NEURAL NETWORK BASED OPTIMUM MODEL FOR LAXAPANA HYDRO POWER GENERATING SYSTEM

A dissertation submitted to the
Department of Electrical Engineering, University of Moratuwa
in partial fulfillment of the requirement for the
Degree of Master of Science

by

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January 2006

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DECLARATION

The work submitted in this dissertation is the result of my own investigation , except where otherwise stated.

It has not already been accepted for any other degree, and is also not being concurrently submitted for any other degree.

UOM Verified Signature

C.G.S.Gunasekara

Date : 18|01|2006

We / ~~I~~ endorse the declaration by the candidate.

Dr. Lanka Udawatta

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Abstract

Laxapana hydro power generating system is a cascaded system which, consists of two main reservoirs Castlereigh and Moussakele. . The power generating system comprises of five power stations at three levels. This system consists of thirteen generating units with different capacities and different characteristics (Pelton and Francies). The only function of this scheme is to generate electric power, making use of the hydro potential available at the upper-most two main reservoirs. The electric power generation of this system is characterized by several factors such as reservoir and pond levels, rainfalls to different reservoir areas, machine availabilities and turbine characteristics. At present, almost all hydro potentials available in the country has been used for electricity generation. There is a deficit between the electricity demand and generation. At present the balance is provided by thermal generation. Hence, getting the maximum share from hydro which reduces thermal power purchasing would be a great saving to the national economy.

The objective of this research is to model the system in order to get the maximum usage of the stored hydro potential to generate electricity. In this study, two models have been developed. First model to schedule the generator loads and the second model to, predict the water levels of three ponds for a short duration once the generator loads are fixed and other parameters are known.

In this research correlation between inputs and outputs are investigated to device a model, using a range of historical data available. As this is a multi dimensional system with large number of inputs as well as outputs, application of Artificial Neural Network (ANN) technology [1] to model this system is explored to discover a working mechanism of the system from the examples of past behavior. Then, by coupling the above two neural network models, developed for generator load scheduling and pond water level monitoring, system was dynamically simulated to explore the feasibility of maximum electrical power generation. Using this model water levels of ponds can be dynamically simulated , to evaluate whether the load share expected from Laxapana complex according to the system control center's daily load dispatch is feasible.

Acknowledgements

Thanks are due first to my supervisors. Dr Lanka Udawatta and Mr Sanjeewa Witharana . for their great insights guidance and sense of humor. My sincere thanks should go to the officers in Post Graduate Office. Faculty of Engineering. University of Moratuwa. Sri Lanka for helping in various ways to clarify the things related to my academic works in time with excellent cooperation and guidance. My sincere gratitude is also extended to the Head of the department Prof HYR Perera for the valuable guidance given and to the staff of the Electrical Engineering department.

Lastly. I should thank many individual friends and colleagues who have not been mentioned here personally in making this educational process a success. May be I could not have made it without your support.

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