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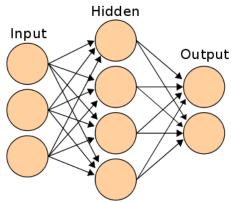SHEI "National Mining University", Dnipropetrovsk

Neural Networks

Artificial intelligence is very popular topic to talk about among different group of people, no matter how deeply they are into science. Let's touch one of many implementations of AI which knows how to recognize faces, helps you with weather prediction and understands your handwriting better than you do.

According to Wikipedia definition, an artificial neural network, often just called a neural network, is a mathematical model inspired by biological neural networks. In most cases a neural network is an adaptive system that changes its structure during a learning phase. Neural networks are used to model complex relationships between inputs and outputs or to find patterns in data.

A neural network is characterized by an architecture in which its operations are distributed among many relatively simple processors. When a complicated procedure is broken up this way, two benefits are realized: 1. Simple hardware processors can be constructed. These are typically cheap and fast. This allows economical implementations of what might otherwise be nearly impossible. 2. The procedure can take advantage of the neural network craze. If an algorithm can be called a neural network, its chances of attracting attention are vastly increased.

There is no strict step by step instruction to design a neural network. It varies depending on purpose but there are some basic things:

- ○ Collect data
- ○ Split data into training, testing and validation sets which will be later used by neural network.
- ○ Set the number of hidden layers, hidden neurons, output neurons
- ○ Choose evaluation criteria
- ○ Train your neural network

Nowadays artificial neural networks are experiencing some kind of second birth and can be applied in many areas: system identification and control (vehicle control, process control, natural resources management), quantum chemistry, game-playing and decision making (backgammon, chess, poker), pattern recognition (radar systems, face identification, object recognition and more), sequence recognition (gesture, speech, handwritten text recognition), medical diagnosis, financial applications (automated trading systems), data mining (or knowledge discovery in databases), visualization and e-mail spam filtering.