Deep learning for classification as a pre-step to automatic melon fruit suture segmentation

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Abstract. Analysis of melon's certain traits through digital images provides a valuable tool for characterizing many melon (honey dew) varieties, gives better understanding of differentiation between species and can be beneficial for breeding. Accurate automatic segmentation of specific traits as sutures (longitudinal stripes present at the fruit surface) or nettings is often required as an inevitable analysis step. In this work, we employ a fine-tuned deep learning network to verify images of melon for presence or absence of longitudinal sutures and apply automated k-means clustering algorithm to segment sutures from the images of melons identified as sutured. The experimental study shows the effectiveness of proposed method on the applied dataset of melon fruit's images provided by Vilmorin & Cie. The applied approach demonstrated significantly higher accuracy (97.5%) in identifying sutured melons and reduced the number of mis-segmented images in comparison with previous strategies applied such as binary pixel counting algorithm (60%) and supervised machine learning method with hand-crafted features (92.5%).

Keywords. deep learning, image classification, image segmentation, melon's image, k-means clustering