SMARTCOOK: INTELLIGENT INDIAN RECEIPE MATCHING WITH PHOTO-BASED INGREDIENT RECOGNITION

Sopitha S
Department of CSE
VISTAS
Chennai, India
sopithasopitha7@gmail.com

Ajin zenofer Y
Department of CSE
VISTAS
Chennai, India
ajinzenofer80@gmail.com

Athitiya Kumar S K
Department of CSE
VISTAS
Chennai, India
Athithyakumar77@gmail.com

Mr UdayaKumar, Asst Prof
Department of CSE
VISTAS
Chennai, India
nudayakumar.se@velsuniv.ac.in

Mrs P.M,G.Jegathambal
Department of CSE
VISTAS
Chennai, India
jegathambal.se@vistas.ac.in

 DOA:15.05.2025 / DOP: 20.05.2025 ISSN: 3048-619X
Volume 2 Issue 2 [Apr – July 2025] DOI:

Abstract*—SmartCook, a web platform designed to simplify meal planning while promoting sustainable cooking by helping users reduce food waste. Through SmartCook, users can input ingredients either manually or by using photo-based recognition, where the platform identifies ingredients with the support of advanced image processing technology, such as TensorFlow. Once ingredients are identified, SmartCook offers recipe suggestions tailored to the user's preferences and available ingredients, providing a highly efficient meal-planning experience. Key features include a secure user authentication system, enabling users to create accounts, save favorite recipes, and receive personalized recommendations, enhancing both the platform's usability and engagement. Smooth integration between the front end and back end is achieved via API, ensuring real-time data flow and reliable recipe suggestions for users. SmartCook is also hosted on cloud services, which allows for scalability and stability across devices. SmartCook effectively showcases the benefits of combining image recognition with personalized recommendations, creating an accessible, technology-driven tool for meal planning. Future enhancements will focus on increasing image recognition accuracy, expanding machine-learning capabilities for better personalization, and exploring additional functionalities, positioning SmartCook as a valuable tool for sustainable meal management in modern households.

Keywords— SmartCook, meal planning, recipe suggestions, ingredient detection, image recognition, food waste reduction, user authentication, and sustainable cooking.

I. Introduction

SmartCook is an innovative web platform that has emerged in response to the growing need for efficient meal planning and sustainable cooking practices. In an era where food waste is a significant global concern, SmartCook offers a solution that empowers users to make the most of their available ingredients while minimizing waste. The platform leverages advanced technology to enable users to input ingredients manually or through photo-based recognition, allowing for seamless identification and utilization of food items.

With the increasing popularity of personalized nutrition and cooking, SmartCook aims to enhance the user experience by providing tailored recipe suggestions based on individual dietary preferences and available ingredients. This approach not only simplifies meal planning but also encourages users to adopt healthier eating habits and explore diverse culinary options.

SmartCook stands out in the realm of digital cooking aids by integrating image recognition technology to facilitate a more intuitive interaction between users and the platform. This innovative feature allows users to easily discover recipes that align with their ingredient inventory, making meal preparation more accessible and efficient. As the demand for sustainable cooking solutions continues to rise, SmartCook positions itself as a valuable tool for modern households, promoting responsible food management and culinary creativity.

The growing need for efficient meal planning and sustainable cooking practices has inspired the development of SmartCook, an innovative web platform designed to transform the culinary experience for users. In a landscape where food waste is a pressing global issue, SmartCook aims to provide an effective solution that enables users to maximize their ingredient usage while minimizing waste. By integrating advanced technology, SmartCook allows users to input ingredients either manually or through photo recognition, streamlining the process of identifying and utilizing available food items.

The primary objective of this project is to create a user-friendly platform that offers personalized recipe suggestions based on individual dietary preferences and the ingredients users have on hand. By emulating the intuitive nature of modern cooking aids, SmartCook encourages users to explore new culinary possibilities and adopt healthier eating habits. The platform incorporates image recognition capabilities, enabling users to effortlessly discover recipes that match their ingredient inventory, thus enhancing the meal planning experience.

