

一种基于模拟退火算法改进的卷积神经网络

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摘要: 卷积神经网络(CNN)是一种深度学习技术,其目标是构建一个接近人类的智能来执行任何知识的任务.使用基于交叉熵损失函数的模拟退火算法对 dropout 正则化,即有些单元值被抑制的 CNN 进行优化训练,而在测试阶段所使用的模型平均方法则同时考虑了保留概率和池化区域内单元值所占概率.在 MNIST 手写数据库和 CMU-PIE 的部分图像库的实验结果表明,在同一 CNN 结构和相同迭代次数时,此方法均优于其他方法,不仅能够得到更好的识别率而且更能防止过拟合的问题.

关键词: 卷积神经网络; 模拟退火算法; 交叉熵; 图像识别

An Improved Convolutional Neural Network Based on Simulated Annealing Algorithm

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Abstract: CNN is a deep learning method, where its aim is to the goal of artificial intelligence that could perform any intellectual tasks. This paper proposes to optimize CNN with dropout regularization that it can some units became zero using simulated annealing algorithm based on cross entropy loss function, also proposes model averaging method that it combines retaining probability and probability of each unit within pooling region at test time. We do experiments on MNIST handwritten database and part of CMU - PIE database. Under the same structure and the same number of iterations, the method is superior to other methods. It can get a better recognition rate and can be better to overcome the over-fitting problem.

Key words: convolution neural networks; simulated annealing algorithm; cross entropy; image recognition

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