Discrimination and classification of Eurycoma longifolia Jack in medicinal foods by means of a DSP-based electronic taste sensor

Eurycoma longifolia Jack (ELJ), better known as Malaysian Ginseng, is fast becoming popular due to its efficacy as a general health and testosterone booster, and for its known aphrodisiac properties. With the growing popularity of ELJ, together with the increasing consumer demand for healthy foods, it is expected that the number of healthy food suppliers boasting claims that their products are enriched with this medicinal herb will also increase. It is, therefore, important to device a strategy that can rapidly provide corroborating evidence in order to assess the authenticity of such a claim onsite. A portable electronic taste sensor employing digital signal processing (DSP) technology was developed to meet this objective. The sensor was constructed from eight kinds of lipid membranes forming the multichannel artificial taste-sensing equipment. The system was trained to detect ELJ into four different concentrations: 0.01%, 0.03%, 0.05% and 0.08%. Over 100 samples were tested, from which the taste system was able to correctly classify the test mixtures at a greater than 90% success rate. This classification success rate, however, dropped to well below 50% when data from multichannel were used independently, indicating the between-channel variations were relatively small. Data fusion via principal component analysis helped enlarge the variation with the first and second principal components, contributed nearly 92% of the total variance. Equipped with 32-bit state-of-the-art DSPs, the taste system allowed both training and testing schemes to be implemented directly onboard.