



FOOD RECOMMENDATION based on MOOD

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Abstract:

Modern consumer systems require advanced personalized solutions to improve user experience and reduce decision fatigue. This paper presents an Adaptive Mood-Based Food and Music Recommender that integrates real-time facial emotion recognition (FER), authenticated user profiles, and an adaptive feedback loop. The system uses a convolutional neural network (CNN) model to determine the user's mood, which then triggers personalized food and music suggestions. Key features include user authentication, first-time user onboarding to collect initial preferences, and a persistent feedback mechanism that filters out disliked items across sessions. Testing showed reliable performance in mood detection, secure access, and delivering relevant, adaptive recommendations, offering a multifunctional solution for next-generation personalized platforms.

IndexTerms : Neutral , Happy , Sad , Surprise , Recommender System , Mood Detection , Computer Vision , OpenCV, User Feedback Loop , Adaptive Filtering , Food Recommendation Engine , Facial Emotion Recognition (FER), Convolutional Neural Network (CNN) , Real-Time Processing.

1. Introduction

Modern applications demand advanced personalized technologies to support users in making rapid decisions in saturated environments. Traditional recommendation systems often fail to address dynamic challenges like the user's **real-time emotional state** or individual dietary restrictions (user dislikes). To overcome this, our project proposes an Adaptive Mood-Based Food Recommender integrated with a secure web framework and smart sensing technologies. The system monitors mood via facial expression, ensuring timely, relevant suggestions. The integration of user authentication and a continuous learning mechanism improves user satisfaction and reduces repetitive, irrelevant results, contributing to next-generation smart consumer technologies.

2. Literature Survey

Wearable and AI-driven personalization has been widely explored, focusing on user engagement and adaptive content delivery. Prior studies highlight IoT-enabled systems for tracking user biometrics and enhancing safety. Research on biomedical sensors shows effective monitoring of heart rate and temperature, but these are often limited in direct recommendation application². Works on adaptive filtering and collaborative filtering demonstrate the value of personalized feedback, yet many lack real-time responsiveness or integration with live emotion data. Studies on detection mechanisms confirm the role of machine learning systems in identifying human states, though their deployment in secure, full-stack web contexts is underexplored. Overall, existing work contributes to individual features, but a comprehensive, multifunctional platform integrating secure authentication, emotion sensing, and a persistent food preference feedback loop remains largely unexplored. The identified gap forms the basis for our proposed adaptive approach.

3. Hardware and Software Requirements

The Hardware and Software requirements of our Project are Listed below in the Tables below

3.1 Hardware Requirements

Component	Description
Processing Unit	Multi-core processor (Intel i5/Ryzen 5 or better) for Python execution and web serving. Dedicated GPU (NVIDIA/AMD) is highly recommended for faster Keras/TensorFlow inference and training.
Memory (RAM)	8 GB RAM minimum (16 GB recommended) to handle the Python environment, Keras model loading, and simultaneous video processing.
Input/Sensing	Webcam/Integrated Camera (HD 720p or better) for live video capture and real-time facial emotion detection.
Storage	SSD (Solid State Drive) for fast loading of the Keras model (mood_model.h5), Python libraries, and the local SQLite database (users.db).
Networking	Standard network adapter (required for Flask local host access and external content like Spotify).

3.2 Software Requirements

Components	Description
Operating System	Standard modern operating system capable of running Python 3.x and Python dependencies.
Programming Language	The core language used for the entire backend, AI, and data processing.
AI/Machine Learning	Used for loading and running the pre-trained Convolutional Neural Network (CNN) emotion recognition model.
Web Frameworks	The core application framework for routing, handling web requests, and templating the HTML interface.
Data & Security	Used for user authentication, session management, storing user accounts in users.db, and secure password hashing.
Data Serialization	Used for handling persistent data (user preferences, music links) and array manipulation for image processing.
External APIs	Used for embedding public music content into the web interface.
Computer Vision	Essential for accessing the webcam, detecting the face (Haar Cascade), and processing/flipping video frames for the live stream.

