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LUCRARE DE DIPLOMĂ

Deep Learning în jocuri

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BACHELOR THESIS

Playing games with Deep Learning

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Abstract

Deep Learning is a new, interesting and a fast-growing field of Machine Learning. It combines the classical model of multilayer perceptrons with layers of feature extraction inspired from visual cortex of the brain. Moreover, dealing with the curse of dimensionality is another advantage when we talk about Convolutional Neural Networks. This paper proposes an alternative to the classical reinforcement learning techniques, such as Q-Learning and SARSA. The question which arises is this: what if we make an agent and allow it to play a game based on information from visual frames and rewards recieved during the game?

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Chapter 1

Introduction

1.1 Motivation

Humans have always felt the need to explore and find a way to a better life. Starting with stone tools (2.6 million years ago) and continuing with personal computers are only some proof in human evolution. Lately, we have discovered Machine Learning which have the purpose to allow machines for learning to do different tasks.

Deep learning is a subfield of machine learning area and it is inspired by how the human brain works. Through deep learning, we are trying to solve some of the most pressuring human problems as cancer classification (benign or malignant tumor)[1], self-driving cars based on pedestrian detections[2] or recognizing digits taken by Google Street View[3], all using unsupervised learning for features

1.2 Project description

1.3 Technologies

All algorithms described in this paper have been implemented using Torch7[1], a deep learning framework written in Lua[2], a scripting language based on a C API. For creating the game, generating frames or modifying images LOVE platform[3] was the close alternative which is also written in Lua.

Why Lua and Torch? They provide a fast environment as opposed to another ones[4], multiple modules with functions already implemented such as transfer functions(tanh, sigmoid), loss functions(Mean Squared Error) or convolutional layers(SpatialMaxPooling, SpatialSubSampling)

1.4 Structure of this paper

[1] http://torch.ch/
[2] http://www.lua.org/about.html
[3] https://love2d.org/wiki/Main_Page

Chapter 2

State of the art

2.1 mami

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