

A Review on Artificial Intelligence (AI) is Future Generation

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Abstract:- In the future, intelligent machines will replace or enhance human capabilities in many areas. Artificial intelligence is the intelligence exhibited by machines or software. It is the subfield of computer science. Artificial Intelligence is becoming a popular field in computer science as it has enhanced the human life in many areas. Artificial intelligence in the last two decades has greatly improved performance of the manufacturing and service systems. Study in the area of artificial intelligence has given rise to the rapidly growing technology known as expert system. Application areas of Artificial Intelligence is having a huge impact on various fields of life as expert system is widely used these days to solve the complex problems in various areas as science, engineering, business, medicine, weather forecasting. The areas employing the technology of Artificial Intelligence have seen an increase in the quality and efficiency. This paper gives an overview of this technology and the application areas of this technology. This paper will also explore the current use of Artificial Intelligence technologies in the PSS design to damp the power system oscillations caused by interruptions, interruptions, in Network Intrusion for protecting computer and communication networks from intruders, in the medical are a medicine, to improve hospital inpatient care, for medical image classification, in the accounting databases to mitigate the problems of it and in the computer games.

Keywords: Artificial Intelligence (AI), Automation, PSS Design, Neural Networks, Hybrid Logic.

1. INTRODUCTION

Data is common thing between Human and Artificial Intelligence, where every part of data needs to develop our skill. It is also similar to artificial intelligence but the small different is, it can able to manipulate the data efficiently that is only thing is special [1].

It is claimed that Artificial Intelligence is playing an increasing role in the research of management science and operational research areas. Intelligence is commonly considered as the ability to collect knowledge and reason about knowledge to solve complex problems. In the near Future Generation many of fields was replaced by AI (Artificial Intelligence) especially in the medicinal field [2].

John McCarthy coined the term in 1956 as branch of computer science concerned with making computers behave like humans. It is the study of the computation that makes it possible to perceive reason and act [3]. Artificial intelligence is different from psychology because it emphasis on computation and is different from computer science because of its emphasis on perception, reasoning and action. It makes machines smarter and more useful. It works with the help of artificial neurons (artificial neural

network) and scientific theorems (if then statements and offering real practical benefits in many of their applications [4]. Major Artificial Intelligence areas are Expert Systems, Natural Language Processing, Speech Understanding, Robotics and Sensory Systems, Computer Vision and Scene.

Recognition, Intelligent Computer-Aided Instruction, Neural Computing. From these Expert System is a rapidly growing technology which is having a huge impact on various fields of life [5]. The various techniques applied in artificial intelligence are Neural Network, Hybrid Logic, Evolutionary Computing, and Hybrid Artificial Intelligence.

2. WHAT IS ARTIFICIAL INTELLIGENCE?

Artificial Intelligence is the development of computer system that is able to perform tasks that would require human intelligence Examples:

- Face Recognition.
- Translation between the languages
- Speech recognition
- Alexa, siri, Echo Dot, Cotana

2.1 Types of Artificial Intelligence

- ❖ WEAK AI
- ❖ STRONG AI

➤ WEAK AI:

Machines with weak Artificial intelligence are made to respond to specific situations, but cannot think for themselves.

➤ STRONG AI

A machine with strong AI is able to think and acts just like a human. It is able to learn from experiences.

Since there are no real life examples of strong AI, yet the best representation would be how Hollywood portrays robots

2.2 First Testing Approach

The Turing test was proposed Alan Turing (1950) .This test was designed to test that whether a particular machine can think or not. The test involves a human interrogator who interacts with a human and with a machine and has to tell who is human and which one is machine [6]. The computer passes the test if an interrogator after posing some written questions, cannot tell whether the written response is coming from human or from the machine.

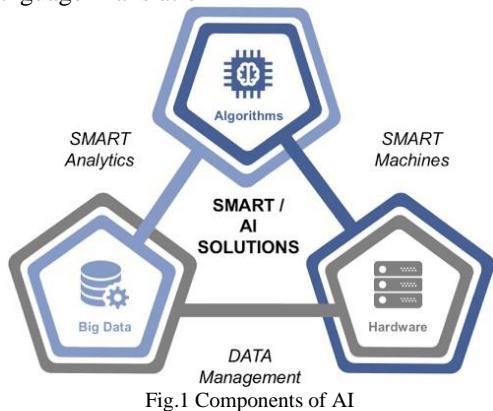
3. AREA OF ARTIFICIAL INTELLIGENCE

2.1 Language understanding

The ability to "understand", respond to the natural language

and translate from spoken language to written form; to translate from one natural language to another natural language [7].

- Speech Understanding
- Semantic Information Processing (Computational Linguistics)
- Question Answering
- Information Retrieval
- Language Translation



3.2 Learning and adaptive systems

The ability to adapt behavior based on previous experience, and to develop general rules concerning the world based on such experience.

- Cybernetics
- Concept Formation

3.3 Problem solving

Ability to formulate a problem in a suitable representation and plan to solved, to know that, when new information is needed and how to obtain it.

