Feature space reduction by the criterion of contingency with null-space

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Abstract

Often, when forming a feature space, an excessive number of features is defined deliberately, and then, uninformative features are excluded. This technique is known as the feature space reduction [1]. It raises a problem of choosing an informativeness indicator and a threshold value of the selected indicator.

The works [2, 3] investigated the possibility that an indicator of contingency of a vector corresponding to a particular feature with null-space of the transposed matrix, composed of the remaining feature vectors, can be used as a criterion of informativeness of this feature. This technique involves setting a certain threshold for the contingency indicator and excluding the features if their contingency is less than specified. However, the issue of a reasonable choice of a threshold for obtaining an optimal set of features from the original set remains open.

This paper proposes and investigates a method for assigning a quantitative value to the threshold based on calculating the criterion of contingency of a feature space component, which is introduced to allow for the displacement of the separating hyperplane.

Keywords: null-space, feature space, feature space reduction, indicator of contingency of a vector, transposed matrix, hyperplane.

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