

AI-based soft-sensor for shelf life prediction of 'Kesar' mango

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Abstract

This paper presents prediction of shelf-life of '*Kesar*' cultivar of mangoes stored under specified conditions based on their respiration rate and ripeness levels. A deep-CNN was fine-tuned on 1524 image data of mangoes stored under different conditions to classify the ripeness levels of mangoes as 'unripe', 'early-ripe', 'partially-ripe' and 'ideally-ripe'. CO_2 respiration rate (RR_{CO_2}) was further calculated using principle of enzyme kinetics to establish a correlation between RR_{CO_2} and ripeness levels. A Support Vector Regression model was employed to predict the shelf life and ripeness levels of mangoes under different storage conditions, thereby creating an AI based soft-sensor. The developed methodology can be used for other climacteric fruits besides mangoes. This solution can be used by producers and distributors for post-harvest handling of climacteric fruits like mango. It will also aid retailers in taking dynamic decisions with respect to pricing, logistics and storage conditions to be maintained to get the desired ripening rate, thus, contributing to reduction of wastage of fruits and subsequent economic losses.