Distillation-based Chinese Food Ingredient Recognition and Nutrition Estimation System

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The foods' ingredients and nutrition are of great significance for human health, so that people can meet their fitness needs or avoid consuming allergenic and post-operative contraindicated foods. However, the diversity of recipes and the randomness of combinations in Chinese cuisine make great challenges for Chinese food identification. To address the above issues, we built a new lightweight end-to-end food query and nutrition recognition system, which is based on knowledge distillation and deep learning methods. Firstly, well-performed DenseNet-121 is used to recognize the categories of food. At the same time, ResNet-50 is used as the Net-T, and pre-trained VGG-16 is used as the Net-S in the knowledge distillation framework, which is used to recognize the ingredients of the food. Finally, ingredient nutrition is obtained by querying the ingredient table. Experiments illustrate the good performance of the proposed method, with 91.65% Accuracy of food classification and 92.01% Accuracy of ingredients recognition.