FREQUENCY DILATION LEARNING FOR TEMPORAL CONVOLUTIONAL NEURAL NETWORKS

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ABSTRACT

Convolutional neural networks (CNNs) make up the bedrock in modern machine learning. With ever increasing data sets and increasing efforts to port these foundational systems to mobile and robotics applications there is an ever strong desire to reduce the computational and memory footprint of CNNs. In this paper we introduce frequency dilation, a novel technique to increase efficiency at minimal cost in terms of network accuracy.

1 Introduction

Integral transforms lie at the core of computational efficiency trough sparsity [2][6]. Previous works have reduced the parameter count of fully connected layers trough the fast hadamard transforms [8]. Fully connected layers are re-parametrized trough a fixed basis. Using a fixed bases [1] proposes a unitary RNN, later [7] finds that in the RNN case using a fixed basis is detrimental to network performance. As we believe that the fixed basis in [8] is equally restricted, and therefore detrimental to performance. Instead we proposed a learn-able representation based on the dual tree wavelet transform [4], which we apply to both input data and network weights.

2 Related work

[3]

3 Theory

Sparsity of a representation is basis dependent [6][5], fewer coefficients are are required in order to represent a signal, only a limited number of basis functions components are able to do the job.

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