AI-powered Nutrition Analyzer for Fitness Enthusiasts

Introduction:

Nutrition analyzer aims to use personal information about individuals or groups of individuals to deliver nutritional advice that, theoretically, would be more suitable than generic advice. Deep learning, a sub branch of Artificial Intelligence, has promise to aid in the development of predictive models that are suitable for analysing Nutrition. Using the prediction made by CNN to provide nutrition values of the food or fruits, that help fitness enthusiasts to track their daily nutrition intake to maintain a healthy life.

Literature Survey:

1. To recognize multiple fruits more accurately, the authors(**Pure-CNN: A Framework for Fruit Images Classification**) proposed a Pure Convolutional Neural Network (PCNN) with minimum number of parameters. The PCNN consists of 7 convolutional layers. Additionally, to reduce overfitting and taking average of whole feature maps we employed recently developed Global Average Pooling (GAP) layer that is verified to be very effective. They analysed classification performance using PCNN on recently introduced fruit-360 dataset. The experimental results of the 55244 color fruit images from the 81 categories, show that the PCNN achieved a classification accuracy of 98.88%. The paper presents a new approach to improve fruit image classification using PCNN with Global Average Pooling (GAP).

The highest classification accuracy of 98.88% was obtained when using PCNN with GAP layer. Thus this method can be used for both object recognition and multi-class image classification.

2. In paper (**Fruit Classification using Convolutional Neural Network via Adjust Parameter and Data Enhancement**) the author proposed a method of fruit automatic recognition and classification based on CNN. The paper used 2 data set , one is two color fruit image data set (public data set and the other is self-made data set).

The methods used are preprocessing and Classification Network.

They used deep learning module in halcon software. They used the pre-training network built in halcon software to classify and identify fruit images. The CNN used in this paper does not give specific network structure.

According to the experimental results, the method proposed in this paper provides an effective method for automatic recognition and classification of fruit images.

After parameter adjustment, and achieved the highest average classification accuracy of 99.8% on the public data set. In the self-made data set, the classification accuracy is 90.2%.

3. **Improving the Prediction of Rotten Fruit Using Convolutional Neural Network**. This research developed two models for fruit recognition and predicting the freshness or spoilage of fruit using the CNN approach based on VGG16 architecture. The first model was developed from the RGB images dataset, while the second model has developed from the concatenated images dataset, including RGB image, LoG image, grayscale without background image, and HSV with AGT image.

This model gave the validation accuracy of 89.97% and the validation loss of 4.98% during the validation processing.

4. **DeepFood: Food Image Analysis and Dietary Assessment via Deep Model by LANDU JIANG1,2 , BOJIA QIU2, XUE LIU2, CHENXI HUANG1, AND KUNHUI LIN1 on 2016**. The model developed had a three-step algorithm to recognise food and then to create a dietary plan using the dataset available. They

used the fat, calories, carbohydrate and proteins as its primary factor to create a dietary plan, which was obtained from the model which can identify the food details. They used Convolutional Neural Network (CNN), Region Proposal Network (RPN).

Dataset used by them were UEC-FOOD100, UEC-FOOD256.

5. **Personalized Classifier for Food Image Recognition by Shota Horiguchi, Sosuke Amano, Makoto Ogawa, and Kiyoharu Aizawa in 2015**. They used a method of incremental learning to get output more personalized to the end user, to increase the accuracy. So each user had a personalized prediction from a personalised model which was trained dynamically with the sample input dataset obtained from them by using a food logging application. They used Convolutional Neural Network (CNN).

6. **Very deep convolutional networks for large-scale image recognition**. In this paper, Author proposed about investigating the effect of the convolution network depth with enormous accuracy . their main contribution is that increasing cn depth using convolution filter (3X3) architecture. That can be achieved by pushing the depth to 16–19 weight layer . the Basics of our ImageNet challenge 2014 submission where their team secure first place In training of convNet configuration , their input to convNETs is fixed size 224x224 rgb image (converted as square image) that multiplied by 3x3 convoluTion matrix

In this work ,they evaluated CNN for large scale image classification .It is beneficial for the classification accuracy. They showed that their model generalized well to wide range of task and datasets matching or outperforming more complex recognition pipeline built around less deep image representations. Their results yet again confirm the importance of depth CNN.

7. **Dropout: A Simple Way to Prevent Neural Network from Overfitting**, the authors proposed a method called Dropout, a simple way to prevent overfitting in neural networks. The key idea is to randomly drop units along with their connections from the neural network during training. This prevents units from co-adapting too much.

The central idea behind the method is to take a large model that overfits easily and repeatedly sample nad train smaller sub-models from it. They implemented this method to variety of application domains including object classification, digit recognition, speech recognition and more and resulted in reducing the error and improves the models performance.

The major drawback of this method is that is increases training time. A dropout network typically takes 2-3 times longer to train than a standard neural network of the same architecture.

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Published on :
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