Computer Games Development
SE607
Technical Design Document
(Draft)
Year IV

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[Date of Submission]

[Declaration form to be attached]

Contents

1 Introduction

1.1 Intended audience

This document is addressed to every person willing to understand in more depth the technical part of the software developed for this research project.

1.2 Reading suggestions

The software of this project is developed in in support of the research project intituled: *What are the benefits of using Vision Transformers over Convolution Neural Networks for modern computer games?* The goal of this project is to compare three artificial neural networks against each other on video game environments, and to discover the effectiveness and benefits of one against another to solve a specific problem. For more details on this project, please look at the project report[99].

1.3 Purposes

The purpose of this document is to effectively communicate the technical details and design decisions of the software developed for this project.

2 Technical Design

2.1 Technology stack

This section lists the stack of technology used to develop the software.

2.1.1 Programming language

- Python 3.9

2.1.2 Libraries and API

- **TensorFlow 2:** API that facilitates development of neural networks
- **Farama Gymnasium:** various game environments specifically made to be solved by machine learning methods. Also feature a useful API.

2.1.3 Data storage

Data output from the software are stored locally on the user computer into files.

2.1.4 Tools

- **JetBrains PyCharm Professional:** multipurpose Python IDE
- **Windows Subsystem for Linux (WSL):** to install and use TensorFlow 2 on a Windows OS, to be able to use the NVidia GPU for training.

- **Git:** version control system to store code

2.2 Architecture

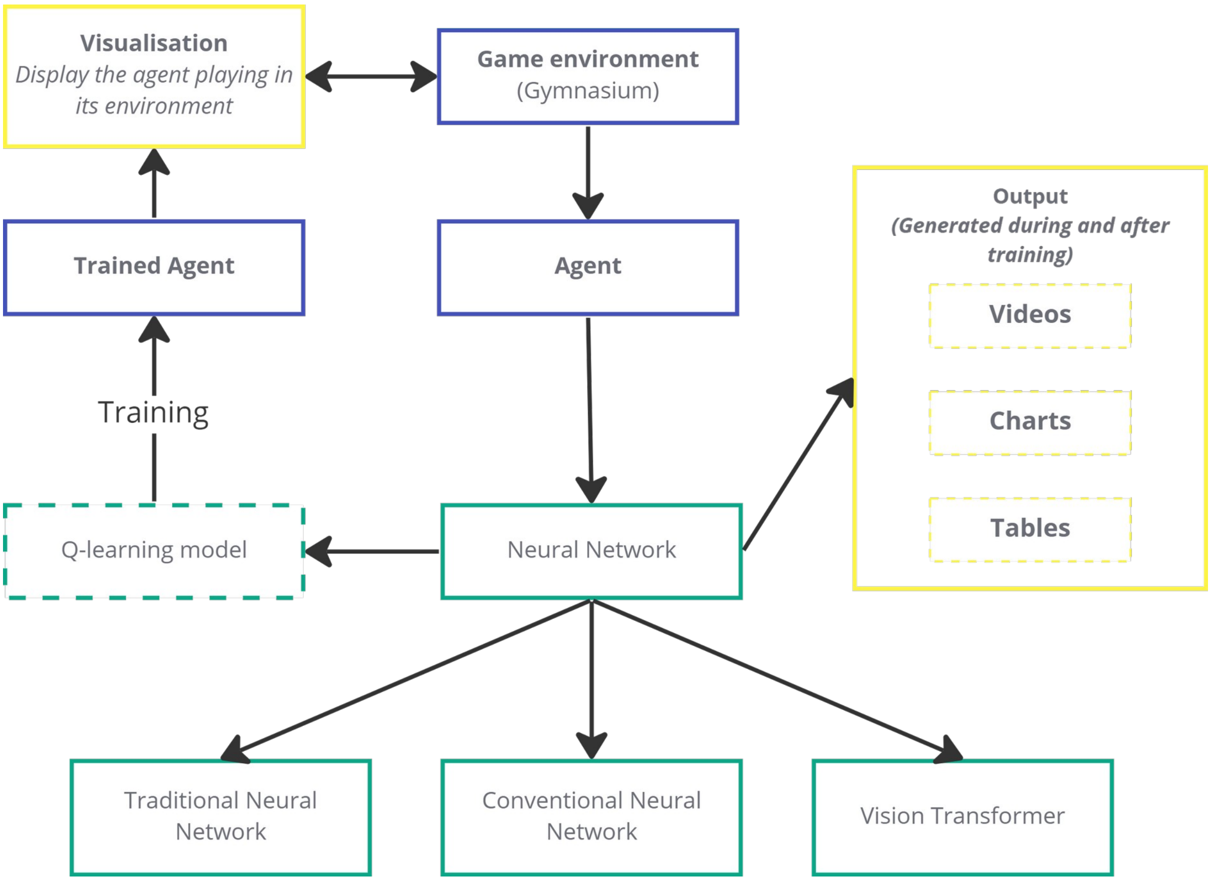

Figure 1: communication between components (roughly)

The diagram below shows a rough representation of the component architecture and communication that will be used.

The software is split into 3 parts:

- **Neural network's part (**in green**)**, composed of NN, CNN and ViT
- **Environment's part (**in blue**),** composed of the game environment and its agent(s)
- **Output and visualisation's part (**in yellow**),** representing the output data that will be used for visualisation and comparison of the NN

2.3 Class Responsibility Collaborator (CRC) Cards

As of now, there is no detail on the specific class implementation for the software. This section needs to be completed asap.

2.4 Class Diagram

As of now, there is no detail on the specific class implementation for the software. This section needs to be completed asap.

2.5 Features breakdown

This section describes in detail the big features of the software, with implementation details as needed. This section needs to be completed asap.

3 References

99 is used as placeholder for now, because the numbering of the references will change.

Report

[99] Dudon, A. (2022). *What are the benefits of using Vision Transformers over Convolution Neural Networks for modern computer games?* Carlow: South East Technological University.

Website

[99] Farama Foundation. Gymnasium. [Online]. (https://gymnasium.farama.org/). (Accessed 13 December 2022).

[99] Farama Foundation. The Farama Foundation. [Online]. (https://farama.org/). (Accessed 13 December 2022).