Detecting the Freshness and Class of the Fish using Multispectral Imaging

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ABSTRACT

Many species of fish are consumed as food all around the world. Fish is an important source of protein and other nutrients. Therefore, the determination of fish quality is of vital importance since fish has a short shelf life even at refrigerator temperatures. The existing technique is to determine fish quality under human inspection based on personal expertise and skills. Hence, the results are subjective and can vary with the experience and knowledge of the supervisor. Therefore, it is important to develop a standard method to determine fish quality with minimal human intervention. Multispectral imaging is a promising research field as it is a useful tool in many applications. The main advantage of multispectral imaging is the ability to gather physical, geometrical, and chemical information, of objects, beyond the range of the visible region, as compared to RGB images only. Multispectral imaging technique is a preferred analytical tool to identify the quality of food and meat because the technique is reliable, nondestructive, economical, chemical free, and environmentally friendly. The principal aim of our work is to develop a deep neural network based fish grade classifier for yellowfin tuna, using an in-house developed multispectral imaging system with nine spectral bands. Multispectral images of the samples were obtained and preprocessed. Then, the sample space was visualized using dimension reduction techniques. A dataset consisting of training and testing multispectral images was created. A neural network was developed and trained on the training data which achieved 90 % accuracy on the testing data.

Keywords: Deep learning, fish grade classification, multispectral imaging