7. Conclusions

7.1. Final Considerations

The proposed applications of computational intelligence techniques to vehicle dynamic problems achieved promising results. The computational effort is similar to that of analytical algebraic methods and performance indicators such as lap time and sum of squared errors improved significantly. This performance is surely limited by human's response time, modeled here as the inference system constants.

In addition, the proposed implementation successfully emulated the actions of a human driver.

This paper was meant to propose an innovative, modular and simple approach.

7.2. Future Works Propositions

With respect to the optimization method, some propositions can be made. The chromosome model, for instance, treats all track stretches as a single individual, which creates critically long chromosomes. As a result, the genetic algorithms' operators become slower and make convergence harder. An alternative to reduce the chromosome size is to model a single track stretch, so that several optimization procedures could be assembled sequentially. Another option to enhance convergence is to create two parallel genetic optimization algorithms, treating separately lateral and longitudinal accelerations. This strategy would use the relationship among the variables on individual systems to evolve them together. In genetic algorithms literature, this approach is called co-evolution.

Concerning the fuzzy controller, the main ideas for future works are focused on improving the emulation of a human driver's behavior. Fuzzy sets shapes reflect human driving experience and other intelligent technique, such as neural networks, can be used to automatically determine those shapes.