4. Methodology

The proposed system integrates user security and data persistence into a unified flow. The methodology combines machine learning sensing and security technologies to create an intelligent recommender.

1. **Authentication & Onboarding:** New users must **Register and Log In**. The system checks the onboarded flag: if false, the user is redirected to the preferences form (/onboarding) to input initial likes/dislikes.
2. **Emotion Sensing:** The user initiates **Live Detection** (OpenCV captures frames) or **Snapshot Capture**. The input image is fed to the CNN to determine the core mood (Happy, Sad, Stress).
3. **Adaptive Filtering:** The core recommendation route (/find) executes the adaptive algorithm:
 - It retrieves the user's **Disliked** food list from the JSON file.
 - It **filters out** any suggestion matching a disliked item/keyword.
 - It **boosts** items matching the user's **Loved** list to the top of the final suggestion list.
4. **Feedback Loop:** A "✗ Not for me" button on the results page sends an AJAX request (/submit_dislike) to instantly add that specific food item to the user's persistent dislike list.



Figure 4.1 : Flow chart of Working Model

5. Results & Discussion

The prototype was tested under different emotional states and user profiles to validate its performance.

- **Security:** The **Flask-Login** framework ensures secure user access and session management.
- **Real-Time Performance:** The implemented **Frame-Rate Control** fixed lag issues, ensuring the live mood detection operates smoothly and responsively.
- **Adaptive Recommendation:** The persistent feedback mechanism successfully demonstrated the ability to **filter out disliked items** and **prioritize loved items** across multiple login sessions, addressing the core problem of repetitive, irrelevant suggestions.
- **Functionality:** All integrated features—login, onboarding, mood detection, time filtering, and music playback (via Spotify Embeds)—are fully operational.



Fig 5.1: Web Interface



Fig 5.2: Live Mood Detection



Fig 5.3: Food recommendation after mood detection

6. Conclusion & Future Work

By combining emotional intelligence, secure authentication, and a strong learning mechanism into a single web application, the Adaptive Mood-Based Recommender is a success. The platform uses real-time facial emotion identification to determine the user's mood, which guarantees that the initial recommendations are relevant and made at the right moment.

The system's main asset is its ongoing learning loop. The system constantly adapts by implementing user onboarding to learn initial food preferences and an immediate post-recommendation feedback loop (✗ Not for me button). This ensures that suggestions are very tailored: disliked items are automatically filtered out, and favored items are given preference for the user, which immediately addresses the issue. repeatedly offering superfluous meals over many sessions.

The system may be improved in the future by including AI-based preference learning (such as utilizing item embeddings), incorporating user ratings as a secondary feedback mechanism, as well as incorporating more inclusive, free media APIs.

7. References

- [1] *Handbook of Cognition and Emotion*, pp. 45-60, 1999, P. Ekman, *Basic Emotions*.
- [2] *Using convolutional neural network (CNN) to identify facial expressions*, by Sn. K. Mabu, H. A. Rahman, and Z. A. Abas *Journal of Telecommunication, Electronic and Computer Engineering*, vol. 9, no. 1, pages 11–16, 2017.
- [3] P. Viola and M. Jones, *IEEE Computer Society Conference on Rapid Object Detection Utilizing a Boosted Cascade of Simple Features on Computer Vision and Pattern Recognition*, vol. 1, pages 511–518, 2001.
- [4] *Adaptive recommender system based on user feedback and content feature*, International, by H. Zhang, S. Deng, and F. Ye *Proceedings of the Conference on Communications, Circuits, and Systems*, vol. 1, pp. 317–321, 2018.
- [5] *International Journal of, A survey on secured password storage using hashing techniques*, by A. H. Othman and P. T. H. Al-Qazzaz of *Computer Science Issues*, vol. 14, no. 1, pp. 10-15, 2017.

