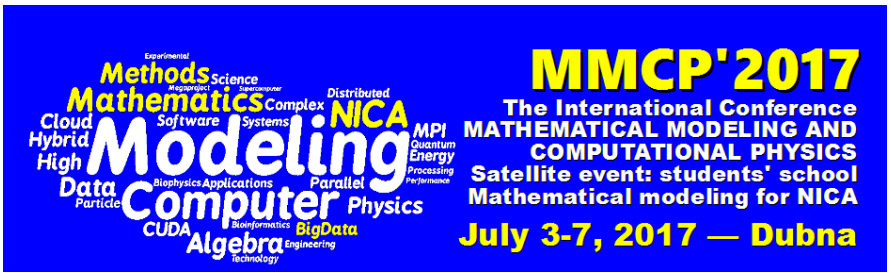

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IMAGE CLASSIFICATION BY SHALLOW AND DEEP NEURAL NETWORKS

Thursday, 6 July 2017 13:30 (30 minutes)

The paper intends to demonstrate the advantages of deep learning approaches over ordinary shallow neural network (NN) on their comparative applications to image classifying. An autoassociative neural network is used as a standalone program realized the nonlinear principal component analysis (NLPCA) for prior extracting the most informative features of input data for neural networks to be compared further as classifiers. Two special studies devoted to the optimal choice of activation function, the normalization transformation of input data and to denoising properties of our NLPCA algorithm demonstrate its efficiency even on noisy data. Three types of neural networks are compared: feed-forward NN with one hidden layer, deep NN with several hidden layers and deep belief NN with several pretraining RBM layers. The number of hidden layer and the number of hidden neurons in them were chosen by cross-validation procedure to keep balance between number of layers and hidden neurons and classification efficiency. Results of our comparative study demonstrate the undoubted advantage of deep networks, as well as denoising power of autoencoders. In our work we use both GPU and cloud services to speed up our calculations.

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