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Rapid identification of tea quality by E-nose and computer vision combining with a synergetic data fusion strategy

Min Xu, Jun Wang, Shuang Gu



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1 **Rapid identification of tea quality by E-nose and computer vision**
2 **combining with a synergetic data fusion strategy**

3 Running title: Tea quality identification by E-nose and computer vision

4 Min Xu, Jun Wang[✉], Shuang Gu

5 *Department of Biosystems Engineering, Zhejiang University, 866 Yuhangtang Road, Hangzhou 310058, PR China.*

6 **Abstract:** This research demonstrates a rapid detection method of jointly using electronic nose (E-nose)
7 and computer vision system (CVS) to detect tea aroma and tea appearance for tea quality identification.

8 Feature-level and decision-level fusion strategies were introduced for analyzing the fusion signals of E-
9 nose and CVS. K-nearest neighbors (KNN), support vector machine (SVM) and multinomial logistic
10 regression (MLR) were applied for classification modelling. The results showed that the decision making
11 based on fusion strategies synergistically integrated the advantages of E-nose and CVS and obtained
12 better performance than independent decision in tea quality identification. The decision-level fusion
13 combining the SVM results of both E-nose and CVS was the most effective strategy with the
14 classification accuracy rates of 100% for training and testing sets. This study manifests the simultaneous
15 utilization of E-nose and CVS combined with the decision-level fusion strategy could be worked as a
16 rapid detection method to identify tea quality.

17 **Keywords:** Tea; quality identification; E-nose; computer vision; data fusion.

✉ Corresponding author Tel. : +86-571-88982178; fax: +86-571-88982191.

E-mail address: jwang@zju.edu.cn (Jun Wang)

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