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A REVIEW OF MOOD-AWARE AI RECIPE RECOMMENDER WITH VOICE GUIDANCE

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Abstract: This study investigates emotion-driven food recommendation systems, ingredient-identifying recipe proposals, and advancements in text-to-speech (TTS) technology. Emotion-based platforms such as 'MoodieFoodie' and 'Mood Canteen' leverage facial recognition and social media insights to recommend dishes aligned with users' feelings, enhancing satisfaction and emotional well-being. Recipe recommendation platforms like 'Makeat' and 'RecipeIS' employ YOLOv5 and CNNs for ingredient detection, providing customized suggestions based on available ingredients, thereby minimizing food waste. TTS systems, including Tacotron and WaveNet, apply deep learning techniques to produce natural and expressive speech, enabling multilingual and emotion-rich interactions. Together, these technologies enhance personalized and interactive experiences in food selection, cooking, and digital communication.

Index Terms **- Emotion-based recommendation, Ingredient recognition, Recipe suggestions, Text-to-speech (TTS), Facial recognition, Deep learning, Personalized recommendations.**

I. INTRODUCTION

The 'Mood-Aware AI Recipe Recommender with Voice Guidance' system customizes recipe recommendations based on user mood, whether craving comfort food or a light meal. By utilizing text or voice input, the system interprets emotions using natural language processing (NLP) and suggests relevant recipes. The system relies on an extensive database of recipes, incorporating past choices for a more personalized experience. Once a recipe is selected, users receive step-by-step guidance through visual or voice instructions, facilitated by TTS technology, making cooking more accessible and engaging.

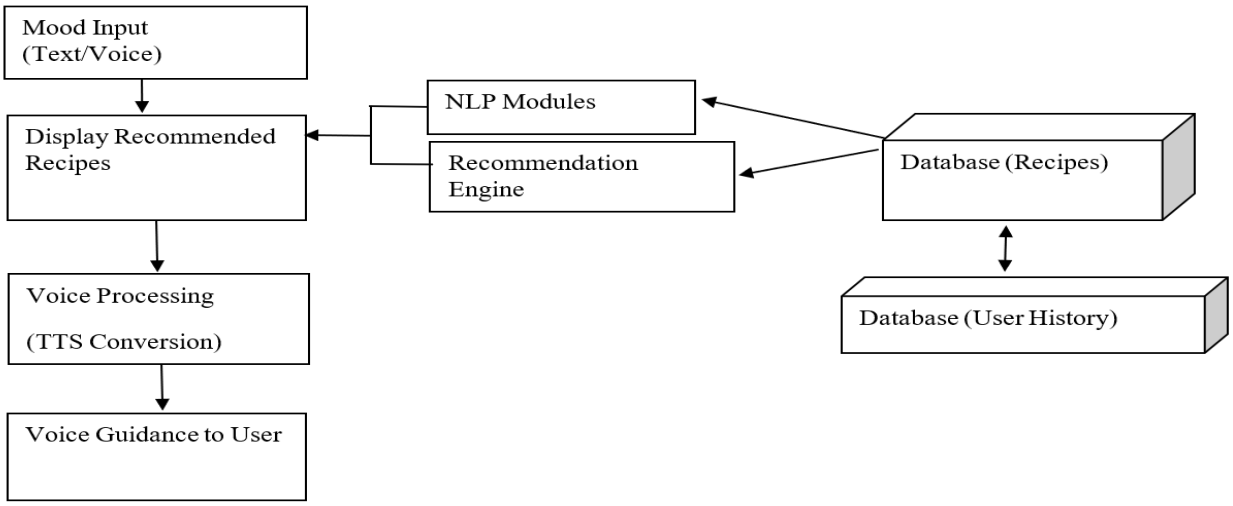

Fig 1: Process Diagram for Mood Aware AI Recipe Recommender

II. GOALS OF MOOD-AWARE AI RECIPE RECOMMENDER SYSTEM

1. ***Effectively Condense Recipe Collections*** - Summarizing extensive recipe databases while maintaining crucial information for straight forward and precise mood-based suggestions.
2. ***Develop and Enhance Mood Recognition Models*** - Utilizing deep learning algorithms to improve emotion detection accuracy.
3. ***Improve Personalization and Recommendation Precision*** - Implementing advanced recommendation algorithms.
4. ***Advance AI-Driven Culinary Assistance and NLP Engagement*** - Enhancing interactive voice assistance for better user experience.

III. APPLICATIONS OF MOOD-AWARE AI RECIPE RECOMMENDER

1. ***Enhancing Meal Personalization*** - Providing mood-driven meal suggestions to create a tailored dining experience.
2. ***Improving Culinary Accessibility*** - Enabling hands-free, guided cooking instructions via TTS, aiding individuals with physical impairments.
3. ***Promoting Mental Well-being*** - Suggesting mood-enhancing recipes to support emotional health.
4. ***Encouraging Healthy Eating Habits*** - Combining dietary preferences with mood assessment for balanced meal recommendations.
5. ***Facilitating Cooking Knowledge*** - Educating users on ingredient impacts on mood and nutrition.

IV. TASKS AND TECHNIQUES OF MOOD-AWARE AI RECIPE RECOMMENDER SYSTEM

A. Tasks

1. ***Emotion Detection for Mood-Based Food Recommendations*** - Identifying user emotions through facial expressions, voice, or sentiment analysis.
2. ***Multimodal Emotion Detection for Enhanced Accuracy*** - Integrating multiple data sources (voice, facial expressions, and text) for precise mood assessment.
3. ***Indian Recipe Suggestions Based on Ingredients*** - Recommending Indian cuisine based on available ingredients.
4. ***Ingredient Identification and Health-Focused Recipe Suggestions*** - Detecting ingredients to generate diet-conscious meal plans.
5. ***Efficient Text-to-Speech Synthesis*** - Developing high-fidelity TTS systems for natural-sounding voice guidance.

B. Techniques

1. ***Facial Expression Analysis*** - Deep learning models analyzing facial emotions to refine recommendations.
2. ***Fusing Facial and Voice Sentiment Analysis*** - Combining visual and auditory cues for accurate mood assessment.
3. ***Content-Based Recommendation Using Cosine Similarity*** - Matching user preferences with similar recipe attributes.
4. ***CNN-Based Ingredient Detection*** - Leveraging convolutional neural networks for ingredient recognition.

5. ***Transformer-Based TTS for Real-Time Speech*** - Enhancing voice synthesis with parallel text-to-mel spectrogram generation.

Table 1. Different Tasks and Techniques in mood-aware ai recipe recommendation system with interactive voice guidance

SNO	TASKS	TECHNIQUES	DATASET
1	Cuisine & Mood Based Food Recommendation System	Facial Recognition (OpenCV, DEEPFACE), K-means Clustering	Facial image data
2	Appetite Recommendation System Through Emotions	Convolutional Neural Networks (CNN), K-means Clustering, Sentiment Analysis	Restaurant and user preference data
3	Recommendation of Food Based on Current Mood	Logistic Regression, Location-based API	Google Maps API for location-based data
4	Mood Canteen: Emotion-Based Recipe Recommendation	Geneva Emotion Wheel, MoodLens for sentiment analysis, SMASH heuristics	Social media posts, food images, emojis
5	System for Mood-Based Food Recommendation Using Machine Learning	DeepFace, K-means Clustering	Zomato dataset and custom survey data
6	Emotional Insights for Food Recommendations	Emotion Pattern Recognition, Re-ranking of Recommendations	Emotion-driven user data
7	EMOQ - Emotion-Based Food Recommendation	DeepFace, Feedback Loop	User feedback loop, emotion-detected data
8	Real-time ingredient recognition and recipe recommendation	Bag-of-features based on color histograms + linear SVM classifier	30 food ingredient video categories taken in Tokyo grocery stores
9	Ingredient recognition for recipe recommendations to reduce food waste	Convolutional neural network (ResNet-50)	Fruits and Vegetables Image Recognition Dataset from Kaggle(36 Classes)
10	Ingredient recognition and health-conscious recipe recommendation	CNN Object Detection API from TensorFlow	TensorFlow pre-trained model data for real-time ingredient recognition
11	Ingredient detection and recipe recommendation for users away from home	Object Detection with YOLOv7	Custom dataset of vegetable images with 15 classes and a total of 527 images
12	Ingredient-based Indian recipe recommendation	Content-based model with cosine similarity	Indian recipes scraped from the web with ingredient attributes
13	Ingredient-based recipe recommendation on a mobile app	TF-IDF with cosine similarity	6000+ Indian Food Recipes dataset from Kaggle which has been extended