- Inference (Resolution-Based Theorem Proving, Plausible Inference and Inductive Inference)
- Interactive Problem Solving
- Automatic Program Writing
- Heuristic Search

3.4 Perception (visual)

The ability to analyze a sensed scene, which is relating to an internal model, represents the perceiving organism's "knowledge of the world." The result of this analysis is a structured set of relationships between entities in the scene.

- Pattern Recognition
- Scene Analysis

3.5 Modeling

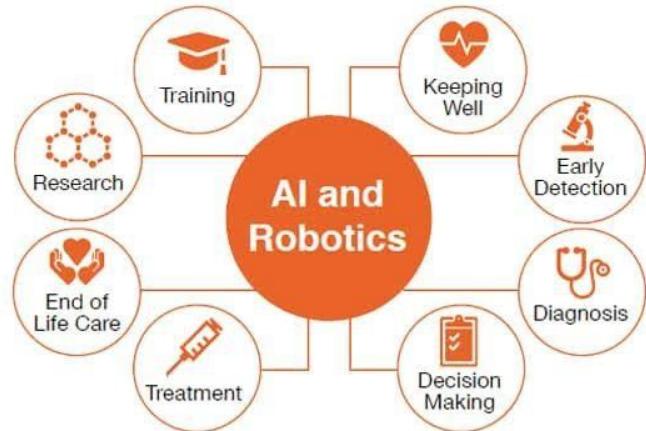
The ability to develop an internal representation and set of transformation rules which can be used to predict the behavior and relationship between some set of real-world objects or entities.

- The Representation Problem for Problem Solving System
- Modeling Natural Systems (Economic, Sociological, Ecological, and Biological etc.)
- Hobot World Modeling (Perceptual and Functional Representations)

3.6 Robots

A combination of most or all the above mentioned abilities with the ability to move over terrain and manipulate objects.

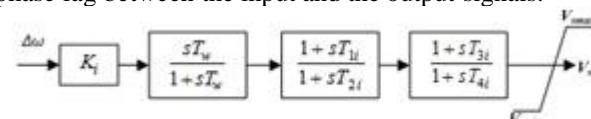
- Exploration
- Transportation/Navigation
- Industrial Automation (e.g., Process Control, Assembly Tasks, Executive Tasks)
- Security
- Other (Agriculture, Fishing, Mining, Sanitation, Construction, etc.)
- Military
- Household



4. APPLICATION OF ARTIFICIAL INTELLIGENT TECHNIQUES IN POWER SYSTEM STABILIZERS (PSS) DESIGN

Since the 1960s, PSSs have been used to add damping to electromechanical oscillations. The PSS is an additional control system, which is often applied as a part of an excitation control system [10]. The basic function of the PSS is to apply a signal to the excitation system, producing electrical torques to the rotor in phase with speed differences that damp out power oscillations.

They perform within the generator's excitation system to create a part of electrical torque, called damping torque, proportional to speed change. A CPSS can be modeled by a two stage (identical), lead-lag network which is represented by a gain K_l and two time constants T_1 and T_2 . This network is connected with a washout circuit of a time constant T_w . The signal washout block acts as a high-pass filter with the time constant T_w that allows the signal associated with the oscillations in rotor speed to pass unchanged. Furthermore, it does not allow the steady state changes to modify the terminal voltages. The phase compensation blocks with time constants $T_{1i} - T_{4i}$ supply the suitable phase-lead characteristics to compensate the phase lag between the input and the output signals.



In the field of power system operation computer programs are executed and modified frequently according to any variations. Artificial intelligence (AI) has the ability to deal

with the high non-linearity of practical Systems. The various technologies that are used in PSSs optimization problems are ANN, FL, ES etc.

4.1 Artificial Neural Network (ANN) in PSS:

In the power systems the most applications of the artificial neural network use a multilayer feed forward network. In the neural adaptive PSS, a feed- forward neural network with a single hidden layer is proposed which includes two sub networks: adaptive neuro-identifier, in which the dynamic characteristics of the plant are tracked and adaptive neuro-controller to damp the low frequency oscillations. Radial basis function network (RBFN) has three layers: input layers, hidden layers, and output layers. The hidden layer find centers and widths of the radial basis functions for individual pattern units and the output layer finds the weights between the pattern units and the output units using an unsupervised learning algorithm. A recurrent neural network (RNN) stabilization controller is proposed to improve the transient stability of power systems in which both the governor and AVR is used. The weight of the proposed controller is adjusted on-line. The signal output of the first RNN is added to the PSS signal output for excitation control. The signal output of the second RNN is used as a stabilizing signal for the governor system [8]. ANNs are intelligent controllers to control nonlinear, dynamic systems through learning, which can easily accommodate the nonlinearities and time dependencies.

4.2 Hybrid Logic (FL) in PSS

In 1964, Lotfi Zadeh developed FL to address inaccuracy and uncertainty which usually exist in engineering problems [10]. A design process for hybrid logic based PSS (FLPSS) was proposed for a multi- machine power system. The input signal to FLPSS is the speed deviation of the synchronous generator and its derivative. For the robustness of the FLPSS, five generator power systems were used and for designing a normalized sum-squared deviation index were used [8]. This A novel input signal based FLPSS was applied in the multi-machine environment.

