

Deep neural networks represent an effective and universal model capable of solving a wide variety of tasks. This thesis is focused on three different types of deep neural networks - the multilayer perceptron, the convolutional neural network, and the deep belief network. All of the discussed network models are implemented on parallel hardware, and thoroughly tested for various choices of the network architecture and its parameters. The implemented system is accompanied by a detailed documentation of the architectural decisions and proposed optimizations. The efficiency of the implemented framework is confirmed by the results of the performed tests. A significant part of this thesis represents also additional testing of other existing frameworks which support deep neural networks. This comparison indicates superior performance to the tested rival frameworks of multilayer perceptrons and convolutional neural networks. The deep belief network implementation performs slightly better for RBM layers with up to 1000 hidden neurons, but has a noticeably inferior performance for more robust RBM layers when compared to the tested rival framework.