

## **Fruit Identification System in Sweet Orange Citrus (L.) Osbeck Using Thermal Imaging and Fuzzy**

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**Abstract :** In agriculture, intelligent systems applications have generated great advances in automating some of the processes in the production chain. In order to improve the efficiency of those systems is proposed a vision system to estimate the amount of fruits in sweet orange trees. This work presents a system proposal using capture of thermal images and fuzzy logic. A bibliographical review has been done to analyze the state-of-the-art of the different systems used in fruit recognition, and also the different applications of thermography in agricultural systems. The algorithm developed for this project uses the metrics of the fuzziness parameter to the contrast improvement and segmentation of the image, for the counting algorithm was used the Hough transform. In order to validate the proposed algorithm was created a bank of images of sweet orange Citrus (L.) Osbeck acquired in the Maringá Farm. The tests with the algorithm indicated that the variation of the tree branch temperature and the fruit is not very high, which makes the process of image segmentation using this differentiates, this increases the amount of false positives in the fruit counting algorithm. Recognition of fruits isolated with the proposed algorithm present an overall accuracy of 90.5 % and grouped fruits. The accuracy was 81.3 %. The experiments show the need for a more suitable hardware to have a better recognition of small temperature changes in the image.

**Keywords :** Agricultural systems, Citrus, Fuzzy logic, Thermal images.

**Conference Title :** ICCAR 2016 : International Conference on Control, Automation and Robotics

**Conference Location :** Copenhagen, Denmark

**Conference Dates :** June 27-28, 2016