

# A Bayesian Approach for Raisin Data Classification

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Raisin performs a decisive role in the commodity economy. Recently, low-quality raisin products have been introduced to agricultural markets worldwide. Therefore, it is crucial to identify a suitable classification method to distinguish between varieties of raisins. Previous research has employed various traditional machine learning methods to classify commodities. However, it is challenging to quantify uncertainties through traditional machine learning models. Therefore, this study employed a Bayesian Logistic Regression (BLR) model using seven morphological features of two varieties of raisins grown in Turkey. Initially, different machine learning techniques were employed on data. After that, four priors, such as Jefferys, Laplace, Cauchy, and Gaussian, were considered, and hyperparameters were tuned using the empirical Bayes method. Marginal posterior distributions of the model parameters were estimated, and the convergence of the models was checked. Then, evaluation metrics of the BLR model with different priors were compared to those of machine learning models. According to the results, the BLR model with Gaussian prior produced the highest accuracy of 93%. Finally, it can be concluded that the BLR model with Gaussian prior provides substantially better results when classifying raisin data.

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