Building the nuclear power plant includes creation of reactors, turbines, water colling towers; by other words, it includes the construction of all components and systems of future plant.

After the process of building is over, before running the plant, there is a testing process, which are made to become sure, that everything works as it should work. And only then the plant is started. Unfortunately, the time of running of nuclear power plant is limited. According to different sources, thus time is from 30 to 80 years.

After the limit is over there is a process of decommissioning.

There are 3 possible options for decommissioning:

1. Direct dismantling. In this case all nuclear fuel is removed. All buildings are dismantled and the area of plant is purified.
2. Delayed dismantling. This method is quite the same as the first one. But in delayed dismantling the plant is preserved for from 30 to 100 years and only then it is dismantled.
3. The last way is insulation. The whole plant may be concluded to sarcophagus and will be dismantled only after 100 years. [1]

The advantage of two last methods that they reduce the amount of radioactive fuel and, consequently, they reduce the cost of dismantling.

After dismantling, according to theory of “Peaceful Atom”, the area of NPP should be restored to a greenfield site, like no nuclear power plant has ever stood here.

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Scientific supervisor: A.V. Balastov, senior lecturer, Department of Foreign Languages, Institute of Power Engineering, TPU.

PERCEPTRON NEURAL NETWORK. POTENTIAL WAY OF USE

D.I. Polovnikov
National Research Tomsk Polytechnic University
Institute of Power Engineering, Department of Nuclear and Thermal Power Plants,
Group 5032

Neural network is a mathematical model, its software and technical realization. I have decided to take 2 perceptron types - single and multi. I decided to find out why multi-layer perseptron is used in calculations of nuclear reactions. Let's start with a structure of the single-layer network.

As you can see on the screen the network has only one layer - output, because the input layer does not make any counts. On the input and output layer such network takes and gives binary function. For a certain number of steps the network learns to give correct answers. Typically, the speed of learning decreases with increasing time.

Often for speed function of learning it is chosen the ε (t) = 1 / at, a> 0 or a similar functions. Power of network is not big, because the neurons have a threshold function with the only answer 0 or 1.

Now let's look at the multilayer perceptron. The network can have many layers. All layers are hidden, except the output layer. Each neuron has a non-linear activation function. Non-linear function is very important, because otherwise the network can be changed to a single layer perceptron. The more layers, the more difficult to learn the system and the moretime it takes. At the same time training can be unsuccessful.

I made a table to make it easier to compare the characteristics of networks, you can see it on the screen.

If you want to understand clearly difference between networks there is an example of single-layer perseptron work. It is recognition of alphabet letters and geometrical figures. That is all, the highest level of such network.

Example of potential use of a multilayered perseptron is measuring channels on the NPP

As you know all parameters from reactor, turbine and all systems go to operator room by measuring channels. But channels have their own time of life. With the help of a neuronet staff can understand when the channel begins to give a deviation of parameter. Parameters from a neuronet arrive in operator room parallel with parameters from channels. There is an available deviation for each parameter. If parameter by channel has a deviation from neural network and this deviation is bigger then available it means that channel crashes and we have to repair it.

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Научный руководитель: А.В. Баластов, ст. преподаватель каф. ИЯЭИ ЭНИН ТПУ.