - **Integrates Technology:** Works with smart kitchens and grocery services for convenience.

7. **Literature Review:**

   1. The development of AI-based recipe generators and cook assistants holds significant promise for revolutionizing the way people discover, prepare, and enjoy food. Through advanced algorithms and machine learning techniques, these systems can offer personalized recipe recommendations, assist users in meal planning and grocery shopping, and provide step-by-step guidance during the cooking process. However, while AI-powered culinary assistants offer exciting opportunities, several challenges and considerations must be addressed. These include ensuring the accuracy and reliability of recipe recommendations, accommodating diverse dietary preferences and restrictions, and maintaining user privacy and data security.

   2. AI-powered recipe generation structures, ultimately enhancing the culinary adventure for customers worldwide. The advanced recipe generator is based on state-of-the-art AI and ML solutions that offer one an in-depth customer experience. There are many layers of processes from data collection to results generation: the recipe databases, culinary literature, and user data were combined by the advanced AI technique in order to communicate intricate patterns connected to the ingredients usage, the link between chosen ingredients and chosen recipes, and harmonic interactions between ingredients.

   3. The project enabled understanding the changes in output affected by the change made in hyperparameters. After successful creation of the model generating seemingly precise model we can move ahead to the next step of adding features to enhance user interactions. In future the model can make use of pre-trained transformersfor definite and cohesive text generation

thus correcting the model prediction and accuracy. Furthermore to make the project ideal and efficient other filters for searching along with search by ingredients can be added, such as search by image, search by cuisine type, health monitoring of recipes generated. Adding another approach to recipe generation such as recipe generation from title rather than ingredients, canbe an innovative direction to recipe generation using AI.

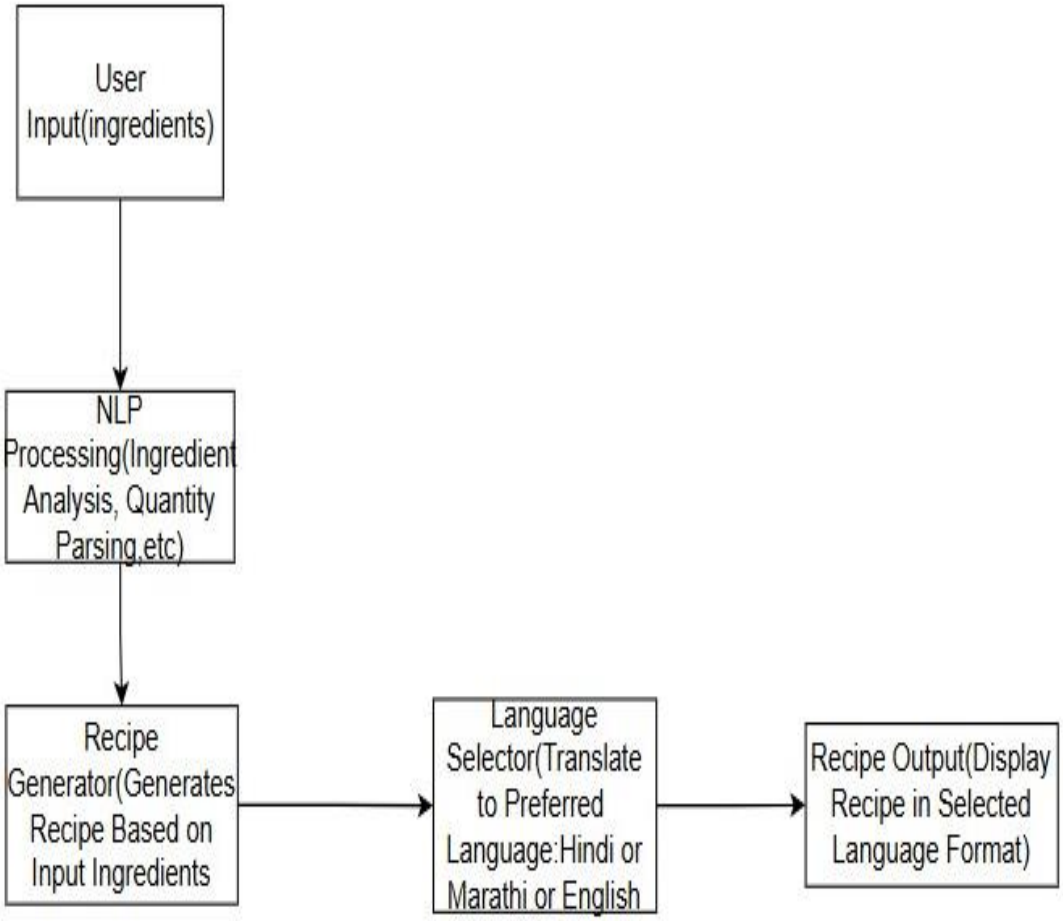
4. The proposed work experimented with different modules and permutations of different methods to provide the most accurate results. An interactive web app was subsequently created for ease of access and interactivity. Further, an exhaustive survey was conducted over a set of expected properties of the recipes generated by the evolutionary model. The feedback received supported the acceptance of newly generated unique Indian cuisine-centric recipes; more than 86% agreed that they might prepare/cook the recipe generated by the model.

