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# An ANN based Approach to Correlate Fermentation Condition with Sensory Characteristics of Black Tea

This research paper delves into the profound influence of various process conditions during the fermentation of tea on its sensory attributes. The key parameters under scrutiny in the fermentation process are temperature and relative humidity. These pivotal factors are monitored daily within a tea factory setting, facilitated by the installation of an RS 485 network-based instrumentation system specifically developed for this purpose. Given the substantial dimensions of the fermentation room, diverse sensor nodes are strategically positioned at various locations to ensure comprehensive data collection.To ensure the accuracy of the collected data, a calibration process for the sensor nodes is performed using a standard saturated binary salt solution. Concurrently, assessments of the tea's sensory qualities are conducted by skilled tea tasters. These assessments encompass a spectrum of sensory characteristics, including briskness, strength, body, and brightness, providing qualitative insights into the tea's attributes. Subsequently, we embark on an exploration of the relationships between the fermentation process parameters and the sensory characteristics of tea. Initially, a multivariate linear regression model is developed to establish these connections. An artificial neural network-based technique is further implemented to establish these relationships.The findings of our study reveal the distinct advantages of the artificial neural network method over the conventional multivariate linear regression approach. The results demonstrate that the artificial neural network method shows better results in terms of correlation accuracy. Specifically, our analysis reveals remarkable correlations of 95.53% for briskness, 96.18% for strength, 91.6% for body, and 95.43% for brightness when employing the artificial neural network method. Likewise, the Root Mean Square Error values obtained for the Artificial Neural Network method are 0.079, 0.082, 0.11 and 0.074 for briskness, strength, body and brightness respectively; demonstrate better than the multivariate linear regression approach.

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