			with web scraped images
14	Recipe recommendation based on user preferences and ratings	Item-based and user-based collaborative filtering	46,336 recipes and 1,966,920 user reviews from All recipes dataset
15	Real-time ingredient detection and personalized recipe recommendation	YOLOv5 CNN model and hybrid recommendation approach	Custom dataset of 1,296 images for 39 ingredient classes
16	Personalized recipe recommendation based on user-defined criteria	TF-IDF vectorization and cosine similarity with Flask for web deployment	Comprehensive recipe dataset including names, ingredients, and dietary specifications
17	Representation mixing for TTS. Enhance TTS by combining character and phoneme inputs.	Uses "representation mixing" with sequence-to-sequence models, multi-scale residual convolutions, and WaveNet for waveform conversion.	LJSpeech (13,100 English audio files).
18	High-Fidelity TTS with GANs (GAN-TTS). Generate high-quality, natural-sounding TTS with GANs.	GAN model with feed-forward generator, multi-frequency discriminators, and novel evaluation metrics.	44 hours of high-fidelity North American English audio.
19	AlignTTS: Non-Autoregressive TTS. Efficient TTS without pre-aligned data.	Feed-Forward Transformer with duration predictor and alignment loss.	LJSpeech.
20	OCR and TTS Conversion Convert text from images to speech.	OCR using neural network, TTS with Microsoft Win32 SAPI.	Custom OCR dataset for English characters and numbers.
21	TTS system for visually impaired users.	Natural Language Processing (NLP) and Digital Signal Processing (DSP).	Not specified, adaptable to any text input
22	TTS with OCR integration for image-based text conversion.	Google TTS API, OCR, Python libraries.	Character recognition datasets (alphabet and numeric)
23	Effective TTS model exploration.	Concatenative synthesis, formant synthesis, HMM.	General language datasets (not specified)
24	TTS systems with focus on Kurdish language.	Tacotron, WaveNet, FastSpeech, transformer-based TTS.	VCTK, Librispeech, and Kurdish datasets

V. FUTURE WORK

The future of these systems is incredibly promising, with exciting possibilities to make our everyday experiences more personal and seamless. Imagine technology that understands your emotions with pinpoint accuracy, offering meal suggestions that not only satisfy your taste buds but also match your mood. These

systems could recognize a wider range of emotions, catering to your unique needs while embracing diverse cuisines, dietary preferences, and ingredients. By connecting with food delivery platforms, they could take care of everything suggesting a meal and having it delivered to your door in no time. Recipe recommendation tools could become even smarter, tapping into vast ingredient databases to help you cook with what's available. Support for multiple languages would make them accessible to people around the world, embracing different cultures and cooking styles. Meanwhile, text-to-speech systems could become more expressive and responsive, making interactions feel natural and engaging. Together, these advancements promise to make food and communication technology more personal, inclusive, and effortless.

VI. CONCLUSION

Technologies like emotion-focused platforms, ingredient-identification tools, and advanced text-to-speech (TTS) systems are revolutionizing how users interact with food and meal planning. These innovations not only personalize the experience but also address broader challenges such as food waste and accessibility. By analyzing emotional states, emotion-focused platforms can suggest meals that align with users' moods, promoting comfort and satisfaction. Ingredient-identification tools empower users to maximize the utility of what they have at home, reducing waste by identifying potential recipes based on available ingredients. Meanwhile, sophisticated TTS systems enhance accessibility, offering a more inclusive way for individuals to engage with food-related content and services, such as cooking instructions or personalized recommendations.The future holds exciting potential for these technologies. Improvements in machine learning, emotional analytics, and real-time data processing could enable even more nuanced meal suggestions tailored to individual needs. Furthermore, integrating these systems with external services like food delivery apps or grocery platforms can create seamless ecosystems. For instance, after identifying ingredients, users might receive recommendations for supplementary items delivered quickly, streamlining the meal preparation process. As these technologies continue to evolve, they promise to foster greater convenience, sustainability, and user satisfaction in food-related experiences.

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