Literature Review

Title : Nutrition Assistant Application
Domain : Cloud Application
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A. Picture-to-Amount (PITA): Predicting Relative Ingredient Amounts from Food Images

PITA, a deep learning architecture for predicting the relative amount of each ingredient in a given food image, was proposed. From a domain-driven Wasserstein loss from image-to-recipe cross-modal retrieval system, they first learn an image embedding representation. Then, using an amount prediction network, they detect ingredients from ingredient detection networks and predict amounts based on the results of the ingredient detection networks. As part of the evaluation metric and loss function, ingredient substitution groups are created to facilitate functional ingredient substitutions.

Advantages: Their method generates state-of-the-art results, improving previous baselines, even in the presence of challenging test examples, the model is still able to yield robust ingredient amount estimates.

Disadvantages: In future work, it prospects to improve classification accuracy

B. Smart Log system that performs automated nutrition monitoring and meal prediction.

The smart sensor board consisting of Piezo Electric sensors is used for nutrition quantification. The nutrient data acquisition is done using Optical Character Recognition and by linking open source Application Program Interfaces (APIs) through barcodes. The meal prediction is done by collecting nutritional value of the leftover food along with the user's feedback on the type of food that is desired. The SR8 database available through the US Department of Agriculture website is also analysed using their API which provides a food

report of associated nutrient values for a particular food item and a nutrient report which gives an extensive list of food and their nutrient values for a selected amount of nutrients. The results have been analysed by creating an AttributeRelation File Format which inputs the Waikato Environment for Knowledge Analysis (WEKA) tool which builds a better prediction model and is observed that the Bayesian classifiers provided better results.

Advantages: The experiment showed that the proposed feature can achieve the best accuracy rate than the global one and the local regular-grid one for dish recognition.

Disadvantages: The open dataset consisted of multiple redundant logs and psychological monitoring mechanisms have not been incorporated which in turn leads to lack of accurate prediction.

C. Using Deep Learning for Food and Beverage Image Recognition

NutriNet, a novel deep learning architecture, and a pixel-level classification solution for images of fake food were created by the researchers. NutriNet was the first to recognise beverage images after being trained on a larger food image dataset with more food classes than previous works. Their work on fake-food image recognition includes the development of the first automatic system for recognizing images of fake food, and the visual similarity between fake and real food makes it useful for both fake-food experiments and real food recognition.

Advantages: They presented a solution for pixel-level classification of food images using deep learning. They used the FCN-8s food images and achieved a high classification accuracy.

Disadvantages: The deep learning wasn't implemented inside a practical solution space like dietary assessment, which would benefit the general population.

D. Automated food recognition system that provides dietary intervention based on computer vision and machine learning

The unique feature of the system relies in the realization of real-time energy balance with the help of network simulation. Food recognition deals with the challenges in image segmentation, classification and the volume-nutrient estimation. Food segmentation is done on the food image using Otsu's segmentation. Feature extraction is done using Local Binary Patterns (LBP), colour, texture and Scale-Invariant Feature Transform (SFIT). Classification is

done using SVM, Bag of Features and K Nearest Neighbours. Weight estimation is done by mapping the nutritional facts from the USDA dataset and then followed by metabolic network modelling.

Advantages: The intervention module provides insightful information regarding the nutrients, eating patterns and alerts for the same are provided.

Disadvantages: The performance has to be improved and deep learning techniques with wearables could have been incorporated.

E. NutriTrack: Android-based food recognition app for nutrition Awareness

The researcher developed an Android-based food recognition application used as a health awarenesss by allowing the user to photograph food and view its nutritional content. Users are informed of their required calorie intake when the system implements the Mifflin-St Jeor method to determine daily calorie consumption. Furthermore, the researchers investigated its impact on people's health awareness regarding food nutrition using randomly selected respondents. Finally, this paper examines the impact of the food recognition app on changing people's perceptions of food nutrition.

Advantages: Clarifai and Nutritionix deliver precise outcomes in regards to food detection and nutrition calculation based on user's analysis. Features of the application resemble the user requirements that address the problem of dietary monitoring.

Disadvantages: The study shows that respondents' level of food nutritional awareness is remarkably low as to the status of cognizance about food intake. The framework utilized in the development of the application greatly influenced the usability and functionality of the application.