Abstract

Cultivar discrimination during on-line quality selection is required by high quality food industries. The aim of this work was to evaluate the potential use and efficacy of shape-based techniques in order to discriminate among four traditional Italian cultivars (Tonda di Giffoni, San Giovanni, Mortarella and Tonda Romana). Tonda di Giffoni and Tonda Romana are very similar having a spherical shape, while the other two cultivars are elongated. Color RGB images of about 400 hazelnuts were analysed with a morphological method based on the elliptic Fourier approximation to closed contours in a two-dimensional plane. This method was applied on the three outlines obtained by the polar, lateral and random plane positioning view of in-shell and unblanched kernel. The coefficients of the harmonic equations were analysed *via* Partial Least Square Discriminant Analysis (PLSDA) multivariate classification and mean outline for each group was graphically extracted. Results show higher percentage of correct classification for the lateral view (from 77.5% to 98.8% in the independent test). Also the random positioning view, in particular for in-shell kernels between the two rounded cultivars and between the two oblong cultivars, showed good classification results (respectively, 95.1 and 97.6). This preliminary study demonstrates the potential of modern multivariate techniques using shape-based methods on digital images to achieve high efficiency performance in fruit grading and classification.