WHITNEY KING
MACHINE LEARNING ENGINEER NANODEGREE
FEBRUARY 13TH, 2019

CAPSTONE PROPOSAL

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I. Domain Background

Some of the most exciting Artificial Intelligence models being shared bend the reaches of human perception, producing new people, worlds, creatures[1], cartoon characters[2], or superheroes in the blink of an eye. Others push beyond the limits of human capabilities, accomplishing a multitude of tasks with unimaginable deft and efficiency[3]. When it comes to AI, and in particular deep learning, one of the most fascinating and appealing things for me is the ability to fuse technology, functionality, and art. As the potential uses of deep learning have begun to come up frequently in the media, people are often faced with having to question what the reality and extent of the repercussions of developing these technologies are. Those whom are less informed generally end up being apprehensive and fearful for very valid reasons. That said, it's important to balance this out with not only knowledge, but also visible, tangible, positive, and delightful applications that impact individuals directly.

When thinking on positive and delightful aspects of applying reinforcement learning, my mind immediately kept jumping to the ongoing viral social experiment *Twitch Plays Pokémon*. The idea behind this is the game is played in a collaborative Twitch channel "by parsing commands sent by users through the channel's chat room".

II. Problem Statement

1 paragraph

In this section, clearly describe the problem that is to be solved. The problem described should be well defined and should have at least one relevant potential solution. Additionally, describe the problem thoroughly such that it is clear that the problem is quantifiable (the problem can be expressed in mathematical or logical terms) , measurable (the problem can be measured by some metric and clearly observed), and replicable (the problem can be reproduced and occurs more than once).

III. Datasets & Inputs

2 – 3 paragraphs

In this section, the dataset(s) and/or input(s) being considered for the project should be thoroughly described, such as how they relate to the problem and why they should be used. Information such as how the dataset or input is (was) obtained, and the characteristics of the dataset or input, should be included with relevant references and citations as necessary It should be clear how the dataset(s) or input(s) will be used in the project and whether their use is appropriate given the context of the problem.

IV. Solution Statement

1 paragraph

In this section, clearly describe a solution to the problem. The solution should be applicable to the project domain and appropriate for the dataset(s) or input(s) given. Additionally, describe the solution thoroughly such that it is clear that the solution is quantifiable (the solution can be expressed in mathematical or logical terms) , measurable (the solution can be measured by some metric and clearly observed), and replicable (the solution can be reproduced and occurs more than once).

V. Benchmark Model

1 – 2 paragraphs

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[1] (Yen-Chen, 2018)
[2] (Shane, 2017)
[3] (Silver, Hubert, & Schrittwieser, 2018)

In this section, provide the details for a benchmark model or result that relates to the domain, problem statement, and intended solution. Ideally, the benchmark model or result contextualizes existing methods or known information in the domain and problem given, which could then be objectively compared to the solution. Describe how the benchmark model or result is measurable (can be measured by some metric and clearly observed) with thorough detail.

VI. Evaluation Metrics

1 – 2 paragraphs

In this section, propose at least one evaluation metric that can be used to quantify the performance of both the benchmark model and the solution model. The evaluation metric(s) you propose should be appropriate given the context of the data, the problem statement, and the intended solution. Describe how the evaluation metric(s) are derived and provide an example of their mathematical representations (if applicable). Complex evaluation metrics should be clearly defined and quantifiable (can be expressed in mathematical or logical terms).

VII. Project Design

1 page

In this final section, summarize a theoretical workflow for approaching a solution given the problem. Provide thorough discussion for what strategies you may consider employing, what analysis of the data might be required before being used, or which algorithms will be considered for your implementation. The workflow and discussion that you provide should align with the qualities of the previous sections. Additionally, you are encouraged to include small visualizations, pseudocode, or diagrams to aid in describing the project design, but it is not required. The discussion should clearly outline your intended workflow of the capstone project.

REFERENCES

Shane, J. (2017, August 24). *New My Little Ponies, Designed by Neural Networks.* Retrieved from AI Weirdness: http://aiweirdness.com/post/164560090962/new-my-little-ponies-designed-by-neural-network

Silver, D., Hubert, T., & Schrittwieser, J. (2018, December 7). A general reinforcement learning algorithm that masters chess, shogi, and Go through self-play. (U. C. London, Ed.) *Science Magazine, 362*(6419), pp. 1140 - 1144. Retrieved from Science Magazine: http://science.sciencemag.org/content/362/6419/1140

skymind.ai. (2019, February 23). *A Beginner's Guide to Convolutional Neural Networks (CNNs).* Retrieved from A.I. Wiki: https://skymind.ai/wiki/convolutional-network

Wikipedia. (2019, February 22). *Convolutional neural network.* Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Convolutional_neural_network

Wikipedia. (2019, February 23). *Twitch Plays Pokémon.* Retrieved from Wikipedia: https://en.wikipedia.org/wiki/Twitch_Plays_Pok%C3%A9mon

Yen-Chen, L. (2018, May 19). *pix2pix-tensorflow.* Retrieved from Github: https://github.com/yenchenlin/pix2pix-tensorflow

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Before submitting your proposal, ask yourself. . .

- Does the proposal you have written follow a well-organized structure similar to that of the project template?
- Is each section (particularly **Solution Statement** and **Project Design**) written in a clear, concise and specific fashion? Are there any ambiguous terms or phrases that need clarification?
- Would the intended audience of your project be able to understand your proposal?
- Have you properly proofread your proposal to assure there are minimal grammatical and spelling mistakes?
- Are all the resources used for this project correctly cited and referenced?