
SOFTWARE REQUIREMENTS SPECIFICATION

for

Deep Learning on Embedded
Platform

Version 1.01

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Contents

1	Introduction	4
1.1	Purpose	4
1.2	Intended Audience and Reading Suggestions	4
1.3	Project Scope	4
1.4	Definitions, acronyms, and abbreviations	4
1.5	References	4
2	Overall Description	5
2.1	Product Perspective	5
2.2	Product Functions	5
2.3	User Classes and Characteristics	5
2.4	Operating Environment	5
2.5	Design and Implementation Constraints	5
2.6	User Documentation	6
2.7	Assumptions and Dependencies	6
3	Chart	7
3.1	Timeline	8

1 Introduction

1.1 Purpose

The goal of this document is to create a clear requirements documentation that identifies the necessary parts to accomplish this project.

1.2 Intended Audience and Reading Suggestions

The intended audience of this document are the instructors and TAs of our CS 461 course, as well as the client who has tasked us with the project.

1.3 Project Scope

Deep learning is a form of machine learning that uses multi-layered neural networks and high-speed GPU processing to make sense of images, sound and text. The main requirements are to run a deep learning application on the Jetson TX1 development kit and to have documentation clear enough to recreate our project. The end result of this project will be an AI capable of learning to play the game Galaga, and the project itself will be used by NVIDIA to create a lesson for their deep learning institute. Since the lesson plan will not be developed by us, this document only covers the project requirements and not requirements for the lesson.

1.4 Definitions, acronyms, and abbreviations

JETSON TX1 Developer Kit: Tiny computer which has a full-featured development platform for visual computing.

AI: A branch of computer science dealing with the simulation of intelligent behavior in computers.

1.5 References

N. C. L. Information, Deep learning, NVIDIA Developer, 2016. [Online]. Available: <https://developer.nvidia.com/deep-learning>. Accessed: Oct. 18, 2016.

NVIDIA, 2016. [Online]. Available: <http://www.nvidia.com/object/jetson-tx1-dev-kit.html>. Accessed: Nov. 2, 2016.

Merriam-Webster, 2016. [Online]. Available: <http://www.merriam-webster.com/dictionary/artificial%20intelligence>. Accessed: Nov. 2, 2016.

2 Overall Description

2.1 Product Perspective

Our team name will be AI Gaming. Our project is titled Deep Learning on Embedded Platform. We are doing this project in cooperation with Nvidia's deep learning institute with the end goal of turning it into a lesson plan. We must use deep learning, a subset field of AI that uses neural networks, as a part of our project. This is a standalone project that will be used by NVIDIA for training purposes.

2.2 Product Functions

The project goal is to teach a neural net to play a video game. The neural net will take video input and use it to learn how to play the game Galaga. A camera or screen capture device must be used to retrieve game state input. The neural net must be trained and allowed to create its own code to accomplish the task. The neural network should define for itself how to respond to in-game stimuli and react accordingly, as per the training it has received. We may code interactions between the net and the game to allow it to play the game. We may not hard code its responses to in-game stimuli, as these responses must be trained into the neural net. The final project must be able to run inference on the Jetson TX1 developer platform.

2.3 User Classes and Characteristics

This product as well as its documentation will be used by deep learning trainers and trainees.

2.4 Operating Environment

The final project must be able to run inference on the Jetson TX1 developer platform. It must also use a high-end GPU in the Amazon AWS cloud to train its deep neural networks.

2.5 Design and Implementation Constraints

We may code interactions between the net and the game to allow it to play the game. We may not hard code its responses to in-game stimuli, as these responses must be trained into the neural net.

2.6 User Documentation

We must clearly outline our actions taken and resources required at every step of the process. This means that all technology used to accomplish our task must be recorded and accounted. Our process will be detailed in such a manner that it will allow others to recreate our project, provided they can acquire the materials we used.

2.7 Assumptions and Dependencies

The solution of our project will need to be able to beat the first level of the game at least 90% of the time. Ideally the system should be able to make it past level five approximately 50% of the time. The ability of the system to make it farther than that on average, or to increase the percent chance on it making it to certain points, will be considered a stretch goal.

3 Chart

3.1 Timeline

