

In the area of image recognition, the so-called deep neural networks belong to the most promising models these days. They often achieve considerably better results than traditional techniques even without the necessity of any excessive task-oriented preprocessing. This thesis is devoted to the study and analysis of three basic variants of deep neural networks—namely the neocognitron, convolutional neural networks, and deep belief networks. Based on extensive testing of the described models on the standard task of handwritten digit recognition, the convolutional neural networks seem to be most suitable for the recognition of general image data. Therefore, we have used them also to classify images from two very large data sets—CIFAR-10 and ImageNet. In order to optimize the architecture of the applied networks, we have proposed a new pruning algorithm based on the Principal Component Analysis.