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STUDY OF THE EFFECTIVENESS OF CONVOLUTIONAL NEURAL NETWORKS WITHIN PATTERN RECOGNITION DOMAIN

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It is a well-known fact that computers execute simple arithmetic instructions at a high speed. They are fast and they do not get tired. Image recognition needs human intelligence – something that machines lack, since humans can process a large amount of information that images contain. The computer neural network should be treated like a child that should be gradually educated refining its behavior (or decisions) to reach an acceptable standard. Obviously, computers do not really think, they only get some input, do some calculation and produce an output. Firstly, the output will not be perfect, so the error should be taken into account to improve the output value to our standard. The prediction should be refined by iteratively adjusting unknown parameters considering the error, so that the actual output could become close to our standard. Here, the error is difference between our standard and the actual output. To understand the whole process of prediction, we should look at the architecture of the human's brain. Traditional computers process data sequentially and in concrete terms. There is no fuzziness or ambiguity in their cold hard calculations. On the other hand, the human brain, apparently running at much slower rhythms, seems to process signals in parallel with fuzziness in the computation. Various forms of neurons transmit an electrical signal from one end to the other, from the dendrites along the axons to the terminals. These signals pass from one neuron to another. In this way, humans sense light, sound, heat, etc. Signals from specialized sensory neurons are transmitted through human nervous system to the brain, which is also made of neurons. A neuron takes an electrical input and generates another electrical signal. This looks exactly like classifying or predicting machines, which get an input, perform some processing, and produce an output. How many neurons do we need to perform complex tasks? The human brain has about 100 billion neurons. A fruit fly has about 100,000 neurons and is capable of flying, evading danger, finding food, etc. Observations suggest that neurons do not react rapidly, but instead suppress the input until it reaches a certain threshold and subsequently it triggers an output. Biological neurons get a number of inputs, not just one. They are simply summed up and become an input for sigmoid function, which controls the output. If the combined signal is not strong enough, it is suppressed by the sigmoid function. However, if the sum is sufficient to pass a threshold, the resulting output goes further to other neurons.