The structure of this paper is organized as follows: the next section provides a review of the relevant literature on digital cooking aids and their impact on food waste reduction, It also outlines the project development process, including user interface design and the integration of image recognition technology, also the algorithms used for ingredient detection and recipe recommendation and the project's results, highlighting user engagement and the effectiveness of recipe suggestions. Last three sections discuss the implications of the findings and their relevance to sustainable cooking practices and summarizes the project's conclusions and proposes avenues for future research and development.

1.1 PROBLEM DESCRIPTION

SmartCook addresses the pressing issue of food waste in households by providing an innovative platform for meal planning. Despite the abundance of food and recipes available online, many individuals struggle to utilize their ingredients efficiently, leading to significant waste. Traditional meal planning methods often lack personalization, making it challenging for users to find recipes that suit their dietary preferences and available ingredients.

Moreover, the manual input of ingredients can be time-consuming and prone to error, discouraging users from utilizing the platform effectively. Additionally, there is a lack of intuitive tools that integrate technology, such as image recognition, to facilitate the detection of ingredients, which can enhance user engagement and streamline the cooking process.

Furthermore, the challenge of maintaining sustainability in cooking practices necessitates a solution that not only helps in reducing waste but also encourages healthier eating habits. Privacy concerns related to user data and the need for a secure authentication system are crucial to ensuring a trustworthy experience for users. Therefore, SmartCook must navigate these complexities to deliver a user-friendly, effective tool that promotes sustainable cooking and minimizes food waste.

1.2 OBJECTIVE

The primary objectives of SmartCook are to promote sustainable cooking practices, reduce food waste, and

enhance meal planning efficiency. Here are some specific objectives of the SmartCook platform:

1.2.1 **Facilitate ingredient utilization:** SmartCook aims to help users make the most of their available ingredients by providing tailored recipe suggestions based on what they have on hand.

1.2.2 **Enable intuitive meal planning:** By utilizing image recognition technology, SmartCook allows users to easily identify ingredients through photos, streamlining the meal planning process.

1.2.3 **Enhance user engagement:** SmartCook encourages users to create accounts, save favorite recipes, and receive personalized recommendations, fostering a more interactive cooking experience.

1.2.4. **Promote healthier eating habits:** The platform is designed to provide recipes that cater to users' dietary preferences, helping them make healthier choices in their meal preparation.

1.2.5. **Raise awareness of food sustainability:** SmartCook aims to educate users on the importance of reducing food waste and adopting sustainable cooking practices through its features and functionalities.

1.3. SCOPE OF THE PROJECT

The SmartCook project is designed to create a comprehensive web platform that not only facilitates meal planning but also actively contributes to reducing food waste. The scope includes the implementation of both manual ingredient input and innovative photo-based ingredient detection, leveraging image recognition technology to streamline the user experience. This functionality will empower users to quickly identify available ingredients, making meal preparation more efficient and intuitive.

Additionally, the project emphasizes user engagement through a user-friendly interface that supports personalized recipe suggestions tailored to individual dietary preferences and available ingredients. Key features will also include account management capabilities, allowing users to save favorite recipes and receive customized recommendations. Moreover, the project will prioritize data security and user privacy by integrating a robust authentication system. As part of its scope, SmartCook will also explore future enhancements, such as refining image recognition accuracy and expanding machine learning functionalities, ensuring the platform remains adaptable and responsive to users' evolving needs in sustainable cooking practices.

II. LITERATURE SURVEY

2.1 Recommendation of Indian Cuisine Recipes*:*

Based on Ingredients (2019) This study recommends Indian recipes based on available ingredients using a content-based machine learning model. By collecting recipes through web scraping, it offers suggestions tailored to Indian cuisine, showcasing the potential of ingredient-based personalization for Smart Cook.

