

Editorial

Advances in Energy Efficiency through Neural-Network-Based Models

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1. Introduction

Currently, new technologies and approaches are continuously and rapidly being introduced and implemented in energy systems. In this scenario, machine learning plays a crucial role in many areas such as building design and construction, smart cities, and renewable energy systems, among many others. Consequently, measuring and modelling energy consumption is key to improving energy efficiency in these areas of application. Recently, certain types of machine learning methods, namely artificial neural networks, are growing in popularity in terms of dealing with energy-related data for energy modelling and decision-making processes.

Traditionally, energy efficiency has been addressed using standard control methods in the energy industry. However, the application of intelligent techniques such as artificial neural networks has led to new and sophisticated solutions for energy efficiency improvement. As a result, it is of paramount importance to develop and implement new intelligent techniques to address this problem.

This Special Issue aims to provide comprehensive coverage of energy efficiency and energy modelling using artificial neural networks. Some of the relevant topics of this Special Issue were as follows:

- Artificial neural networks;
- Deep learning;
- Energy consumption modelling;
- Artificial neural networks model optimisation applied to energy consumption;
- Energy monitoring;
- Energy modelling;
- Machine learning;
- Energy optimisation;
- Energy systems.

2. Publication Statistics

A total of four papers were accepted and published after a thorough peer-review process of the submitted manuscripts. The geographical distribution of the authors is provided in Table 1. A total of 17 authors from 5 countries contributed to this Special Issue: 47% from Spain, 17% from Brazil, 17% from Poland, 11% from Chile, and finally, 6% from Peru.

Moreover, on average, the published papers involved a team of 4 researchers, with a minimum of 3 and a maximum of 5 (in total, 17 authors).



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Table 1. Distribution of the authors' nationality.

Country	Authors	Reference
Spain	8	[1,2]
Brazil	3	[3]
Poland	3	[4]
Chile	2	[3]
Peru	1	[3]

3. Author Affiliations

The affiliations of those authors who contributed to this Special Issue are listed in Table 2.

Table 2. Author affiliations.

Affiliation	Authors	Reference
University of Granada	7	[1,2]
Faculty of Mechanical Engineering	3	[4]
Federal Rural University of Rio de Janeiro	2	[3]
Universidad de Valparaíso	2	[3]
Federal University of Bahia	1	[3]
Universidad Peruana Unión	1	[3]
IBM	1	[2]

4. Topics

In order to summarise the topics of the research works published in this Special Issue, we present Table 3, taking into account those topics proposed by the Editors.

Table 3. Topics of energy efficiency and energy consumption modelling using artificial neural networks.

Topic	Manuscripts	Reference
Machine Learning	2	[1,2]
Energy Optimisation Modelling	2	[3,4]

The submitted manuscripts presented noteworthy solutions for the energy sector. As can be seen in the previous table, this Special Issue involved two main topics of interest. The application of new machine learning methods was exploited in [1] by implementing artificial neural networks inspired by quantum theory. The authors validated their models with actual energy data that were experimentally measured. In [2], the authors applied some of the most well-known machine learning methods to a solar farm in Scotland. Furthermore, energy consumption modelling was performed in order to optimise energy use and predict scenarios such as electricity expenditure in the industrial sector by combining neural-based models with statistical methods [3] or fuel consumption for vehicles by making use of technical parameters and artificial neural networks [4].

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