

SC42050 Literature Assignment

# Application of Artificial Neural Networks in Modeling (e.g. Modeling of Traffic on a Freeway for Prediction)

Anahita Jamshidnejad

This assignment concerns the applications of Artificial Intelligence, specifically Artificial Neural Networks in prediction of the short-term traffic conditions.

In your report paper please make sure that the following questions are all addressed.

- Describe the Artificial Neural Network (ANN) and explain where was this idea inspired from? What are the specific characteristics of the ANN which distinguish it from other methods? Explain the structure of the ANN, while comparing it with the neural processing of the brain.
- What are the main applications of the ANN in the field of traffic? What is the reason that the ANN is utilized extensively in the field of traffic (explain which characteristics make the ANN appropriate for traffic systems)?
- How is the ANN applied to the prediction of short-term traffic conditions on a freeway? In your literature survey check the same applications where fuzzy logic is used instead of Artificial Neural Networks and explain the advantages and drawbacks of using the ANN in these applications instead of the fuzzy logic.
- Compare how was the ANN optimized in the three references (Zhang et al., 1997; Gilmore and Abe, 1995; Dia, 2001)? Are those ANN's valid only for the traffic network that they have been trained for?

## References

- Dia, H. (2001). An object-oriented neural network approach to short-term traffic forecasting. *European Journal of Operational Research*, 131(2):253–261.
- Gilmore, J. F. and Abe, N. (1995). Neural network models for traffic control and congestion prediction. *I V H S Journal*, 2(3):231–252.
- Zhang, H., Ritchie, S., and Lo, Z.-P. (1997). Macroscopic modeling of freeway traffic using an artificial neural network. *Transportation Research Record: Journal of the Transportation Research Board*, (1588):110–119.