• Limitations: The model focuses solely on Indian cuisine, limiting versatility for broader culinary recommendations. It also lacks image recognition, requiring users to input ingredients manually rather than allowing detection through photos.

2.2 Indian Cuisine Recipe Recommendation:

Based on Ingredients Using Machine Learning Techniques (2021) This system recommends popular Indian recipes by analyzing available ingredients, using a content-based recommendation model. It provides a more customized approach that aligns with Smart Cook's goal of ingredient-based personalization.

• Limitations: Like the previous model, it's limited to Indian cuisine and does not include an image recognition feature, restricting it to text-based ingredient inputs rather than dynamic photo uploads.

2.3 Photo2Food: Recipe Recommendation System (2022):

This project uses CNNs to classify ingredients from images and connect them to recipes, which supports Smart Cook's ingredient-recognition goals. The system provides users with recipes based on ingredient photos, simplifying cooking with on-hand ingredients.

Limitations: While useful, it lacks adaptability to varied cuisines and relies on extensive datasets for accurate classification. CNN-based classification can also be resource-intensive, which could hinder responsiveness in real-time applications.

2.4 Identify Ingredients from Food Images and Generate Recipe (2023).

This paper reviews neural network techniques for recognizing ingredients from food images and generating corresponding recipes. It highlights the potential and challenges of neural networks for ingredient detection, relevant to Smart Cook's ingredient identification feature.

• Limitations: The paper notes challenges with dataset size, which could limit detection accuracy. Modeling complex cooking instructions also remains difficult, impacting the system's ability to generate detailed, accurate recipes.

2.5 A Literature Survey on Recipe Generation from Food Images Using AIML (2024)

This study uses deep learning to analyze food images and automatically create titles, ingredient lists, and cooking steps, simplifying recipe generation. It presents a user-friendly way for Smart Cook to generate recipes from images.

• Limitations: It requires significant computational resources, making it less efficient for real-time use. The system also relies on clear, high-quality images, which may be difficult in everyday scenarios like low light or busy backgrounds.

2.6. Identification and Prediction of Recipes Using Ingredients' Snapshot (2024)

Using YOLOv5 and Inceptionv5, this study detects and categorizes ingredients from an image to suggest recipes. The combination of object detection and classification is valuable for Smart Cook's real-time ingredient recognition.

• Limitations: High-quality images and a well-labeled dataset are essential for reliable results, and lower-quality images may reduce accuracy. The system's computational needs could also limit accessibility for real-time or low-resource settings.

III. EXISTING SYSTEM

Several existing systems aim to assist users with meal planning and recipe suggestions, utilizing various technologies to enhance user experience and promote efficient cooking practices. Here are a few notable examples:

Whisk: Whisk is a platform that allows users to create shopping lists and meal plans based on their favorite recipes. It integrates with multiple recipe websites and offers a feature that suggests recipes based on available ingredients. However, Whisk relies primarily on manual input for ingredient selection, limiting its intuitiveness.

Yummly: Yummly is a recipe recommendation app that utilizes user preferences, dietary restrictions, and available ingredients to suggest personalized recipes. It offers a vast database of recipes and allows users to save their favorite meals. However, it does not incorporate photo-based ingredient recognition, which could streamline the process of identifying available ingredients.

Paprika Recipe Manager: Paprika is a comprehensive recipe management tool that enables users to save, organize, and plan meals. Users can input ingredients manually or use existing recipes, but it lacks advanced features like image recognition or machine learning algorithms for personalized suggestions based on scanned ingredients.

Foodprint: Foodprint is an app focused on reducing food waste by helping users track their pantry items and suggesting recipes based on ingredients nearing their expiration dates. While it addresses the issue of food waste effectively, it does not provide a robust system for personalized recommendations based on user preferences.

These existing systems highlight the growing interest in utilizing technology for meal planning and recipe discovery. However, most of them face limitations in their ability to intuitively recognize ingredients through photo-based methods or in personalizing suggestions based on user-specific dietary needs and preferences. The SmartCook project aims to bridge these gaps by integrating advanced image recognition and machine learning capabilities to provide a more seamless and personalized cooking experience.

