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Smart Diet Planner with Emotional Eating Detection

Zaid Sajid Tukdi[1], Anjali Vishal Salve[2], Israr Shafi Shaikh[3]
(Kj's Trinity Polytechnic, Pune, India),
Email:(zaidtukdi3@gmail.com, anjalisalve2007@gmail.com, israrshaikh1023@gmail.com)

Abstract:

The increasing prevalence of unhealthy eating habits due to emotional factors has become a significant concern in modern lifestyles. This paper presents the design and implementation of a **Smart Diet Planner with Emotional Eating Detection**, a desktop-based application developed using Python and Tkinter. The system aims to identify emotional eating patterns by analyzing user- provided textual inputs through techniques from Natural Language Processing and Machine Learning.

The proposed system utilizes a text classification model based on Term Frequency–Inverse Document Frequency and Logistic Regression to detect user emotions across multiple categories such as stress, sadness, anxiety, and mindfulness. Based on the detected emotional state and user-entered dietary data, the application identifies patterns of emotional eating and provides personalized diet recommendations.

Additionally, the system integrates health metrics such as Body Mass Index (BMI), Basal Metabolic Rate (BMR), and Total Daily Energy Expenditure (TDEE) to generate goal-oriented nutritional guidance. Features such as calorie tracking, mood history visualization using graphical analysis, and weekly behavioral reports enhance user awareness and promote healthier decision- making.

The application operates entirely ofline, ensuring accessibility and ease of use without dependency on cloud infrastructure. The results demonstrate that integrating emotion detection with diet planning can significantly improve awareness of eating behaviors and support the development of healthier lifestyle habits.

1. Introduction

In recent years, unhealthy eating patterns influenced by emotional states have become increasingly common, leading to various health issues such as obesity, stress-related disorders, and poor nutritional balance. Emotional eating refers to the tendency of individuals to consume food in response to feelings such as stress, sadness, anxiety, or boredom rather than actual physical hunger. With the rapid growth of digital health technologies, there is a need for intelligent systems that not only monitor dietary habits but also understand the psychological factors influencing them. The integration of Artificial Intelligence, particularly techniques from Natural Language Processing and Machine Learning, provides an effective approach to address this problem.

This paper presents a Smart Diet Planner with Emotional Eating Detection, a desktop-based application designed to assist users in maintaining healthy eating habits by analyzing both emotional and dietary data. The system utilizes a text classification model based on Term Frequency–Inverse Document Frequency and Logistic Regression to identify user emotions from textual input. Based on the detected emotional state and calorie intake, the application determines whether the user is engaging in emotional eating and provides personalized diet recommendations accordingly. Additionally, features such as calorie tracking, mood history visualization, and weekly reports enhance user awareness and support better decision-making. By combining emotional analysis with nutritional planning, the proposed system aims to promote healthier lifestyle choices and improve overall well-being.

2. Scope of the project:

The scope of the Smart Diet Planner with Emotional Eating Detection system is focused on developing a desktop-based application that integrates dietary management with emotion analysis to promote healthier eating habits. The system utilizes techniques from Natural Language Processing and Machine Learning to analyze user-provided textual input and identify emotional states such as stress, sadness, and anxiety. Based on this analysis, the application detects emotional

eating behavior and provides personalized diet recommendations. It also includes features such as calorie tracking, Body Mass Index (BMI) calculation, and graphical visualization of mood history and weekly reports, making it a comprehensive tool for self-monitoring and health awareness.

The project is limited to a standalone desktop environment and operates without the use of cloud services, ensuring ofline accessibility and ease of deployment. It is designed for individual users and does not currently support multi-user synchronization or real-time data sharing. The emotion detection is based solely on text input and may vary depending on user expression and dataset quality. Future enhancements may include mobile application support, integration with wearable devices, real-time emotion detection using voice or facial recognition, and improved recommendation systems using advanced machine learning models. Despite these limitations, the system provides a practical and scalable foundation for intelligent diet planning and behavioral analysis.

