

论文

一种新的人工免疫网络算法及其在复杂数据分类中的应用

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摘要

作为一种新的智能计算方法, 人工免疫网络已被广泛的应用到模式识别以及数据分类中。现有的人工免疫网络分类算法大都存在两个缺陷: 一是网络规模庞大、计算复杂; 二是对抗原的一次递呈并不能保证获得全局最优分类器。该文提出了一种新的人工免疫网络分类算法, 该算法利用每个类别对应单个B细胞的策略, 简化网络规模并减少了同类别B细胞之间的抑制操作, 同时引入了新的基于对训练样本正确识别率的亲合度评价函数, 实现了基于抗原的优先级的选择策略。采用5组UCI的线性数据和4组混合特征数据以及1幅SAR图像对算法的性能进行了全面测试, 结果表明, 与模糊C均值算法, 多值免疫(MVIN)算法和基于分类问题的克隆选择算法(CSA)相比, 新算法在分类精度上具有一定的优势, 鲁棒性更好。

关键词 [人工免疫网络](#) [分类](#) [SAR图像](#) [混合数据](#)

分类号 [TP18](#)

A New Artificial Immune Network Algorithm for Classifying Complex Data

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Abstract

As a new computational intelligence method, the Artificial Immune Network (AIN) is widely applied to pattern recognition and data classification. Existing artificial immune network algorithms for classifier have two major limitations: one is the scale of the networks, a large scale of networks needs high computation complexity, the other is only once presenting the antigens that can not guarantee find the optimal global classifier. A new Artificial Immune Network Classifier (AINC) algorithm is proposed in this paper. In the proposed algorithm, only one B-cell is used to denote single class in order to reduce the scale of network, and avoid the suppression operation between B-cells, moreover, a new affinity based on the correct rate is proposed to realize the evaluation strategy based on antigen priority. The proposed algorithm is extensively compared with Fuzzy C-Means (FCM), Multiple-Valued Immune Network algorithm (MVIN), and Clonal Selection Algorithm for classifier (CSA) over a test suit of several real life data sets and one SAR image. The result of experiment indicates the superiority of the AINC over FCM, MVIN and CSA on accuracy and robustness.

Key words [Artificial immune network](#) [Classification](#) [SAR image](#) [Heterogeneous data](#)

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