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NEAT - Jetpack

Grau en Enginyeria Informàtica

Index

[​ Introduction 2](#__RefHeading___Toc120_2100255082)

[​ The game 2](#__RefHeading___Toc122_2100255082)

[​ Neural networks 3](#__RefHeading___Toc124_2100255082)

[​ Genetic algorithms 3](#__RefHeading___Toc126_2100255082)

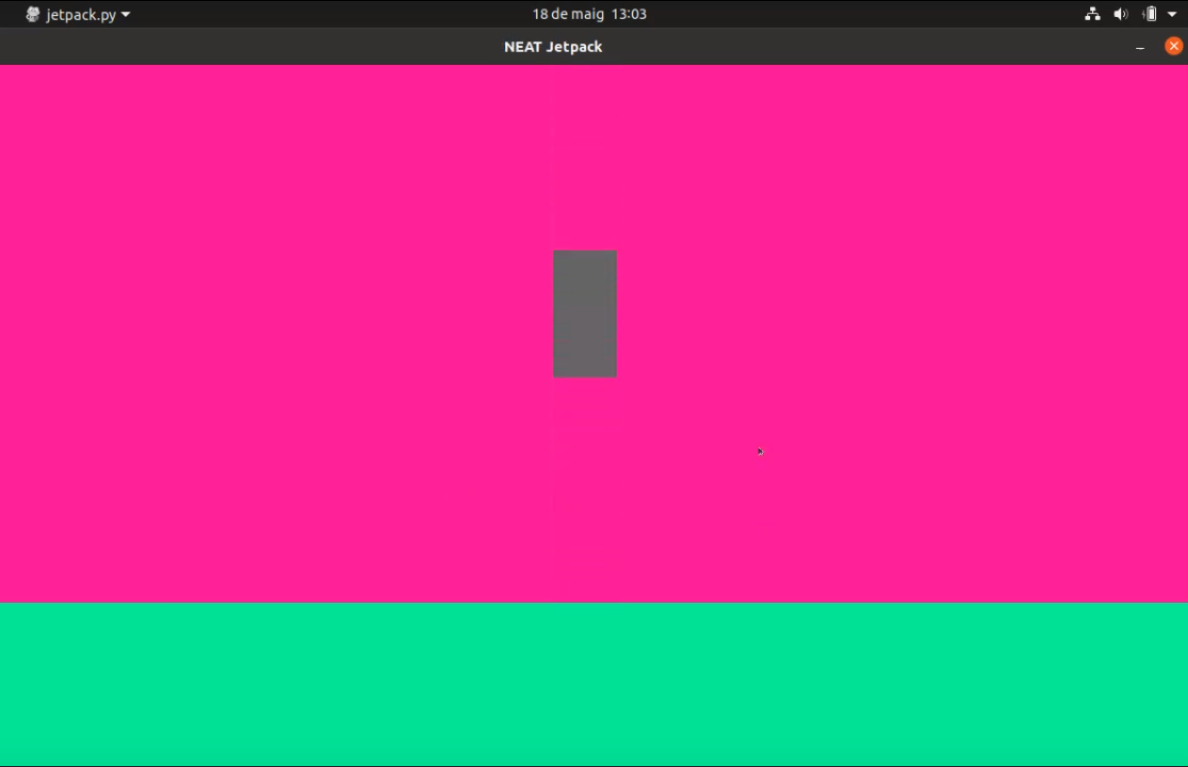
[​ Conclusions 3](#__RefHeading___Toc128_2100255082)

# Introduction

The main idea for this free subject machine learning project was to invest and learn more about neural networks such as it’s an unknown field for both of us so we though that we could learn a lot while doing this project. So we decided to replicate a well-known game from our childhood called “Jetpack Joyride” and after add some neural networks to make the game play by itself.

# The game

Firstly, we started creating our player. To do that we designed it by ourselves and we added some faces from our classmates to make it funnier. Once we had the player we created the background which is an image that is moving to it’s left-side. Also we added the floor using the same idea as the background. Moreover, we added the propulsion of the player’s jetpack to make him fly and the gravity that increases it’s acceleration while the player is falling down and the hit-box to make the player collide with the obstacles. Finally we created some lasers, with their hit-box also, that are the obstacles that the player has to avoid.





# Neural networks

Our project uses a simple neural network that has 9 inputs and 1 output.

Our inputs are:

- The distance of the player to the floor.

- The horizontal distance of the player to the first laser node.

- The horizontal distance of the player to the second laser node.

- The vertical distance of the player to the first laser node.

- The vertical distance of the player to the second laser node.

- The horizontal distance of the player to the first node of the second laser.

- The horizontal distance of the player to the second node of the second laser.

- The vertical distance of the player to the first node of the second laser.

- The vertical distance of the player to the second node of the second laser.

And out output is:

- Activate the jetpack.

# Genetic algorithms

For our project we implemented four genetic algorithms:

- Inheritance: To transfer the characteristics from parents to descendant.

- Mutation: To randomly change some features to maintain the genetic diversity.

- Selection: We implemented a fitness function.

- Crossover: Genetic operator.

# Conclusions

To sum up we enjoyed a lot developing this project and also watching the AI playing alone and viewing how was it improving his records so we had a great time. On the other hand we did not struggle in any section of the project and also we understood how does the neural networks work and how can we implement it in a project.