

SC42050 Literature Assignment

Fuzzy Controllers for Traffic Intersections

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This assignment concerns the application of fuzzy logic in designing efficient controllers for traffic network intersections.

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

- Explain why fuzzy logic is suited appropriately for applications in traffic networks. In paper1 two features are employed in order to develop the cooperation mechanism, these features involve *synchronizing the traffic signals*, and *controlling the outgoing vehicles*. Explain the role of these two features and discuss the role of the designed fuzzy controller in implementing these two features.
- Explain the structure of the fuzzy controller being designed in (Lee and Lee-Kwang, 1999) (what are the inputs, the rule base, the fuzzy inference engine). What are your suggestions for improving this controller? explain your reasons. The intersections need to cooperate in (Lee and Lee-Kwang, 1999). What is the effect of the cooperation mechanism on the decision made by each fuzzy controller compared with a situation where each controller was supposed to act individually (no cooperation).
- (Choy et al., 2003) uses fuzzy logic for traffic signal control, but this time fuzzy logic is implemented in a hybrid architecture. Like paper1 the problem involves a large traffic network which is divided to subproblems. Here a fuzzy neural decision-making module is applied in each subproblem. Compare the controller for each subproblem in (Lee and Lee-Kwang, 1999) (fuzzy controller) and (Choy et al., 2003) (fuzzy neural controller). Which controller is more efficient in your opinion? why?

References

- Choy, M. C., Srinivasan, D., and Cheu, R. L. (2003). Cooperative, hybrid agent architecture for real-time traffic signal control. *IEEE Transactions on Systems, Man, and Cybernetics-Part A: systems and humans*, 33(5):597–607.
- Lee, J.-H. and Lee-Kwang, H. (1999). Distributed and cooperative fuzzy controllers for traffic intersections group. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)*, 29(2):263–271.