IV. PROPOSED SYSTEM

The proposed SmartCook platform will generate personalized recipe suggestions using photo-based ingredient recognition and user preferences. It will collect a diverse dataset of food images paired with corresponding recipes. The system will integrate advanced image recognition capabilities to automatically detect ingredients from uploaded photos. Convolutional Neural Networks (CNNs) and attention mechanisms will be utilized for enhanced accuracy in ingredient detection. SmartCook aims to simplify meal planning by providing tailored recipes based on available ingredients. This innovative approach promotes sustainable cooking practices and reduces food waste effectively.

V. SYSTEM DESIGN

The design phase of SmartCook aims to define a structured approach to building the platform, transforming the requirements into a practical solution. This phase begins with requirements gathered during analysis and serves as a bridge from understanding the problem to implementing the solution. SmartCook's design is critical to ensuring the platform's usability, functionality, and maintainability, which will also influence testing and ongoing improvements. The primary outputs of this phase are the system architecture and data flow diagrams that illustrate how various modules interact and how data is exchanged between them.

This chapter outlines the design documents created for SmartCook, including functional architecture, activity diagrams, and other relevant design specifications. Each module's functionality is further detailed to establish clear internal logic, supporting system development and future modifications. The system architecture specifies the key components and explains their interactions, while the data flow diagram provides a visual representation of data movement across modules. These design documents serve as continuous guides for SmartCook's development and coding, ensuring alignment with project objectives and user requirements.

5.1. SYSTEM ARCHITECTURE

The proposed SmartCook platform is designed with a modular, client-server architecture that leverages cloud-based storage and machine learning capabilities for efficient recipe recommendation and ingredient detection. The system will consist of a user-facing web interface, a cloud-based server, and an image recognition module that will communicate with one another to provide a seamless user experience.

The SmartCook system architecture includes several key components:

1.User Interface: The front end will be a responsive web interface where users can manually input ingredients or upload photos for ingredient detection. This interface will also display personalized recipe suggestions, favorite recipes, and account management options.

2. Image Recognition Module: The image recognition module, powered by Convolutional Neural Networks (CNNs), will automatically detect ingredients from user-uploaded photos. The system will use image-processing algorithms and attention mechanisms to enhance ingredient recognition accuracy, streamlining the recipe suggestion process.

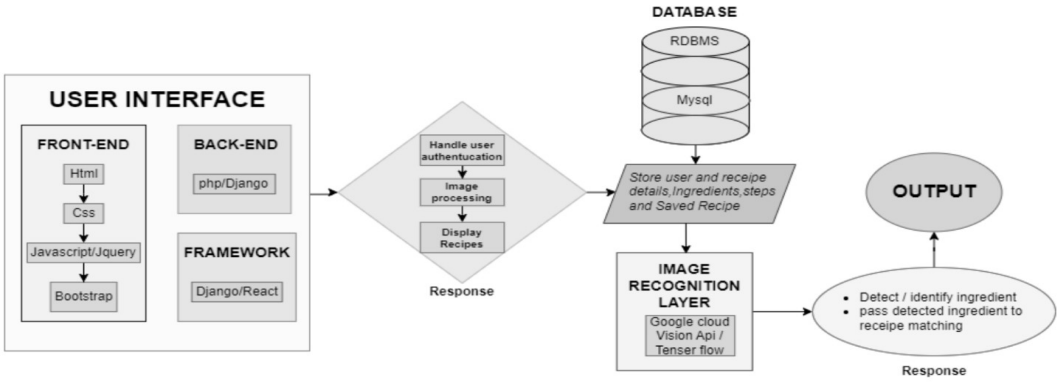

Fig 1 : System Architecture

3.**Recommendation Engine:**

A content-based recommendation engine, located on the cloud server, will filter and suggest recipes based on detected ingredients, user preferences, and dietary restrictions. It will utilize machine learning models to refine suggestions according to user feedback and interactions.

