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Independent Study & Mentorship Program 1 (ISM 1)

February 24, 2022

Product Proposal (Rough Draft)

Introduction and Statement of Purpose

In my final product, I plan to create a research project which will help me gain an excellent understanding of deep learning and implement my knowledge of machine learning, computer vision, and natural language processing (NLP) to solve real-world problems. I want to learn and demonstrate a practical implementation of machine learning and integrate machine learning models into software applications. My aspiration is to learn and use several different machine learning algorithms to expand and enhance my knowledge. I am aspiring to implement a hand gestures project that recognizes our gestures to perform basic functions such as opening applications, basic search for websites, and basic necessities on mobile devices, computers, etc. This project will also try to use speech recognition to perform more complex functions such as adding text/composing an email, creating a google search, and other functions on top of the basic functions to add more usability. I will conduct research on articles, books, and online courses to learn more about how I could implement this concept. This solution could address many of our day to day situations as we often carry objects and need our smartphone to execute certain functions hands-free. In this way, I will apply my research skills and knowledge of machine learning algorithms and programming to create a model that will utilize computer vision to help

people in their daily life and save time as well as I will gain practical knowledge on how to actually implement machine learning models on real-world problems.

Review of skills and Research

Research topics that will be instrumental for my project include learning about different machine learning algorithms using deep learning and specifically, computer vision. Furthermore, in these different areas, I will learn the practical applications of specific algorithms such as convolutional neural networks, neural analysis, and advanced algorithms such as Generative Adversarial Networks (GAN) models.

Since I am currently programming in python, I will also gain an expanded understanding of the python language as well as how it comes into play for machine learning. I am planning to use my knowledge of several programming languages such as Swift, Javascript, and Java as well as my general understanding of several machine learning algorithms to implement the model using programming skills.

Methodology

Materials:

This project will be conducted digitally to create a machine learning model, the main materials for the project will be following:

- Laptop.
- Digital Python Libraries.
- Digital platforms for implementing machine learning like Tensorflow and application platforms such as React.
- Digital Courses for learning Machine learning on platforms such as Coursera.

- Machine Learning e-books, books, and research articles.

Procedure:

1. I will start by gaining a deeper understanding of computer vision and deep learning concepts, algorithms, and models which will help create my final project.
2. I will take a deep dive on computer vision algorithms, the theory behind them, as well as the implementation of them that are necessary for my project through research by using scholarly articles, books, and online courses from Coursera and other resources.
3. I will actually implement these algorithms and create my final project that would refine and increase my practical knowledge/skills.
 - a. I will frame the clear problem statement for my final project, and design and implement this project by myself from start to finish by using the knowledge that I will gain from my research and my skills from original work.
 - b. I will prepare, collect, and find data sets required for implementing the computer vision algorithm for hand gestures. I will also research speech recognition APIs and algorithms to put into use for my project.
 - c. I will choose the specific model which will be most suitable for solving the problem.
 - d. I will train and fine-tune the model in an agile way to evaluate the model.
 - e. I will finetune the machine learning model implementation to optimize the outcome.
 - f. I will also successfully try to launch this model into a more usable form such as an app or website on platforms such as React or Xcode.

Utilization of Higher-Level Thinking Skills

During this project, I will use multiple higher-level thinking skills such as problem-solving, designing, evaluating, analyzing, and synthesizing information. I will use my analyzing skills to conduct successful research that would help me gain knowledge for the field of machine learning. I will then synthesize information from my research to create my final project by relating my knowledge from several topics such as algorithms, frameworks, and data management that I will learn. After that, I will design the entire project by myself and the guidance of my mentor from start to finish and will problem-solve obstacles that will come up during the project and research. Whether that may be from simply not finding online sources to learn about my topic or concerning the actual implementation of the project, I will use my problem-solving skills in every area. Lastly, I will evaluate how I can transform my project into a usable form for people to be implemented in the real world and create this form if plausible.

Conclusions

The outcome of my original work will be an application/website platform that implements my machine learning model in a usable form and supplemental research that shows my learning that was used to create my final product. My project is aimed to help people by making online tasks easier without the necessity to continuously be on their phones which could help create time efficiency, increase productivity, and improve some daily functions on devices by using hand gestures and speech to accomplish tasks.