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Applicability of digital image processing for quality control of vegetable mixes

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Nowadays, the consumer's comprehensive information supply is more and more important concerning their conscious decision on purchase. Answering to the demand, development of food quality control systems is in the focus of the food industry. The aim of the presented work was the estimation of ingredients (m/m %) of vegetable mixes by digital image processing technique. Hitachi HV-C20 type 3CCD camera was used for image acquisition. During the experiment, different corn based vegetable mixes (green pea, chili, olive and red pepper, red kidney bean, green pea and red pepper) were used. For all samples, images were taken about the whole mix and the manually separated ingredients as well. Calibration of the computer vision system is essential, therefore corresponding mass (g) and visible area (cm²) data were recorded. Segmentation was performed based on a threshold value of normalized color channels. Graphical user interface and algorithm were developed for image analysis using Scilab software. Curve fitting was performed on mass and visible area to find the best prediction model of lowest RMSE. Close relationship was found between mass and segmented area ($R^2 > 0.98$). Statistical software of SPSS was used to analyse surface color of ingredients. According to the result of discriminant analysis, ingredients of evaluated vegetable mixes were distinguished above 97% accuracy. The preliminary results of the experiment are promising and computer vision system seems to be able to assess the quality of vegetable mixes.