

## **MATLAB Based Software Tool for Grain Classification and Their Quality Identification**

H. Y. R. Atapattu<sup>1</sup>, N. W. K. Jayatissa<sup>1\*</sup>

At present, the field of agriculture is the most prevalent and enduring industry in the world. Among the existing food crops, grain varieties have attracted more attention of farmers since they play a major role in providing daily nutritional rations of human beings. Hence, it is important to develop accurate, efficient and cost effective methodology for classification and identification of grain varieties in order to yield high quality products while boosting the profit of farmers. In this study, an attempt was made to develop a software tool based on MATLAB by using the techniques of image processing to classify grain varieties namely; green gram and rice grains into their sub varieties and identify foreign particles present and the percentage of broken grains in a given sample. The decisions in classification and identification of grains were taken based on their different morphological features extracted based on the still images acquired using a digital camera. The images acquired were initially processed through several image pre-processing steps namely; RGB to gray conversion, gray to binary conversion, noise filtering and image erosion. The resulting binary images were then labeled and segmented based on the similarities that exist and the labels given. Subsequently, the features (area, perimeter, centroid, major axis length and minor axis length) of the segmented images were extracted and system decisions in classification of grain varieties and identification of the foreign particles & the percentage of broken grains were performed based on the features extracted with 95 % and 97 % accuracies respectively utilizing 35 training sets and 15 testing sets for each category. The subsequent processing steps were employed to convert numerical values into string values and the final results were displayed and readout loud to enhance the user friendliness of the software tool developed. The graphical user interface of the software tool was also based on the MATLAB. Furthermore, the whole process took a maximum of 5s execution time for one trail of grain classification or quality identification.

**Keywords:** Grain, Image processing, MATLAB, Classification, Quality identification

---

<sup>1</sup>Department of Physics, University of Kelaniya, Kelaniya, Sri Lanka \*jayatissa@kln.ac.lk