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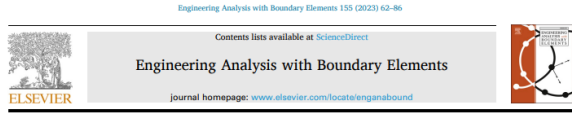
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A state-of-the-art review on the utilization of machine learning in nanofluids, solar energy generation, and the prognosis of solar power

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ABSTRACT

In the contemporary data-driven era, the fields of machine learning, deep learning, big data, statistics, and data science are essential for forecasting outcomes and getting insights from data. This paper looks at how machine learning approaches can be used to anticipate solar power generation, assess heat exchanger heat transfer efficiency, and predict the thermo-physical properties of nanofluids. The review specifically focuses on the potential use of machine learning in solar thermal applications, perovskites, and photovoltaic power forecasting. Predictions of nanofluid characteristics and device performance may be more accurately made with the development of machine learning algorithms. The use of machine learning in the creation of new perovskites and the assessment of their effectiveness and stability is also included in the review. Additionally, the paper explores developments in artificial intelligence, particularly deep learning, in this area and offers insights into techniques for forecasting solar power, including PV production, cloud motion, and weather classification.

1. Introduction

Machine Learning is a subset of Artificial Intelligence used to introduce a computer program. These programs are guided by a set of extensive data using some algorithms and statistics. Machine learning helps to track the data (by forecasting patterns or so). Machine learning constructs models for forecasting and develops heuristics to follow in later progress. Some of the Machine learning techniques uses a large set of data, makes specific patterns based on past data, and approximates the real future called Data Mining. It is to be noted that data mining is one approach to Machine Learning. Machine learning algorithms com-

networks, (b) support vector machines, and (c) decision trees [5]. Also, the majorly used clustering includes k-means [6]. The exercise of allocating an object to predefined categories is called Classification. Moreover, the process of segregating objects into groups/classes (in accordance with similarities) is known as Clustering. In the reinforced learning approach, a sequence of decisions is made where all these techniques have been discussed in the later section. Machine Learning techniques are widely used in modern manufacturing plants; the plants are equipped with a robust data acquisition system that collects and transfers data electronically from all the organization processes. Many variables are measured continuously, and their values are digitized at all phases continuously, these values are warehoused in the organization's

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