计算机应用 2008, 28(9) 2423-2426 DOI: ISSN: 1001-9081 CN: 51-1307/TP

论文

融合先验知识的模糊最小二乘支持向量机模型及其应用

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摘要：

为了解决最小二乘支持向量机(LSSVM)对噪声或孤立点敏感的问题，融合数据样本中的先验知识，提出一种基于噪声分布模型和样本紧密度的模糊最小二乘支持向量机模型。在训练的过程中，考虑样本的噪声分布信息。为了区分有效样本和噪声，研究了基于样本紧密度的策略。运用该策略和噪声分布模型，可自动生成相应样本的模糊隶属度。该方法提高了最小二乘支持向量机的抗噪声能力以及处理含有噪声或孤立点样本的灵活性。将提出的方法运用于润滑油精制生产过程的故障诊断。实验结果表明，该方法具有很好的分类精度和鲁棒性。

关键词： 最小二乘支持向量机 模糊隶属度 先验知识 噪声 故障诊断

Incorporating prior knowledge in fuzzy least squares SVM model and its application

Abstract:

To address the drawback that the Least Squares Support Vector Machines (LSSVM) is sensitive to noises or outliers, a LSSVM model incorporating with prior knowledge on data was proposed based on noise distribution and sample affinity. Information of noise distribution for samples was introduced in the training process. A strategy based on the sample affinity was presented to discriminate data with noises. A fuzzy membership was automatically generated and assigned to each corresponding data point in the sample set by using the strategy and the noise model. The ability of FLSSVM was improved to resist noises. The flexibility was increased to treat data points with noises or outliers. The proposed method was applied to fault diagnosis for the lubricating oil refining process. The experimental result shows that the proposed method has better robustness.

Keywords: Least Squares Support Vector Machines （LSSVM） fuzzy membership prior knowledge noise fault diagnosis

收稿日期 2008-03-21 修回日期 1900-01-01 网络版发布日期

DOI:

基金项目:

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