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APPLYING THE ARTIFICIAL NEURAL NETWORK METHODOLOGY FOR FORECASTING THE TOURISM TIME SERIES

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Keywords: artificial neural networks, training, logistic activation function, backpropagation, feedforward, time series forecasts.

The objective of the present research is to develop a model and apply it to sensitivity studies in order to predict demand. Provides a deeper understanding of the tourism sector in Northern Portugal and contributes to already existing econometric studies by using the Artificial Neural Networks methodology. In this methodology we use a nonlinear model inspired by the architecture of the human brain as well as the way it processes information. Artificial Neural Networks can be defined as structures comprised of compactly interconnected adaptive simple processing elements (called artificial neurons or nodes) that are capable of performing massively parallel computations for data processing and knowledge representation. Neural Networks are able to learn from the data and experience, identify the pattern or trend, and make generalization to the future. The popularity of the neural network model can be attributed to their unique capability to simulate a wide variety of principal nonlinear behaviours [1, 2, 3].

This work's focus is on the treatment, analysis, and modelling of time series representing "Monthly Guest Nights in Hotels" in Northern Portugal recorded between January 1987 till December 2005. The model used 4 neurons in the hidden layer with the logistic activation function and was trained using the *Resilient Backpropagation* algorithm (a variation of backpropagation algorithm). The ANN model has the 12 preceding values as the input. The analysis of the output forecast data of the selected ANN model showed a reasonably close result compared to the target data. In other words, the model produced, according to Lewis (1982) [4] a highly accurate forecast. Therefore it can be considered adequate for the purpose of prediction in the reference time series. But the best model in most real world forecasting situations should be the one that is robust and accurate for a long time horizon and thus users can have confidence to use the model frequently.

To test the robustness of this model, it is critical to employ multiple out-of-sample to ensure that the results obtained for one particular sample are not due to chance or sampling variations.

Finally and considering the results, the artificial neural network based models represent an effective alternative to classical models in tourism forecasting. This methodology becomes interesting to forecast because it allows the use of a non linear model for seasonal time series.

References

1. BASHEER, I. A.; HAJMEER, M. Artificial Neural Networks: Fundamentals, Computing, Design and Application. *Journal of Microbiological Methods*, 2000, 43, p. 3–31.
2. CHIANG, W. C.; URBAN, T. L.; BALDRIDGE, G. W. A Neural Network Approach to Mutual Fund Net Asset Value Forecasting. *Omega, The International Journal of Management Science*, 1996, 24(2), p. 205–215.
3. HAYKIN, S. *Neural Networks. A Comprehensive Foundation.* New Jersey, Prentice Hall, 1999. 231 p.
4. LEWIS, C. D. *Industrial and Business Forecasting Method.* Butterworth Scientific. London, 1982. 305 p.