

Review on Use Artificial Intelligence in Various Applications of Mechanical Engineering, Medical and healthcare Field

Pandit S Patil

Assistant Professor, Department of Mechanical Engineering, R.C.Patel Institute of Technology Shirpur,
Dhule, Maharashtra, India

ABSTRACT

Artificial Intelligence has successfully utilized the field of medical education and Clinical Management, health care and information management, pharmaceutical product formulation and many other different fields of Science and Technology. The various applications of artificial intelligence are in thermal science, mechanical design and solar energy in the field of mechanical engineering. The accurate and reliable application of this technique is known by different organizations, an industry which is using this system.

Artificial intelligence is fundamentally an engineering discipline. In this review paper on artificial Intelligence, we have focused no of artificial Intelligence techniques used in various applications. We also highlight some recent developments in the field of artificial intelligence.

Keywords: Artificial Intelligence, Health Care, Pharmaceutical

I. INTRODUCTION

Artificial Intelligence is very useful for making computerized decisions in real-world problems. AI is as old as computing, whose theory started in 1930 with Alan Turing, Alonzo church, and others. The various achievements of artificial intelligence in systems like google's search engine, the chess programming, medical expert systems, and self-driving cars. Artificial intelligence reduces the human efforts as today's computer can do many well-defined tasks (for example, arithmetic operations,etc.), much faster and more accurate than human beings. However, the computers interaction with their environment is not very sophisticated yet. How can we test whether a computer has reached the general intelligence level of a human being? Can a computer convince a human interrogator that it is a human? But before thinking about such advanced kinds of machines, we will start developing our own extremely

Simple, intelligent machines.[1] It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human

intelligence, but AI does not have to confine itself to methods that are biologically observable. [3]

II. METHODS AND MATERIAL

1. Review on use of Artificial Intelligence (AI) in thermal science

Kwang-Tzu Yang has explained the role of Artificial Intelligence (AI) in Thermal Science and Engineering in his paper he has explained the purpose of the present brief review is to point out the recent advances in the artificial intelligence (AI) field and the successes of such methodologies to the current problems in thermal science and engineering. Some shortfalls and prospect for future applications are also being indicated. [4]. M. Mohanraja et al. Have reviewed the applications of ANN for thermal analysis of heat exchangers. The reported investigations on Thermal analysis of heat exchangers are categorized into four major groups, namely (i) modeling of heat exchangers, (ii) estimation of heat exchanger parameters, (iii) estimation of phase change characteristics in heat exchangers and (iv) control of heat exchangers. In their paper, they have done the analysis by using CFD software and considered various techniques of analysis like heat

exchanger analysis using ANN, theoretical and experimental analysis of heat exchangers, [5].

2. Review on use of Artificial Intelligence (AI) in Design

S.M. Zahraee, M. Khalaji Assadi, R. Saidur in their research paper study presents a full analysis of Artificial Intelligence optimum plans hybrid system optimization. They have explained all of the load requirement conditions in comparison with single usage can provide more economical and dependable electricity, as well as environmentally friendly sources, by compounding such renewable energy sources using backup units to shape a hybrid scheme. Sizing the hybrid system elements optimally is one of the most important matters in this type of hybrid system, which could sufficiently meet all of the load demands with a minor financial investment. Although a number of studies have been performed on the optimization and sizing of hybrid renewable energy systems. [6]

Mehran Ali et al. In their work focused on how Artificial Intelligence (AI) could effectively be used to expedite the decision-making process in the early stages of the aircraft design process. We employ both Fuzzy Logic (FL) and Neural Network (NN) as two different schemes of the AI. The developed tools are intended to help to select the proper combination of engine thrust, wing area and the aircraft weight without going through elaborate details of other direct approaches. They have also shown how the AI could be applied to the specific class of light business jets which serves to validate these schemes. The results indicate the effectiveness of the AI approach in the preliminary aircraft design process. The actual and approximated values for the take-off wing loading and the take-off thrust loading are in agreement within ten percent. The developed design tools, therefore, prove to be effective to decrease aircraft design cycle time. [7]

