Analysis of SURF and SIFT representations to recognize food objects

ABSTRACT

The social media services such as Facebook, Instagram and Twitter has attracted millions of food photos to be uploaded every day since its inception. Automatic analysis on food images are beneficial from health, cultural and marketing aspects. Hence, recognizing food objects using image processing and machine learning techniques has become emerging research topic. However, to represent the key features of foods has become a hassle from the immaturity of current feature representation techniques in handling the complex appearances, high deformation and large variation of foods. To employ many kinds of feature types are also infeasible as it inquire much pre-processing and computational resources for segmentation, feature representation and classification. Motivated from these drawbacks, we proposed the integration on two kinds of local feature namely Speeded-Up Robust Feature (SURF) and Scale Invariant Feature Transform (SIFT) to represent the features large variation food objects. Local invariant features have shown to be successful in describing object appearances for image classification tasks. Such features are robust towards occlusion and clutter and are also invariant against scale and orientation changes. This makes them suitable for classification tasks with little inter-class similarity and large intra-class difference. The Bag of Features (BOF) approach is employed to enhance the discriminative ability of the local features. Experimental results demonstrate impressive overall recognition at 82.38% classification accuracy from the local feature integration based on the challenging UEC-Food100 dataset. Then, we provide depth analysis on SURF and SIFT implementation to highlight the problems towards recognizing foods that need to be rectified in the future research.

Keyword: Bag of features; Food recognition; Image classification; Local features