BIOMIMETIC VISION SYSTEM FOR EDIBLE BIRD NEST CLASSIFICATION OF DIFFERENT SHAPE, SIZE AND COLOR

F.S.A. Sa'ad*, A.Y.M. Shakaff, A. Zakaria, M.N. Jaafar, N.S.A. Abidin, L.M. Kamarudin
Sensor Technology and Application Research Cluster,
Universiti Malaysia Perlis, 01000, Perlis,
Malaysia.

*email : fathinul@unimap.edu.my

Abstract

Swiftlets are birds contained within the four genera *Aerodramus*, *Hydrochous*, *Schoutedenapus* and *Collocalia*. They form the Collocaliini tribe within the swift family Apodidae. Swiftlet nest economy is currently envisaged to contribute significantly to foreign earnings of Malaysia. Many establishments are currently engaged in bird nest farming and trying to improve the quality and quantity of nest production. The raw bird's nest (unprocessed) can achieve up to RM 4,000 per kilos. Processed and cleaned bird's nest can reach up to RM 9,000 or more per kilo. To date, the bird nest grading is based on weight and shape. The inspection and grading for raw edible bird nest were performed visually by expert panels. This conventional method is relying more on human judgments. Unfortunately, it is a tedious process and often inconsistence from one person to another. Bird nest has an approximately two-dimensional nature, and, therefore they are most suitable for real-time machine processing. This experiment was performed on various camera angel and bird nest position. More than hundreds birds nest was used in this experiment obtained throughout west peninsular Malaysia. A Fourier-based shape separation (FSS) method was developed from CCD image data to grade bird nest by its shape and size. FSS was able to differentiate different shape such as conical, round (oval) and 'v' *shaped* depending on the swiftlet species and geographical origin. In addition, color modality from the bird nest image was used to measure and classify the cleanness level of raw bird nest. Color recognition was established using multivariate discriminant analysis. The Wilks' lambda analysis was invoked to transform and compress the data set comprising of large number of interconnected variables to a reduced set of varieties. It can be further used to differentiate bird nest from different geographical origin. Overall, the vision system was able to correctly classify 89% of the bird nest for shape and 96% for cleanness evaluation. The performances were compared with the expert panels and the results show that this technique achieved similar accuracy.

Keywords: swiftlets, shape, size, color