

Title and Reference

- **Title:** Learning Levels of Mario AI Using Genetic Algorithms
- **Authors:** Alejandro Baldominos, Yago Saez, Gustavo Recio, and Javier Calle.
- **Publication:** Advances in Artificial Intelligence (CAEPIA 2015). Lecture Notes in Computer Science, vol 9422. Springer, Cham.
- **Reference:**
 - Baldominos, A., Saez, Y., Recio, G., & Calle, J. (2015). Learning Levels of Mario AI Using Genetic Algorithms. In *Conference of the Spanish Association for Artificial Intelligence* (pp. 267-277). Springer International Publishing.
- **Link:**
https://www.researchgate.net/publication/299778811_Learning_Levels_of_Mario_AI_Using_Genetic_Algorithms

Abstract: Interest and Relation to Optimization

We selected this paper because we wanted to dive deep into our recent coursework on Genetic Algorithms while combining it with our passion for videogames. The research focuses on the Mario AI Championship benchmark, but instead of training a complex reactive agent, it treats level completion as an optimization problem of finding the perfect timed sequence of actions. This approach allows us to focus deeply on the mechanics of the Genetic Algorithm without getting bogged down in the complexities of real-time vision processing or state-space dimensionality. We would additionally like to explore a Deep Learning approach as an alternative solution.

Distribution of Duties

- **Ferran Mirabent:** Setup of the Mario AI Framework and integration of the headless simulation mode.
- **Carlos Bellanco:** Design and implementation of the chromosome encoding and instruction decoding for the agent.
- **Roger Pieres:** Implementation of the core Genetic Algorithm (selection, crossover, and standard mutation).
- **Martí Lorente:** Implementation of the specific domain-dependent heuristic operators described in the paper.
- **Marc Martínez:** Research and preliminary implementation of a Deep Learning alternative for comparison.