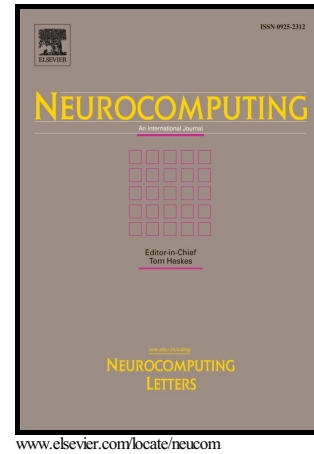


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Learning Pooling for Convolutional Neural Network

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Abstract

Convolutional neural networks (CNNs) consist of alternating convolutional layers and pooling layers. The pooling layer is obtained by applying pooling operator to aggregate information within each small region of the input feature channels and then down sampling the results. Typically, hand-crafted pooling operations are used to aggregate information within a region, but they are not guaranteed to minimize the training error. To overcome this drawback, we propose a learned pooling operation obtained by end-to-end training which is called LEAP (LEArning Pooling). Specifically, in our method, one shared linear combination of the neurons in the region is learned for each feature channel (map). In fact, average pooling can be seen as one special case of our method where all the weights are equal. In addition, inspired by the LEAP operation, we propose one simplified convolution operation to replace the traditional convolution which consumes many ex-

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