4.3 Artificial Intelligence in Medicine

The techniques of hybrid logic have been explored in many medical applications. Hybrid logic is preferred over the multiple logistic regression analysis in diagnosing lung cancer using tumour marker profiles. Hybrid logic is also used in the diagnosis of acute leukaemia and breast and pancreatic cancer and also predict patients' survival with breast cancer. They can also characterize MRI images of brain tumours ultrasound images of the breast, ultrasound. Hybrid logic controllers have been designed for the administration of vasodilators in the peri-operative period to control blood pressure.

4.4 Evolutionary Computation in Medicine

Evolutionary computation is the general term for several computational techniques based on natural evolution process that imitates the mechanism of natural selection and survival of the fittest in solving real-world problems.

The most widely used form of evolutionary computation for medical applications are "Genetic Algorithms". "Genetic Algorithms" based on the natural biological evolution are the most widely used form of evolutionary computation for medical applications. The principles of Genetic algorithms have been used to predict outcome in critically ill patients. MRI segmentation of brain tumours to measure the efficacy of treatment strategies is also done through evolutionary computation. They have also been used in computerized analysis of mammographic micro calcification.

4.5 Using Artificial Intelligence to Improve Hospital Inpatient Care

Clinical decision support systems (CDSS) were one of the first successful applications of AI. Primarily on the diagnosis of a patient's condition given his symptoms and demographic information [4]. Mycin a rule-based expert system for identifying bacteria causing infections and recommending antibiotics to treat these infections was developed in 1970 under the work of CDSS for medical diagnosis. Pathfinder, which used Bayesian networks to help pathologists more accurately diagnose lymph-node diseases. AI has also been useful for computer-aided detection of tumors in medical images. Such approaches help in the diagnosis of various forms of cancer, and congenital heart defects.

5. CONCLUSION

The field of artificial intelligence gives the ability to the machines to think analytically, using concepts. Tremendous contribution to the various areas has been made by the Artificial Intelligence techniques from the last 2 decades. Artificial Intelligence will continue to play an increasingly important role in the various fields. This paper is based on the concept of artificial intelligence, areas of artificial intelligence and the artificial intelligence techniques used in the field of Power System Stabilizers (PSS) to maintain system stability and damping of oscillation and provide high- quality performance, in the Network Intrusion Detection to protect the network from intruders, in the medical area in the field of medicine, for medical image classification, in the accounting databases, and described how these AI techniques are used in computer games to solve the common problems and to provide features to the games so as to have fun. There is bright future in the analysis of Network Intrusion Detection and there is also definite future in the area of Power System Stabilizers.

We conclude that further research in this area can be done as there are very promising and profitable results that are obtainable from such techniques. This technology and its applications will likely have far-reaching effects on human life in the years to come.

6. REFERENCES

- [1] Al-Eghwairyeen, Mohammed. (2018). Review of Artificial Intelligence AI. International Journal of Scientific and Research Publications (IJSRP). 8.10.29322/IJSRP.8.5.2018.p 7731.
- [2] Buch VH, Ahmed I, Maruthappu M. Artificial intelligence in medicine: current trends and future possibilities. *Br J Gen Pract.*

2018;68(668):143–144. doi:10.3399/bjgp18X695213

[3] Daniel B. Neill, “Using Artificial Intelligence to Improve Hospital Inpatient Care”, 2013

[4] Dasu, B., Sivakumar, M. & Srinivasarao, R. Interconnected multi-machine power system stabilizer design using whale optimization algorithm. *Prot Control Mod Power Syst* 4, 2 (2019). <https://doi.org/10.1186/s41601-019-0116-6>

[5] Lakhani P, Sundaram B. Deep learning at chest radiography: automated classification of pulmonary tuberculosis by using convolutional neural networks. *Radiology*. 2017; 284(2):574–582.

[6] M. Sabhnani, A. Dubrawski, and J. Schneider, “Searching for Complex Patterns Using Disjunctive Anomaly Detection,” *Online J. Public Health Informatics*, vol. 5, no. 1, 2013.

[7] S. Velmurugan, G. P. Ramesh “Application of Information Science and Technology in Academic Libraries: An Overview”, *Recent Trends and Advances in Artificial Intelligence and Internet of Things*, Springer, Cham, Intelligent Systems Reference Library, Vol. 172, pp. 75–83, 2020.

[8] Ray, P. K., Paital, S. R., Mohanty, A., Eddy, F. Y. S., & Gooi, H. B. (2018). A robust power system stabilizer for enhancement of stability in power system using adaptive hybrid sliding mode control. *Appl Soft Comput*, 73, 471–481.

[9] Rosen, David. (2019). Thoughts on Design for Intelligent Manufacturing. *Engineering*. 5. 10.1016/j.eng.2019.07.011.

[10] Tavakoli, A. R., Seifi, A. R., & Arefi, M. M. (2018). Hybrid-PSS and hybrid neural network non-linear PI controller-based SSSC for damping inter-area oscillations. *Trans Inst Meas Control*, 40(3), 733–745.