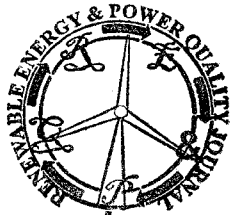


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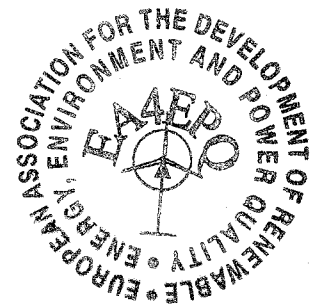
Short-term hourly load forecasting of a hospital using an artificial neural network

D. Morinigo-Sotelo¹, O. Duque-Perez¹, L.A. Garcia-Escudero², M. Fernandez-Temprano², P. Fraile-Llorente¹,
M.V. Riesco-Sanz¹ and A.L. Zorita-Lamadrid¹



¹ Department of Electrical Engineering
E.I.I. (Sede Paseo del Cauce), University of Valladolid
c/ Paseo del Cauce 59, 47011 Valladolid (Spain)
Phone number:+0034 983 184407, e-mail: morinigo@eis.uva.es

² Department of Statistics and Operational Research,
E.I.I. (Sede Paseo del Cauce), University of Valladolid
c/ Paseo del Cauce 59, 47011 Valladolid (Spain)
Phone number:+0034 983 184397, e-mail: lgarcia@eio.uva.es



Abstract. Electricity demand forecasting is important for utilities and for some costumers. It allows to balance energy production and consumption. From the customer point of view, it is essential for efficient operation, sizing of installation, maintenance scheduling, to name just a few. Load forecasting is a difficult task and there are many tools available to perform it. Among them, Artificial Neural Networks are receiving a lot of attention because it is not needed to know any relationship between the involved variables. But, they are constructed as black boxes, what is one their drawbacks. In this paper, some results of the load demand forecasting of a hospital are shown. It is important the previous statistical analysis of the load curves and how the results are improved adding new information to the training data set, as maximum and minimum daily temperatures.

Key words

Load forecasting, Artificial Neural Network, Control Center of Health Care Facilities, Clustering, Robust Techniques.

1. Introduction

When the jurisdiction of the Health System was transferred to the Regional Government of Castilla y León, the Regional Health Management established a collaboration agreement with the Department of Electrical Engineering and the Department of Energy Engineering and Fluid Mechanics of the University of Valladolid, which is currently serving his ninth stage.

This agreement was created with the aim of establishing a formal channel of cooperation between the Regional Health Management and the University of Valladolid, which permitted the consolidation of a working group in

electrical engineering, air conditioning and ventilation guidelines in hospitals and other health care facilities, and the development of an energy management policy for health care facilities. This working group includes staff from both institutions.

This current project involves the following lines: energy tariff optimization, guides and standards for health-care facilities, energy and economic savings, use of renewable energies and energy performance models.

The work presented in this paper is inserted in the last research line previously mentioned, which has the important goal of achieving the best energy efficiency in health care facilities within the Regional Health Management and has been carried out with the participation of the Department of Statistics and Operational Research of the University of Valladolid.

Electricity is one of the main forms of energy that modern life is built upon, used in residential, commercial and industrial sectors. It has two main characteristics that determine the way the electric system is operated, namely [1],[2]:

- 1) Electrical energy cannot be stored in large quantities.
- 2) In most uses, electrical energy cannot be replaced by any other source of energy in a short term.

Due to these characteristics, the system has to maintain a permanent balance between generation and consumption of electricity. Any deviation between supply and demand will generate economic losses to the utility: