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Abstract
Clustering analysis has been widely used in data classification is due to it can extract the representative characteristics of cluster. It can partition the given set of datum into various characteristic cluster based on the similarity degree of datum. Clustering analysis is divided into hierarchical and nonhierarchical methods, the hierarchical method uses the nested structure to achieve the classifying purpose, and the nonhierarchical method applies various validity indices to determine the best number of clusters. In this thesis, we employ various clustering algorithms and validity indices to discuss the application of data classification. The compared results indicate that , and validity indices have best adaptation in decision of number of clusters.

Because gasoline engine is a nonlinear system with uncertainties, it is ineffective to apply analytical approach to construct an engine dynamic model. Therefore, we attempt to apply the fuzzy clustering method to obtain the local optimal results with clustering analysis and various validity indices. The clustering results are used to construct a clustering-based estimator to estimate the output of gasoline engine under various operating conditions. The experimental results indicate that the clustering-based estimator can correctly predict the unmeasured outputs.
Advisory Committee Chen Pei-Chung - advisor

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