4.**Data Storage and Processing:**

The system will use cloud storage to securely store user data, recipe datasets, and ingredient images. Efficient data processing pipelines will ensure rapid access and retrieval, supporting real-time ingredient detection and recipe recommendation.

5.**Security and Privacy Measures:**

Robust authentication and data encryption will ensure secure access and protect user data. Privacy measures will be implemented to comply with data protection regulations, safeguarding sensitive information.

6.**Communication and Data Flow:**

The web interface will communicate with the cloud-based backend in real-time, allowing data to be processed and recommendations generated dynamically. This setup will enable SmartCook to offer a user-friendly, interactive platform for personalized recipe discovery and cooking assistance.

This architecture is designed to deliver a streamlined, accessible cooking solution while promoting sustainable food use and reducing waste. The system design also allows for future enhancements in machine learning capabilities, making it adaptable to evolving user needs.

5.2 SYSTEM WORKFLOW

The SmartCook system workflow begins with user interaction, where users log into the platform and provide inputs, such as manually entered ingredients or ingredient photos. For photo inputs, the image recognition module identifies ingredients using machine learning models and transmits the data to the recipe recommendation engine. The workflow proceeds as follows:

5.2.1.User Input and Image Recognition:

Users either enter ingredients manually or upload photos. The system then utilizes Convolutional Neural Networks (CNNs) to detect ingredients within the image, enhancing recognition accuracy through attention mechanisms.

5.2.2.Ingredient Data Processing:

The recognized ingredients, along with user-entered data, are processed and sent to the recipe recommendation engine. Here, the system applies a content-based filtering model to match ingredients with suitable recipes, incorporating user dietary preferences and restrictions.

5.2.3.Recipe Suggestion and Filtering:

The recommendation engine provides personalized recipe suggestions, displaying recipes based on ingredient availability, and dietary preferences to encourage healthier, diverse meal choices.

5.2.4.User Feedback and Data Storage:

Users can save favorite recipes or rate recommendations for future personalization. User preferences and data are securely stored in the database for refining future suggestions.

5.2.5. Continuous Learning and Improvement:

The system utilizes user feedback and saved data to refine recipe suggestions. Regular model training is conducted to improve ingredient recognition accuracy and the effectiveness of recipe personalization.

5.2.6.Reporting and Analysis:

System usage reports are generated periodically, analyzing patterns in ingredient preferences and recipe popularity to further enhance SmartCook's recommendation capabilities. This structured workflow ensures that SmartCook provides an efficient

and user-friendly experience, delivering tailored recipe suggestions that promote responsible food management.

5.3 METHODOLOGY

The proposed methodology for the Smart Cook project encompasses several key steps, including designing the user interface, implementing the ingredient input system, integrating image recognition capabilities, developing the recipe suggestion algorithm, programming user authentication and authorization, and testing the overall system for functionality and performance.

5.3.1. User Interface Design:

The methodology begins with designing an intuitive user interface (UI) that enhances user experience. The UI will feature an engaging layout for manual ingredient input, photo upload options, and personalized recipe suggestions. The design will prioritize simplicity and ease of navigation, ensuring that users can quickly access the features they need.

5.3.2. Ingredient Input System:

A system will be developed to allow users to manually input ingredients or upload photos of their pantry items. This will include a form for entering ingredient details and a photo upload feature that utilizes image recognition to identify items. The system will provide feedback on the entered ingredients, ensuring accuracy for recipe generation.

5.3.3 Image Recognition Integration:

The Smart Cook application will incorporate image recognition capabilities using tools like TensorFlow. This integration will enable the application to analyze uploaded images of ingredients and accurately identify them, facilitating seamless ingredient tracking and recipe suggestions based on available items.

