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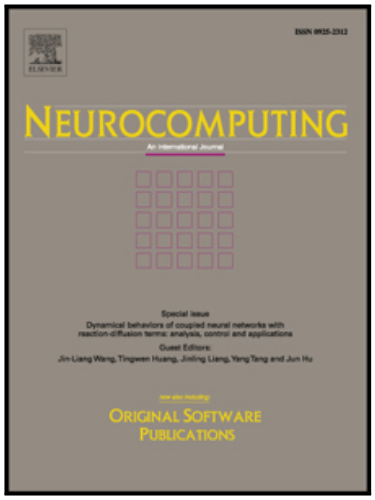

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Deep Neural Networks Regularization for Structured Output Prediction

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Abstract

A deep neural network model is a powerful framework for learning representations. Usually, it is used to learn the relation $\mathbf{x} \rightarrow \mathbf{y}$ by exploiting the regularities in the input $\mathbf{x}$. In structured output prediction problems, $\mathbf{y}$ is multi-dimensional and structural relations often exist between the dimensions. The motivation of this work is to learn the output dependencies that may lie in the output data in order to improve the prediction accuracy. Unfortunately, feedforward networks are unable to exploit the relations between the outputs. In order to overcome this issue, we propose in this paper a regularization scheme for training neural networks for these particular tasks using a multi-task framework. Our scheme aims at incorporating the learning of the output representation $\mathbf{y}$ in the training process in an unsupervised fashion while learning the supervised mapping function $\mathbf{x} \rightarrow \mathbf{y}$.

We evaluate our framework on a facial landmark detection problem which is a typical structured output task. We show over two public challenging

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