3. Review on the use of Artificial Intelligence (AI) in Solar Energy.

S.M. Zahraee, M. Khalaji Assadi, R. Saidur in their paper explained All of the load requirement conditions in comparison with single usage can provide more economical and dependable electricity, as well as environmentally friendly sources, by compounding such renewable energy sources using backup units to shape a

hybrid scheme. Sizing the hybrid system elements optimally is one of the most important matters in this type of hybrid system, which could sufficiently meet all of the load demands with a minor financial investment. Although a number of studies have been performed on the optimization and sizing of hybrid renewable energy systems. In their study, they present a full analysis of Artificial Intelligence optimum plans in the literature, making the contribution of penetrating extensively the renewable energy aspects for improving the functioning of the systems economically. [8] Saeid Mehdizadeh, Javad Behmanesh, Keivan Khalili In their research, three artificial intelligence methods including Gene Expression Programming (GEP), Artificial Neural Networks (ANN) and Adaptive Neuro-Fuzzy Inference System (ANFIS) as well as, 48 empirical equations (10, 12 and 26 equations were temperature-based, sunshine-based and meteorological parameters-based, respectively) were used to estimate daily solar radiation in Kerman, Iran in the period of 1992–2009. To develop the GEP, ANN and ANFIS models, depending on the used empirical equations, various combinations of minimum air temperature, maximum air temperature, mean air temperature, extraterrestrial radiation, actual sunshine duration, maximum possible sunshine duration, sunshine duration ratio, relative humidity and precipitation were considered as inputs in the mentioned intelligent methods. To compare the accuracy of empirical equations and intelligent models, root mean square error (RMSE), mean absolute error (MAE), mean absolute relative error (MARE) and determination coefficient (R^2) indices were used. The results showed that in general, sunshine-based and meteorological parameters-based scenarios in ANN and ANFIS models presented high accuracy than mentioned empirical equations. [9] Mostefa Kermadi and El Madjid Berkouk various in their work MPPT techniques have been proposed in the literature using classical and artificial intelligence methods. However, those techniques are tested on different PV systems and under different environmental conditions. In this work, we attempt to summarize and to give a comprehensive comparative study of the most adopted Artificial Intelligence (AI)-based MPPT techniques. The MPPT techniques which will be described are based on: Proportional-Integral-Derivative (PID), Fuzzy Logic (FL), Artificial Neural Network (ANN), Genetic Algorithms (GA) and Particle Swarm Optimization (PSO). The developed MPPT controllers are tested under the same weather profile in the same photovoltaic

system which is composed of a PV module, a DC-DC Buck-Boost converter and a DC load. Initially, Modelling and simulation of the system are performed using the MATLAB/Simulink environment. Thereafter, the sliding mode control is applied to the converter in order to improve its performance. In a further stage, the different steps of development for each MPPT technique are presented. Simulation is performed to confirm the validity of the proposed controllers under the same variable temperature and solar irradiance conditions. Finally, a comparative study is carried out in order to evaluate the developed techniques regarding two principal criteria: the performance and the implementation cost. The performance is evaluated using comparative analysis of the tracking speed, the average tracking error, the variance and the efficiency. To estimate the implementation cost, a classification is carried out according to the type of the used sensors, the type of circuitry and the software level complexity. Recommendations that expected to be useful for researchers in the MPPT area about the validity of each MPPT technique are given in the last section.

4. Review on the use of Artificial Intelligence (AI) in Medical and health care system.

David D. Luxton in there paper discussed Artificial intelligence (AI) technologies and techniques have useful purposes in just about every domain of behavioral and mental health care including clinical decision-making, treatments, assessment, self-care, healthcare management, research and more. In there introductory chapter they provides an overview of AI and includes definitions of common terms and concepts to provide a foundation for what is discussed in subsequent chapters. Recent technological innovations are highlighted to demonstrate emerging capabilities and forthcoming opportunities. The benefits of the use of AI in mental health care are also discussed. [11]. Monika Hengstler et al. in their work illustrate Drawing an analogy from human social interaction, the concept of trust provides a valid foundation for describing the relationship between humans and automation. Accordingly, this paper explores how firms systematically foster trust regarding applied AI. Based on empirical analysis using nine case studies in the transportation and medical technology industries, our study illustrates the dichotomous constitution of trust in applied AI. Concretely, we emphasize the symbiosis of trust in the technology as well as in the innovating firm

and its communication about the technology. In doing so, we provide tangible approaches to increase trust in the technology and the necessity of a democratic development process for applied AI [12]. Yair Neuman discusses the potential of several such technologies so as to expand our abilities in the realm of public health, from screening for depression, to searching for mental problems to prevent violent acts among teenagers and the identification of early warning signals of an approaching neurodegenerative disease. [13] David D. Luxton et al. discusses ethics involved with the use of artificial intelligent technologies in behavioral and mental health care. A foundational overview of medical ethics and current ethical codes and guidelines that pertain to the use of technology is provided. Emerging ethical issues are then discussed along with specific recommendations to address these issues. Novel approaches to help with the design and testing of intelligent autonomous care providers, including methods for developing ethical principles and decision-making processes for autonomous artificial agents, are presented [14]. Gary L has described how health communication programs can be improved by using artificial intelligence (AI) to increase immediacy.the different methods analyzed by them are as follows-major deficiencies in health communication programs, illustrating how programs often fail to fully engage audiences and can even have negative consequences by undermining the effective delivery of information intended to guide health decision-making and influence adoption of health-promoting behaviors. We examined the use of AI in health practices to promote immediacy and provided examples from the Chronology MD project.