5.3.4. Recipe Suggestion Algorithm:

A robust algorithm will be programmed to suggest recipes based on the identified ingredients. This algorithm will take into account user preferences, dietary restrictions, and available ingredients to provide tailored recipe options. The suggestions will be displayed in an organized manner, allowing users to easily select their desired recipe.

5.3.5.User Authentication and Authorization:

To enhance security, a user authentication system will be implemented, allowing users to create accounts and log in securely. This will involve programming features for registration, login, and password recovery. User authorization will ensure that sensitive information is protected and only accessible to authorized users.

5.3.6. Testing:

The proposed methodology concludes with comprehensive testing of the Smart Cook system. This includes functionality testing to ensure all features work as intended, performance testing to evaluate the speed and responsiveness of the application, and user testing to gather feedback on the overall user experience. Testing will be conducted in various scenarios to ensure reliability and effectiveness.

VI. CORE INSIGHTS

There a several general themes present in relation to the SmartCook project:

1. Image recognition technology

The SmartCook project utilizes new image recognition technologies such as TensorFlow [7] and the Google Cloud Vision API to correctly recognize food items in the uploaded images. As a result, users will be more inclined to use the product since the inability to create recipes from scratch is a common barrier. This process promotes engagement through ingredient input, provides immediate recipe suggestions, and increases user outcomes by suggesting based on visual input that takes seconds to upload. Some similar image recognition applications are demonstrated in [15] that use recipe generation when cookers have ingredients available.

2. Personalized User Experience

Personalized recommendation systems will be an integral of SmartCook, using relevant user data around dietary preference and previous behaviours to provide personalized recipe offers. In this regard,the personalized foods practice is believed to increase user satisfaction and ultimately take a more natural approach to the meal planning process based on interaction and order. These systems are detailed in the research of [20], which aims to enhance meal planning the same way SmartCook does with their primary users who copy will be home users.

3.Sustainability and Waste Reduction

An aspect of the SmartCook project focuses on planning to reduce food waste. SmartCook relies on the user to input available food and engage the user based on those inputs. The importance of sustainability and reducing food waste cannot be overlooked. The recommendation system generates suggestions through AI and the user can have a sustainable impact by planning meals based on ingredients available! Additionally, there is evidence of other works illustrating previous health problems caused by the poor diet of R. Kusumoto et al. [18] how meal planning is beneficial and supports healthy and sustainable production.

The Smart Cook application employs a multi-step algorithm for ingredient recognition and personalized recipe suggestion. This algorithm consists of two primary components: **Image Recognition Algorithm** and **Recipe Recommendation Algorithm.**

Image Recognition Algorithm: This algorithm is responsible for identifying ingredients from user-uploaded images. It utilizes advanced machine learning models trained on a vast dataset of food images. The process includes the following steps:

1. **Image Preprocessing**: The uploaded image undergoes preprocessing to enhance features, including resizing, normalization, and noise reduction, ensuring consistent input for the model. This step is crucial for improving the accuracy of subsequent analyses.
2. Feature Extraction: The algorithm extracts relevant features using Convolutional Neural Networks (CNNs) to analyze shapes, colors, and textures of the ingredients. The CNN architecture allows the model to automatically learn intricate patterns and representations from the images.
3. Classification: The model classifies the ingredients by comparing extracted features against a trained dataset, providing accurate identification. The classification process may also employ techniques such as transfer learning, leveraging pre-trained models to enhance accuracy with limited data.
4. Confidence Scoring: Each identified ingredient is assigned a confidence score based on the model's certainty in its classification. This score helps in

determining which ingredients are most likely present, allowing for improved recipe suggestions.

