

A Morphological and Gradient-based Approach Classify Rice Grains

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Rice is the seed of the monocot plants *Oryza sativa* (Asian rice). Rice grain recognition is very essential in agriculture for the management of rice grain types. Grain quality of rice varieties is determined by their physical characteristics. However, rice grain classification is an important component of computerized rice grain classification. This study proposes a computerized system for rice grain classification using digital morphological feature and shape based features. In order to achieve this goal, it translates into the identifying three target objectives such as to extract the features of rice grains, to classify the rice grains using k-Nearest Neighbour (k-NN) and Support Vector Machine (SVM) and to decrease the labor intensity and improve the speed and precision of the identification and classification compared to previous works. This study confirms the importance of basic (length, width, area, and perimeter) and morphological (aspect ratio, form factor, rectangularity, Equivdiameter) features. The four basic and four morphological features and Histogram of Oriented Gradients (HOG) features are used to classify ten types of rice grain varieties which are currently famous in Sri Lanka. These features are the input to the classifier for efficient classification and the results were tested with the k-NN and SVM classifiers separately. The k-nearest neighbour approach was used as a baseline classifier and then classified with SVM classifier. The proposed approach shows around 98.571% of classification rate when using HOG descriptors than basic and morphological features using SVM classifier as well as k-NN classifier. The experimental result demonstrates that the proposed method is effective and efficient. In particular, by comparing with the k-NN and SVM classifiers, when using HOG descriptors system increases the accuracy with compared to the other basic geometrical, morphological features under the case of not sacrificing the classification accuracy.

Keywords: Rice grains classification, Rice grains identification, SVM, geometric features, morphological