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Project Management Effectiveness by Applying Neural Networks

The artificial neural networks (ANN) are a new form of artificial intelligence that use mathematical algorithms built on the principle of biological neural networks. Project Management is a difficult running system affected by such internal factors as quality, cost, schedule, security and other aspects, and by such external ones as social, economic, legal, natural and environmental factors. For this purpose, artificial neural networks allow project managers to forecast and perform all aspects of schedule control, budget adjustment, project duration and successful completion of the project.

It should be emphasized that a neural networks model is similar to the human brain. Each neuron can be considered as a simple microprocessor where signals are received and processed, and then transmission of another signal takes place. The structure of a neural network includes an input layer that receives data from the outside world, a hidden layer that serves the purpose of modifying an internal signal according to the problem, and an output layer that represents the solution of the problem.

Forecasting by applying neural networks involves two steps: training and learning. Training process is to give reliable data, containing inputs and desired outputs into the network. In the learning process, a neural network adjusts the weights and biases based on minimization of error measure between the produced outputs and the desired outputs. The model operation steps include:

- Defining learning rate, momentum factor and random numbers between 0 and 1.
- Calculating for each unit output from the input layer to the output layer.
- Computing the network error. If the error satisfies error requirements, the study is finished.
- Correcting the learning signal on each layer and weights accordingly.

Historical data or previous cases to make a neural network having an impact in all aspects of effective management are generally required. In constructive management, ANN are the main analysis tool that allows managers of construction company to indicate the importance of each factor for particular project outcome, find the best way to avoid overruns, downtime and examine the construction cost variation tendencies. Therefore, it makes project management more objective and effective.

The artificial neural network can be used as a tool to predict effectively the project duration, prevent project overruns and incorrect scheduling. That is a good alternative to conventional methods as it works faster, smarter and gives precise results. Moreover, the neural networks model allows the project managers to focus on the key success factors and reduce the level of economic, social, and production risks.