Recipe Recommendation Algorithm:

Once ingredients are recognized, this algorithm suggests recipes based on user preferences and dietary restrictions. The key steps include:

1. Ingredient Matching: The algorithm cross-references recognized ingredients with a comprehensive database of recipes, filtering those that can be prepared with the available ingredients. This matching process ensures that users receive relevant options based on what they have on hand.
2. **User Preferences:** It takes into account user inputs regarding dietary restrictions (e.g., vegan, gluten-free), cuisine preferences (e.g., Italian, Asian), and desired cooking time to refine recommendations. This personalization feature enhances user satisfaction by aligning suggestions with individual tastes.
3. Ranking and Suggestion: The matching recipes are ranked based on factors such as popularity, user ratings, nutritional value, and preparation time before presenting them to the user. This multi-criteria ranking system ensures that users receive not only feasible but also appealing recipe options.
4. 4. Feedback Loop: After users try the recommended recipes, the application allows them to provide feedback. This feedback is utilized to refine the algorithm further, improving future recommendations based on user experiences and preferences.
5. Overall, the image recognition and recipe recommendation algorithms work synergistically to deliver a seamless cooking experience, accurately identifying ingredients and providing tailored recipe suggestions based on user needs. By integrating machine learning techniques and user-centered design, Smart Cook aims to simplify meal preparation and enhance culinary creativity.

VII. RESULT

SmartCook furthers meal preparation by letting the users take photographs of ingredients and find recipes based on what they already possess. The interface is clean and user-friendly, with manual input for ingredients and personalized suggestions, guaranteeing an adequately enjoyable experience. The recommendation platform provides suggested recipes according to reusable user feedback, thus contributing toward increasing satisfaction.

SmartCook is built on a strong back-end structure using PHP or Django with a React front end, assuring scalability and optimal performance. Moreover, it encourages sustainability by promoting existing ingredients and therefore, helping users reduce food waste. Overall, the project effectively combines convenience with green practices, wherein it becomes a valuable cooking resource.

VIII. CONCLUSION and FUTURE WORK

The SmartCook project is an overall advance that demonstrates how AI might be used to upgrade the plan for preparing any meal or reducing food waste. Combining image recognition with personal recommendations lowers the complexity of cooking while enhancing healthier eating habits tailored to users' tastes.To reach success, SmartCook will have to overcome concerns regarding accuracy, user engagement of the end-users, and data security. Focusing on user-centered design, and, eventually achieving sustainability, it would make a difference in the landscape of food technology by leading towards efficient meal planning and meeting sustainable, global goals for healthier lifestyles.

IX. REFERENCES

[1] Türkiye, M., 2020. Yemek Tarifi Sitelerini Ziyaret Edenlerin Oranı Yüzde 139 Arttı - Marketing Türkiye. [online] Available at: <https://www.marketingturkiye.com.tr/haberler/evde-kaliyoruz-yemek-yapiyoruz/> [Accessed 21 May 2020].

[2] Allrecipes. 2020. Allrecipes | Food, Friends, And Recipe Inspiration. [online] Available at: <https://www.allrecipes.com/> [Accessed 30 May 2020].

[3] Cookpad. [online] Available at: <http://cookpad.com/> [Accessed 30 May 2020].

[4] Yahoo! Recipe. [online] Available at: <http://recipe.gourmet.yahoo.co.jp/> [Accessed 30 May 2020].

[5] Choose dishes using websites of cooking. (in Japanese), [online] Available at: <http://otona.yomiuri.co.jp/news/news11011803.htm> [Accessed 30 May 2020].

[6] "Obezite Kongresi: Türkiye Obezitede Avrupa'da Birinci Sırada." Euronews, 22 Nov. 2019. Available at: <https://tr.euronews.com/2019/11/22/obezite-kongresi-turkiye-obezitede-avrupa-da-birinci-s-rada>.

[7] Kul, S., Eken, S., Sayar, A., (2019). Distributed and collaborative real-time vehicle detection and classification over the video streams. 2017 International Conference on Engineering and Technology (ICET), pp. 1-4.

[8] A Şentaş, İ Tashiev, F Küçükayvaz, S Kul, S Eken, A Sayar, Y Becerikli (2020). Performance evaluation of support vector machine and convolutional neural network algorithms in real-time vehicle type and color classification. Evolutionary Intelligence 13 (1), 83-91.

