Classification of Mangoes based on fuzzy logic and artificial intelligence

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1. Introduction

The process of grading mango in Vietnam and the world is being carried out mainly by the direct labor of farmers. The methods used by farmers and distributors to classify agricultural products are through traditional quality testing with time-consuming and less efficient observations or some types of machines dedicated and result in low productivity, high cost, sorting out different types of mangoes is relatively costly. Research and application of high-tech machinery in the process of producing agricultural products on the one hand reduce human labor, reduce costs, and otherwise meet high standards of food safety Processing in difficult markets requires high quality is essential. The application of automation in agriculture especially in the production and processing of agricultural products is extremely necessary. World studies of mango classification according to color, size, volume and almost done in the laboratory but not yet applied in practice. The quality assessment of mango fruit has not been resolved. So it is necessary to study image processing techniques; collect and build a database of photos of some types of mangoes in Vietnam; studying mango quality approaches and techniques, examining mango surfaces that are deep, withered, porous, deformed mangoes, ripening on mango fruit; application of image processing technology, computer vision combined with artificial intelligence in the problem of mango classification or poor quality. The design of high-quality mango classification system based on image processing technology, computer vision combines artificial intelligence effectively in accordance with the development situation of agricultural machines today.

Currently mangoes are classified by color, volume, size and shape. The quality of the mango fruit is only predicted by the eye of the classification and has not been studied for application. Case studies of mango classification such as Machine vision-based maturity prediction system for harvested mango classification [1] proposed a machine-based system to classify mangoes by predicting levels maturity to replace manual classification system. Prediction of ripeness was made from video signals collected by a CCD camera placed above the mango conveyor belt. The recursive feature removal technique combined with the vector-based support (SVM) classifier is used to identify the most relevant features of the original 27 selected features. Finally, optimal aggregation of the number of reduced features is obtained and used to classify mangoes into four different types according to maturity level; Tomas U. Ganiron Jr developed a size-based mango classification system using image analysis techniques [2]. This empirical study aims to develop an efficient algorithm to detect and classify mangoes. Using the obtained image, the features of the mango are extracted and used to determine the mango layer. The characteristics of the extracted mango are perimeter, area, roundness and defect rate; The mango classification system uses machine vision and Neural network [3] as a system that can classify ripe or unripe mangoes. The method used to carry out this study was split into several steps: object identification, algorithm development, implementation and evaluation. This system is implemented in C, Computer Vision and ANN (artificial neural networks) so that the system can detect the color of the ripe or unripe mangoes; The research team in Malaysia [4] proposed and implemented fuzzy logic algorithms and algorithms using digital image processing, predefined content analysis and statistical analysis to determine real estate export of local mangoes in Perlis - Malaysia. This study is to design and develop an efficient algorithm to detect and classify mangoes at 80% accuracy compared to human classification. All studies are mostly done in laboratories, with certain results in the exploitation of specific

classification features, with a high classification result in color, volume and size. However, the quality of the mango has not been assessed, but it has been put into practical applications. The studies [5 - 12] mentioned the application of image processing and artificial neural networks with different treatments for fruits, vegetables, fruits and other foods and for certain results in research assist.

2. Characteristics of mangoes

3. Vision machine for sorting mangoes

4. Experiments   and discussions

5. Conclusion

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