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Convolutional Neural Network with Nonlinear Competitive Units

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Abstract

Convolutional Neural Network (CNN) has been an important breakthrough in pattern recognition in recent years. Nevertheless, with the increase in complexity, CNN becomes more difficult to train. To alleviate the problem of training difficulties, we propose a novel nonlinear unit, called Nonlinear Competitive Unit (NCU). By comparing the elements from different network layers and selecting the larger signals element-wisely, it can not only strengthen feature propagation but also accelerate the convergence of CNN. This unit can be regarded as a feature fusion method as well as a kind of activation function. We evaluate our NCU-based models for face verification task and visual classification task on four benchmark datasets. The experimental results demonstrate the superior performance of our models over many state-of-the-art methods, which shows the advantage and potential of the NCU in networks.

Keywords:
Nonlinear Competitive Unit, Feature Fusion, Activation Function, Face Verification, Visual Classification.

1.

Since AlexNet [1] was introduced by Hinton in 2012, convolutional neural network (CNN) has received extensive attention. A number of vision tasks, such as image classification [2, 3], face recognition [4, 5] and face verification

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