[9] Kul, S., Eken, S., Sayar, A. (2019). A concise review on vehicle detection and classification. International Journal of Advanced Robotic Systems 14 (4).

[10] T. M. Denizgez, O. Kamiloğlu, S. Kul and A. Sayar. "Guiding Visually Impaired People to Find an Object by Using Image to Speech over the Smart Phone Cameras." 2021 International Conference on Innovations in Intelligent Systems and Applications (INISTA), 2021, pp. 1-5, doi: 10.1109/INISTA52262.2021.9548122.

[11] G. Gülmez, K. Cebbar, S. Kul and A. Sayar. "A Framework for Using Contactless Technologies in Operating Rooms." 2021 International Conference on Innovations in Intelligent Systems and Applications (INISTA), 2021, pp. 1-6, doi: 10.1109/INISTA52262.2021.9548346.

[12] Konvolüsyonel Sinir Ağı Kullanarak Gerçek Zamanlı Araç Tipi Sınıflandırması. Conference: 1.Ulusal Bulut Bilişim ve Büyük Veri Sempozyumu B3S'17 At: Antalya, Türkiye.

[13] S. Kul, S. Eken and A. Sayar. "Evaluation of Real-Time Performance for BGSLibrary Algorithms: A Case Study on Traffic Surveillance Video." 2016 6th International Conference on IT Convergence and Security (ICITCS), 2016, pp. 1-4, doi: 10.1109/ICITCS.2016.7740330.

[14] S. Kul and A. Sayar. "Entity Name Recognition in Job Postings and Resumes." 2021 3rd International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA), 2021, pp. 1-6, doi: 10.1109/HORA52670.2021.9461326.15. S. Kumar and

[15] M. Kumar. "A Study on the Image Detection Using Convolution Neural Networks and TensorFlow." 2018 International Conference on Inventive Research in Computing Applications (ICIRCA), Coimbatore, 2018, pp. 1080-1083.

[16] B. Wu, Y. Tsou, E. Tan and F. Chang. "Image Recognition Approach for Expediting Chinese Cafeteria Checkout Process." 2020 IEEE 2nd Global Conference on Life Sciences and Technologies (LifeTech), Kyoto, Japan, 2020, pp. 35-38.

[17] G. Pangestu, A. A. Supianto and F. Utaminingrum. "Food Recipe Finder Mobile Applications Based On Similarity Of Materials." 2018 International Conference on Sustainable Information Engineering and Technology (SIET), Malang, Indonesia, 2018, pp. 156-161.

[18] R. Kusumoto, X. Han and Y. Chen. "Sparse model in hierarchic spatial structure for food image recognition." 2013 6th International Conference on Biomedical Engineering and Informatics, Hangzhou, 2013, pp. 851-855.

[19] I.M.A. Jawarneh et al. "A Pre-Filtering Approach for Incorporating Contextual Information Into Deep Learning Based Recommender Systems." IEEE Access, vol. 8, pp. 40485-40498, 2020.

[20] Mouzhi Ge, Mehdi Elahi, Ignacio Fernández-Tobías, Francesco Ricci, David Massimo. "Using Tags and Latent Factors in a Food Recommender System." DH '15: Proceedings of the 5th International Conference on Digital Health 2015 May 2015 Pages 105–112. https://doi.org/10.1145/2750511.2750528.

[21]. S. Miniaoui, S. Atalla and K. F. Bin Hashim. "Introducing Innovative Item Management Process Towards Providing Smart Fridges." 2019 2nd International Conference on Communication Engineering and Technology (ICCET), Nagoya, Japan, 2019, pp. 62-67.

[22]. Medium. 2020. Nedir Bu Mongodb ?. [online] Available at: <https://medium.com/@berkekurnaz/nedir-u-mongodb-994a94a9d1df> [Accessed 30 May 2020].