**BACHELOR’S THESIS**

**TETRIS NEURAL NET PLAYING IN THE NINTENDO SWITCH**

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| Yes | No | Yes | No |
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**Abstract**

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1. Introduction

1.1. Project summary

The basis of this project consists in achieving an AI capable of playing the game “Tetris 99” in the console known as “Switch”, manufactured by the famous game company Nintendo. In order to reach our goal, we have to tackle the problems one by one. Thus, the means by which the results in the project have been obtained consists of dividing it into four different modules:

* Switch-PC interface: The way in which the pc is able to communicate with the console.
* Information capture: How the console’s information is sent to the pc and then processed for use by the neural net.
* Machine learning: How the AI was able to learn. Includes the training environment explanation, the heuristic used and how it was chosen.
* Decision making: Defines how the information extracted by the information capture module is treated right before it is finally ready to be sent to the net. It also explains how the output is adapted and transferred to the console correctly.

The aforementioned modules will be further explained later, in their corresponding section in the document.

1.2. Artificial intelligence in videogames

Artificial intelligence has been present in videogames since the very beginning.

Its purpose has always been to improve the players experience and the methods that have been used to implement such behaviour are vast, ranging from state machines and increasingly more complex enemy movement patterns tied to the game difficulty/level, to combining different advanced methods like pathfinding and decision trees. Other techniques such as procedural generation and data mining can also be currently found in some games.

(<https://en.wikipedia.org/wiki/Artificial_intelligence_in_video_games>)

Due to an increasing interest in new ways to develop artificial intelligence in the recent years, people have started to try and use them to beat their favourite games. Methods like

- Explicar que se quiere hacer por encima

- Hablar sobre la inteligencia artificial en videojuegos

- Redes/ordenadores que juegan a los juegos, sin ser el propio juego, es decir, obteniendo info de la pantalla o de un API

- Definir objetivos

2. System

- Explicar el juego Tetris y el sistema de movimiento de piezas universal (tiene un nombre pero no me acuerdo)

- Visión general del sistema, compuesto por 4 módulos

\* Interfaz ordenador - Switch

\* Sistema de captura de información

\* Aprendizaje previo del sistema de toma de decisiones

\* Sistema de toma/aplicación de decisiones

3. Switch-PC interface

Aquí hay que explicar el emulador del mando hecho con Arduino, recibe comandos del ordenador y se los pasa a la Switch

Aunque no lo hayas hecho se puede describir su funcionamiento.

4. Information capture

OpenCV, cómo se detecta la escena, como se "lee" la pantalla

5. Machine learning module

Aquí hablar del juego Tetris implementado, y que la red aprende sobre ello

6. Decision making

Explicar que este módulo recoge la información del módulo de captura de información, la procesa con el sistema generado en el

módulo de aprendizaje, encola las órdendes, y las manda emulador del mando

7. Results

Pequeña estadística de partidas jugadas y resultados obtenidos

8. Conclusions