5. A recipe generation system from food images holds significant potential across various domains, offering innovative solutions and enhancing user experiences. The applications span from assisting home cooks with personalized recipes to revolutionizing restaurant menus and contributing to educational and wellness initiatives. The system's adaptability and integration capabilities with existing platforms are crucial for its success in the dynamic and ever-evolving culinary landscape.

8. **Problem identification:**

- **Data Quality:** Ensuring a diverse and accurate recipe database.
- **User Variability:** Catering to different cooking skills and dietary restrictions.
- **Ingredient Substitutions:** Difficulty in suggesting suitable alternatives.
- **Nutritional Accuracy:** Meeting dietary goals and guidelines.
- **Data Privacy:** Protecting user health and personal information.

9. Block Diagram:



10. Experimental Setup:

Hardware Development Requirement (Minimum)

Computer or Server:

- **Processor (CPU):** At least an Intel i5 or AMD Ryzen 5 (or better) for faster processing, depending on the complexity of the AI models.
- **RAM:** Minimum of 8 GB, ideally 16 GB, especially for handling large datasets and model training.
- **Storage:** At least 500 GB SSD (or higher), to accommodate datasets, software, and AI models. High I/O performance for faster data retrieval is preferred.
- **Networking:** High-speed internet connection to access cloud-based resources, download datasets, and interact with online APIs or databases.
- **Operating System:** Windows 10, Linux, MacOS

Software Development Requirement (Minimum)

Frontend :

- **Python:** The most common language for AI and machine learning tasks. Python also integrates easily with data processing libraries like Pandas and machine learning frameworks like TensorFlow, Keras, and PyTorch.
- **JavaScript/HTML/CSS:** For front-end web development (if the recipe generator is to be web-based).

Backend

Web Framework:

- **Flask:** A lightweight and flexible Python web framework that can handle RESTful API creation. Flask is ideal if you want more control over the application structure.

- **Django:** A more heavyweight Python framework if you prefer a more "batteries-included" solution with built-in features like an admin panel, ORM (Object Relational Mapping), etc.

Machine Learning/AI Frameworks:

- **TensorFlow/Keras** or **PyTorch**: For implementing the AI model that generates personalized recipe suggestions.
- **scikit-learn:** For non-deep learning ML models like collaborative filtering, clustering, or recommendation algorithms.
- **spaCy** or **NLTK:** If you need natural language processing (NLP) for handling recipe descriptions, ingredient matching, or understanding user inputs (e.g., extracting ingredients from a natural language query).

Database System:

- **SQL/NoSQL:** For database management (e.g., MySQL, PostgreSQL, or MongoDB) to store user data, recipes, and ingredient information.

