

Intelligence in Electrical Engineering

C. Karthik

Assistant Professor,
Dept. of EEE, SACET.

Abstract:- Electrical engineering is a professional engineering discipline that deals with the study and applications of electricity, electronics, and electromagnetism. In which power system is a subfield that deals with generation, transmission, distribution and utilization of electric power and electrical apparatus connected to such systems like motor, generator and transformers. To increase the commutational time period ,accuracy, speeding of the process, and for fault diagnosis, stability analysis, and secure utilization of systems we use artificial intelligence in power electronics .We have discussed the detailed techniques of artificial intelligence in this paper.

INTRODUCTION:

An electric power system is a network of electrical components used to supply, transmit and use electric power. Artificial intelligence or AI is the ability of a computer to act like a human being. It is also known to be the intelligence exhibited by machines and software, for example, robots and computer programs. Artificial intelligence has recently been investigated and applied with success to the solution of some longstanding power system problems where conventional methods experience difficulty. In power system it is generally used for developing systems equipped with the intellectual processes, features and characteristics of humans, like the ability to think, reason, find the meaning, generalize, distinguish, learn from past experience or rectify their mistakes.

NEED FOR AI IN POWER SYSTEMS:

Power system analysis by conventional techniques becomes more difficult because of:

- (i) Complex, versatile and large amount of information which is used in calculation, diagnosis and learning.
- (ii) Increase in the computational time period and accuracy due to extensive and vast system data handling.

ARTIFICIAL INTELLIGENCE TECHNIQUES:

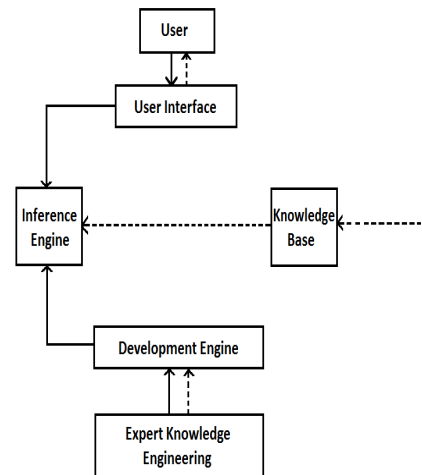
The three major families of AI techniques are considered to be applied in modern power system protection

- Expert system techniques (XPSs),
- Artificial Neural Networks(ANNs),
- Fuzzy Logic systems (FL).

EXPERT SYSTEMS:

An expert system obtains the knowledge of a human expert in a narrow specified domain into a machine implementable form.

Expert systems are computer programs which have proficiency and competence in a particular field. They are also called as knowledge based systems or rule based systems. It can be easily documented, transferred or reproduced. But expert systems are unable to learn or adapt to new problems or situations. Since expert systems are basically computer programs, the process of writing codes for these programs is simpler than actually calculating and estimating the value of parameters used in generation, transmission and distribution.



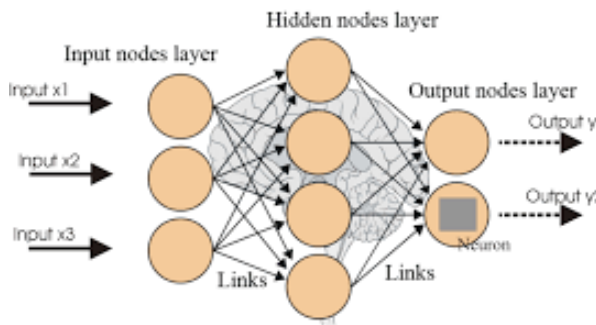
ARTIFICIAL NEURAL NETWORK (ANN):

An ANN is a set of elementary neurons which are connected together in different architectures organized in layers.

Artificial neural networks are biologically inspired systems which convert a set of inputs into a set of outputs by a network of neurons, where each neuron produces one output as a function of inputs.

A fundamental neuron can be considered as a processor which makes a simple non linear operation of its input producing a single output. They are classified by their architecture: number of layers and topology: connectivity pattern, feed forward or recurrent.

It is used in power system stabilizer, load forecasting, load modelling, state estimation etc.



It provides expressive power and higher capability to model complex problems. It can be used for control of power system like voltage control, stability control, power flow control, stability analysis and enhancement, load forecasting, improves performance of transmission lines.

FUZZY LOGIC SYSTEMS (FL):

Fuzzy logic is the ways in which human brain works, and we can use this technology in machines so that they can be perform somewhat like humans. The criteria signals are fuzzified in order to account for dynamic errors of the measuring algorithms. The fuzzy signals are compared with the fuzzy settings.

CONCLUSION:

The main feature of power system design and planning is reliability. Conventional techniques don't fulfil the probabilistic essence of power systems. This leads to increase in operating and maintenance costs. Plenty of researches are performed to utilize the current interest on AI for power system applications. A lot of research is yet to be performed to perceive full advantages of this upcoming technology in power systems for improving the efficiency of electricity market, investment and particularly power systems which use renewable energy resources for operation.

