ELECTRONIC NOSE SYSTEM FOR FRUIT SPOILAGE DETECTION USING IOT-BASED ARTIFICIAL NEURAL NETWORK

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ABSTRACT

Detection of fruit rot presents a significant challenge within the agricultural sector, particularly in preserving fruit quality throughout distribution. This study introduces an electronic nose (E-Nose) system that leverages Artificial Neural Networks (ANN) and the Internet of Things (IoT) to facilitate real-time detection of fruit rot. The E-Nose employs gas sensors, specifically TGS 2600, TGS 2602, and TGS 822, to identify variations in gas compounds indicative of rot. The data collected from these sensors are analyzed using an ANN implemented in MATLAB software, with the results transmitted via IoT for remote monitoring. This study utilized a dataset comprising 2,176 samples to train the ANN utilizing the backpropagation method. The dataset was partitioned into Training, Validation, and Testing. Specifically, 80% of the data (1,740 samples) was allocated for training, while 10% (218 samples) was designated for validation, and the remaining 10% (218 samples) was reserved for testing. The findings of this research demonstrate that the proposed system can detect fruit rot with a high degree of accuracy, thereby enabling prompt preventive measures and minimizing fruit waste. The study categorizes the results based on fresh and rotten fruit. The tests conducted within the fruit detection system yielded Accuracy, Precision, Sensitivity, and Specificity levels of 100%. This outcome was derived from a total of 48 tests, including 16 tests on training data, 16 on untested data, and 16 on new data.

Keywords: Matlab, Artificial Neural Network, Electronic smell.