

# Fuzzy Ant Colony Optimization for Optimal Control - A Comparison to Reinforcement Learning

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## Description

In (Van Ast et al., 2009), the authors describe a modification of the standard ACO algorithm such that it operates in a continuous domain and can be applied to the learning of control policies. In this assignment, we study the modification of the ACO algorithm with fuzzy membership functions and relate it to learning control algorithms, like Reinforcement Learning.

## Questions

1. Write down in a concise and ordered manner the steps in the Fuzzy ACO algorithm. Clearly explain the variables involved. Remember that visualizing some of the steps may be a useful way of understanding them yourself and explaining it to others.
2. Explain the concept of learning control. Explain briefly the steps in Reinforcement Learning (RL) and discuss why RL is an example of a learning control algorithm.
3. In what way does the Fuzzy ACO algorithm from the paper relate to RL? Discuss whether you could call the Fuzzy ACO algorithm a learning control algorithm.
4. Find other examples of learning control in the literature, where the problem is to find control policies in a continuous state space.

## References

Van Ast, J., Babuska, R., and De Schutter, B. (2009). Fuzzy ant colony optimization for optimal control. In *Proceedings of the American Control Conference*, pages 1003–1008.