11. Scope of Project:

- **User Profiling:** Tailoring recipes based on dietary preferences, allergies, and nutritional goals.
- **Ingredient Management:** Suggesting recipes using available pantry items and seasonal ingredients.
- **Culinary Techniques:** Adapting recipes to match users' cooking skills and available time.
- **Nutritional Analysis:** Providing detailed nutritional information and meal planning support.
- **Health Integration:** Syncing with fitness apps and offering professional nutritional guidance.
- **Cultural Preferences:** Including diverse global cuisines and respecting cultural practices.

12. Objective:

- **Personalized Recommendations:** Provide recipe suggestions based on user preferences, dietary restrictions, and ingredients.
- **Simplifying Meal Preparation**: Provide step-by-step instructions, cooking tips, and customizable recipes for different skill levels.
- **Scalability & Flexibility**: Ensure the system can handle growing user demands and adapt to multiple devices, languages.
- **Nutritional Guidance:** To provide detailed nutritional information, helping users make informed dietary choices.

13. Proposed work:

- **Research and Development:** Conduct literature reviews and user surveys to understand needs.
- **System Design:** Plan architecture and create user-friendly UI/UX designs.
- **Data Collection:** Build a diverse recipe database and enable user input for preferences and ingredients.
- **Algorithm Development:** Implement machine learning for personalized recommendations and nutritional analysis.
- **Prototyping and Testing:** Develop a prototype and conduct user testing for feedback.
- **Iterative Improvement:** Use feedback to enhance the system and implement continuous learning.
- **Deployment:** Launch on web and mobile platforms with a marketing strategy.
- **Post-Launch Support:** Provide user support and regular updates based on feedback.
- **Evaluation:** Measure success through user engagement and assess long-term impact on cooking habits and health.

14. Motivation for work:

- **Promote Healthy Eating:** Encourage users to make better dietary choices tailored to their health goals and preferences, combating issues like obesity and nutritional deficiencies.
- **Address Dietary Restrictions:** Provide solutions for individuals with allergies, intolerances, or specific dietary needs, making cooking accessible for everyone.
- **Reduce Food Waste:** Help users utilize available ingredients effectively, minimizing waste and promoting sustainability in food consumption.
- **Cater to Diverse Preferences:** Acknowledge and celebrate diverse culinary traditions by offering a wide range of recipes from various cultures.
- **Leverage Technology:** Use advanced AI and machine learning to create a unique, personalized cooking experience that adapts to users over time.
- **Increase Engagement with Cooking:** Make cooking fun and engaging, turning it into a rewarding activity rather than a chore.

15. Expected Outcome:

The expected outcomes of an AI-driven personalized recipe generator system include increased user engagement and satisfaction through tailored recipe suggestions, improved cooking skills, and healthier eating habits. Users will experience reduced food waste by effectively utilizing available ingredients while exploring diverse cuisines and fostering a supportive community. The system will generate valuable data insights to inform continuous improvement, promote sustainable cooking practices, and integrate seamlessly with this system.

16. Expected Date of Completion:

17. Approximate Expenditure:

18. References:

1. Devarasetty Tejaswini, V Sankar Reddy(2024) Ai Based Recipe Generator And Cook Assistant
2. 1Akshara Pareek, 2Aastha Kanwar Gahlot, 3Neha Khatri, 4Mohnish Sachdeva(2024) Enhancing Recipe Generation Using AI and ML
3. Disha Moolya1 , Sakshi Pansare2 , Anushree Kshirsagar3 , Prof. Sonali Bodekar-Kale4(2022) Recipe Generator using Deep Learning
4. Smriti Chaudhary, Binita Soni, Aditya Sindhavad, Archi Mamaniya, Ashwini Dalvi, Irfan Siddavatam(2022) ChefAI.IN: Generating Indian Recipes with AI Algorithm
5. Tejas D and Varun C M(2024) A Literature Survey on Recipe Generation From Food Images using AIML

Place: Satara

Date:

Roll No.	**Name of Student**	**Signature**
38	Neha Subhash Kumbhar	
40	Namrata Dilip Pawar	
42	Ankita Dnyandev Sanas	
43	Vaishnavi Santosh Mahamulkar	

Project Guide **HOD**