Player Emulation in Video Games using Artificial Intelligence

B.Sc. (HONS) Computing with Games Development

Supervisor: Robert Sheehy

Student Number: T00200674

Student: Ben Lenihan

Munster Technological University, Dromthacker, Tralee, Co. Kerry

# Abstract

1. Table of Contents

[1 Abstract 2](#_Toc85073849)

[1 Table of Contents 2](#_Toc85073850)

[2 Introduction 2](#_Toc85073851)

[3 Artificial Intelligence 2](#_Toc85073852)

[3.1 Introduction 2](#_Toc85073853)

[3.2 Machine Learning 2](#_Toc85073854)

[3.3 Deep Learning 3](#_Toc85073855)

[3.4 Reinforcement Learning 3](#_Toc85073856)

[4 Technologies 3](#_Toc85073857)

[5 Methodology 3](#_Toc85073858)

[6 Implementation 3](#_Toc85073859)

[7 Findings & Conclusions 3](#_Toc85073860)

[8 References 3](#_Toc85073861)

# Introduction

# Artificial Intelligence

## Introduction

Artificial Intelligence is a branch of computer science concerned with building programs that can perform tasks that would, under normal circumstances, require human intelligence. “It is the science and engineering of making especially intelligent computer systems.” (Mccarthy, 2004)

The idea of Artificial Intelligence can be traced back as far as the 1950’s with Alan Turing’s work “Computing Machinery and Intelligence”. In this paper Turing asks the question “Can machines think?”(Turing, 1950). He then establishes out the “Turing Test”. This is a test in which a human interrogator is supposedly able to distinguish between a machine and a human. Developments since then have already allowed Artificial Intelligence to surpass humans in some areas. In 2015 Google’s AI AlphaGo played the European Go champion Fan Hui.(Stanek, 2021)

Artificial Intelligence is utilized in many areas such as “assistants” in the form of Apple’s Siri, in games for non-player characters, self-driving cars and the AlphaGo AI that beat Fan Hui.(European Parliament, 2021)

## Machine Learning

Machine learning is a sub-branch of Artificial Intelligence focusing on the use of algorithms and data to replicate the way humans learn.

UC Berkeley describe a typical machine learning algorithm as follows:

1. **A decision process:** A recipe of calculations or other steps that takes in the data and returns a “guess” at the kind of pattern in the data your algorithm is looking to find.
2. **An error function:** A method of measuring how good the guess was by comparing it to known examples (when they are available).
3. **An updating or optimization process:** Where the algorithm looks at the miss and then updates how the decision process comes to the final decision so that the next time the miss won’t be as great.(Tamir, 2021)

## Deep Learning

Deep learning is a branch of machine learning. Deep Learning is distinguished from regular machine learning by the types of data it works with and the methods by which it learns.

## Reinforcement Learning

Reinforcement Learning is a branch of machine learning. Reinforcement Learning is distinguished from regular machine learning in its use of trial-and-error learning methods. The machine is given rewards and punishments for completing tasks. This allows the machine to learn the right way to perform its tasks as it receives more rewards over time for tasks completed.

# Technologies

# Methodology

# Implementation

# Findings & Conclusions

# References

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