I. current scope:

Desktop-based application developed using Python and Tkinter for diet planning and analysis

Emotion detection using Natural Language Processing and Machine Learning techniques

Text classification using Term Frequency–Inverse Document Frequency and Logistic Regression

Features include calorie tracking, BMI/BMR calculation, mood detection, and diet recommendations

Ofline system with local database, supporting single-user interaction and basic data visualization

II. Future Scope:

Development of a mobile application for better accessibility and real-time usage

Integration of advanced AI models to improve emotion detection accuracy beyond basic Machine Learning techniques

Inclusion of voice and facial emotion recognition along with Natural Language Processing

Cloud integration for data storage, multi-user access, and synchronization

Integration with wearable devices and fitness trackers for automatic health data monitoring

3. System Architecture:

- The system follows a three-layer architecture: User Interface, Processing Layer, and Database
- Tkinter-based interface is used for user input, display, and interaction
- Processing layer performs emotion detection using Natural Language Processing and Machine Learning
- Text is analyzed using Term Frequency–Inverse Document Frequency and classified with Logistic Regression
- Local database stores user data, food logs, emotions, and reports for ofline access

-It consist following Components:

System Architecture (Layered View)

1. User Interface Layer

- Built using Tkinter
- Handles user input for emotions and diet
- Displays recommendations, graphs, and reports

2. Processing Layer (Business Logic)

- Performs emotion detection using Natural Language Processing and Machine Learning
- Uses TF-IDF vectorization and Logistic Regression for classification
- Detects emotional eating and generates diet suggestions

3. Database Layer

- Local SQLite/MySQL database
- Stores user profiles, food logs, emotions, and weekly reports
- Ensures ofline access and persistent data storage

Workflow: User inputs → Emotion & Diet Analysis → Emotional Eating Detection → Personalized Recommendations → Data Stored & Visualized

4. Methodology:

The methodology of the Smart Diet Planner with Emotional Eating Detection involves a combination of user interaction, data processing, and machine learning to provide personalized diet recommendations.

1. **User Input:** The user logs into the desktop application and provides textual input describing their current emotional state along with their food intake and dietary preferences.
2. **Emotion Detection:** The text input is preprocessed using techniques such as tokenization and stop-word removal. A classification model is applied using Term Frequency–Inverse Document Frequency (TF-IDF) for feature extraction and Logistic Regression for classification, which predicts the user's emotional state.
3. **Emotional Eating Detection:** The detected emotion is analyzed along with calorie intake to determine whether the user is engaging in emotional eating. Rule-based logic evaluates the relationship between emotion and food consumption patterns.
4. **Diet Recommendation:** Based on the emotional state and nutritional data, the system generates personalized diet recommendations. It also calculates health metrics like BMI, BMR, and TDEE to guide calorie planning.
5. **Data Storage and Visualization:** All user data, including emotions, food logs, and recommendations, is stored in a local database. The system generates visualizations such as mood history graphs and weekly reports to provide insights into user behavior.
6. **Offline Functionality:** The application operates entirely ofline, ensuring accessibility without internet dependency, and is designed for single-user use with manual input.

5. Conclusion:

-The Smart Diet Planner with Emotional Eating Detection successfully integrates Artificial Intelligence and dietary management to help users maintain healthier eating habits. By combining text-based emotion detection using TF-IDF and Logistic Regression with calorie tracking, BMI/BMR calculation, and personalized diet recommendations, the system provides actionable insights into emotional eating patterns. Ofline functionality and a local database make the application easily accessible and user-friendly, while mood history visualization and weekly reports enhance awareness of behavioral trends.

The project demonstrates that integrating emotion analysis with diet planning can effectively guide individuals toward healthier lifestyle choices. Future enhancements could include mobile accessibility, real-time emotion detection, and cloud-based analytics to further improve personalization and reach.

6. References

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