III. CONCLUSION

This paper focuses on a study and use of the Artificial Intelligence in different fields of mechanical engineering and medical field, health care systems available nowadays. We also focus on Artificial Intelligence (AI) useful for producing and designing high-quality machines and health care systems. In this review paper, we discussed the use of artificial Intelligence as a very important modern tool. Scholars have also suggested different easy methods for adopting artificial intelligence. The use of different similar and parallel techniques along with the AI has also been discussed in this paper.

IV. ACKNOWLEDGEMENT

We would like to thank our Research Guides for the inspiration and support they have given time to time.

V. REFERENCES

- [1] <http://www.cs.umb.edu/~marc/cs470/art01-26.pdf> cited November 2016.
- [2] Deepak Khemani.(2013) "A First Course in Artificial Intelligence" First Edition Tata Mc Grawhill Publication.
- [3] <http://www-formal.stanford.edu/jmc/whatisai/node1.html> cited November 2016.
- [4] Kwang-Tzu Yang, "Role of Artificial Intelligence (AI) in Thermal Science and Engineering" Thermal Engineering Heat Transfer Summer Conference, Volume 3 Vancouver, British Columbia, Canada, July 8–12, 2007 Conference Sponsors: Heat Transfer Division ISBN: 0-7918-4276-2 ASME/JSME 2007.
- [5] M. Mohanraja, S. Jayarajb, C. Muraleedharan "Applications of artificial neural networks for thermal analysis of heat exchangers – A review" International Journal of Thermal Sciences, Volume 90, April 2015, Pages 150–172.
- [6] S.M. Zahraee, M. Khalaji Assadi, R. Saidur "Application of Artificial Intelligence Methods for Hybrid Energy System Optimization" Renewable and Sustainable Energy Reviews, Volume 66, December 2016, Pages 617-630.
- [7] Mehran Ali Azizi Oroumieh, S. Mohammad Bagher Malaek, Mahmud Ashrafizaadeh, S. Mahmoud Taheri."Aircraft design cycle time reduction using artificial intelligence" Original Research Article Aerospace Science and Technology, Volume 26, Issue 1, April–May 2013, Pages 244-258
- [8] S.M. Zahraee, M. Khalaji Assadi, R. Saidur. "Application of Artificial Intelligence Methods for Hybrid Energy System Optimization Review Article" Renewable and Sustainable Energy Reviews, Volume 66, December 2016, Pages 617-630.
- [9] Saeid Mehdizadeh, Javad Behmanesh, Keivan Khalili "Comparison of artificial intelligence methods and empirical equations to estimate daily solar radiation" Journal of Atmospheric and Solar-Terrestrial Physics, Volume 146, August 2016, Pages 215-227.
- [10] Mostefa Kermadi, El Madjid Berkouk "Artificial intelligence-based maximum power point tracking controllers for Photovoltaic systems" Renewable and Sustainable Energy Reviews, Volume 69, March 2017, Pages 369-386.
- [11] David D. Luxton "An Introduction to Artificial Intelligence in Behavioral and Mental Health Care", 2016, Pages 1-26.
- [12] Monika Hengstler, Ellen Enkel, Selina Duelli "Applied artificial intelligence and trust—The case of autonomous vehicles and medical assistance devices" Volume 105, April 2016, Pages 105-120.
- [13] Yair Neuman "Artificial Intelligence in Public Health Surveillance and Research Artificial Intelligence in Behavioral and Mental Health Care", 2016, Pages 231-254.
- [14] David D. Luxton, Susan Leigh Anderson, Michael Anderson "Ethical Issues and Artificial Intelligence Technologies in Behavioral and Mental Health Care" Artificial Intelligence in Behavioral and Mental Health Care, 2016, Pages 255-276.
- [15] Gary L. Kreps, Linda Neuhauser "Artificial intelligence and immediacy: Designing health communication to personally engage consumers and providers" Original Research Article Patient Education and Counseling, Volume 92, Issue 2, August 2013, Pages 205-210.