Creating a Neural Network for Isolated Words Recognition

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Abstract. The purpose of this study: the development of a system of character recognition on the basis of the device of artificial neural networks. As part of the study, an analysis of modern artificial neural networks, as well as the direction of deep learning .As a result of the study, an own method for the realization of the task was developed

Keywords: neural network, word recognition, MNS, training procedure

Full end-to-end text recognition is a challenging problem that has received much attention recently. Traditional systems in this area have relied on elaborate models incorporating carefully handengineered features or large amounts of prior knowledge. In this paper, we take a different route and combine the representational power of large, multilayer neural networks together with recent developments in unsupervised feature learning, which allows us to use a common framework to train highly-accurate text detector and character recognizer modules [1].

The central task of pattern recognition is building on the basis of systematic theoretical and experimental studies of efficient computing tools for assigning formalized descriptions of situations and objects to the corresponding classes [2].

In this paper, we observe the problem from a different angle. For low-level data representation, we use an unsupervised feature learning algorithm that can automatically extract features from the given data. Such algorithms have enjoyed numerous successes in many related fields such as visual recognition. In the case of text recognition, the system in achieves competitive results in both text detection and character recognition using a simple and scalable feature learning architecture incorporating very little hand-engineering and prior knowledge.

Neural networks - a model that is provided as a set of elements (neurons) and links between them, which in general can be directed or not directed and have some weight. The neural network consists of neurons and directed bonds between them, with each link having some weight. Then at each step the neuron receives a signal from all input neurons, calculates the weighted sum of signals, applies to it some function and passes the result to each of its outputs

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Neurons can be grouped into a network structure in various ways. Functional Features neurons and the way they are combined into a network structure determine the characteristics of the neural network. For solutions the most appropriate identification and control tasks are multilayer neural networks (MNS) direct action, or multilayer perceptrons. When designing MNS, neurons are combined into layers, each of which processes a vector of signals from the previous layer. The minimum implementation is a two-layer neural network consisting of an input (distribution), intermediate (hidden) and output layer. The neural network will compare the result with the correct one and, based on this, change the weights of the neurons so that the answer is minimally different from the necessary one. In other words, the neural network is trained to perform a certain function, while adjusting the values (weight coefficients) between the elements. The network is adjusted based on the comparison, the necessary and the obtained results [3].

As a result of the learning process, a neural network is able to identify complex relationships between input and output data. When summarizing information, the network will allow you to return the correct result based on incomplete or distorted data. With a large number of connections between neurons, the network acquires resistance to errors that occur on some lines. Broken links work take on serviceable lines, as a result of which the network does not undergo significant changes. The network training procedure is quite computationally time consuming, requires large size training set. In addition, the training procedure does not always guarantee a result, so a lot of work is devoted to the problems of training neural networks [4].

To solve the task, the following method was developed:

1. Initialization of the weight coefficients of the first layer.
2. Calculation of the state of the first layer of the neurons.
3. Calculation of the state of the second layer of the neurons.
4. Check the exit condition.

If the outputs are not stabilized, that is, changed for the last iteration, then the transition to step 3, otherwise the end. In this paper, we have considered a novel approach for end-to-end text recognition. By leveraging large, multi-layer network, we train powerful and robust text recognition modules artificial intelligence.

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