Prospectus

Team Description

Technical Strengths

<u>Sam Isaacs</u>: Sam is a Computer Science major in his last semester at Grand Valley. He completed his internship at Dominion Systems, a company which creates tax and Human Resources software. In his internship, he was a full-stack developer who created software for the company's website, refactored old code, and worked with the company database. Sam is comfortable with frontend and backend development, has experience with Linux, and is experienced in many common programming languages. Much of this experience will be useful for this project.

<u>Brennan Luttrell</u>: Brennan is a senior in GVSU's Computer Science program. He has interests in full stack web development and game design, and has interned for the SaaS company Clixie Media. During his time at GV and Clixie, Brennan has gained experience in Ruby on Rails, Linux, C/C++, JavaScript, SQL, CSS/Bootstrap, and in traditional object-oriented languages such as Java and Python.

<u>Austin Ackerman</u>: Austin is a Computer Science major at Grand Valley. He is currently developing a custom Electrical Engineering Schematic Builder for Highlight Industries, which has a functioning GUI and several operations. Through this experience Austin has become well versed in python and Linux. After graduation Austin would like to pursue a field of game development, with several games created in, C#, C/C++, JavaScript, and python with IDE's such as Unity, terminal based, and Unreal engine to support his passion. All of these experiences will come together to help cultivate this project.

Anticipated Areas of Growth

<u>Sam Isaacs</u>: Sam has not worked with machine learning, so he is excited to get some experience in the field, as it is one of the fastest growing areas of the computer science industry. He has done work with GUI in the past, but is hoping to expand his knowledge of user interfaces. Sam is also mostly unfamiliar with VGA and will gain a lot of knowledge with it.

<u>Brennan Luttrell</u>: Brennan has worked with TensorFlow, and has trained a few models before through it. Brennan has never built a machine learning algorithm, nor has he had a class to learn the basics in this area of computer science. Brennan is anticipating learning more about the finer details of creating a neural network, a model, and a machine learning algorithm.

<u>Austin Ackerman</u>: Austin has not worked with machine learning and would like to gain experiences in this project. Also Austin does not have experience with VGA and will gain valuable knowledge during this project.

Project Description
Background: Machine learning algorithms have assimilated into everyday life through the means of social media and web browsing, in medicine and even in sports. Many software problems are met with a machine learning solution, so the importance of learning machine learning solutions as computer science has never felt so paramount. This project will be aimed around building an ANN (artificial neural network) based machine learning program to identify and verify data in a VGA data stream. The program will be trained for basic text recognition and image matching, and will have flexibility provided to the user so they can train for their own images or objects. The trained program's algorithm should be able to confirm the location of a letter, word, image or classified object, and can include color, scaling and offset, along with tolerances.

Description of Intended Features/Backlog
1. Recognize when certain text is present on the screen
2. Recognize when a specific object is on the screen
3. Recognize when a specific picture is present on screen
4. Recognize when a specific color is on the screen
5. User will be able to input coordinates for a window on the screen where the software will search
6. Implement a VGA input which will be used as the data source
7. Implement a machine learning algorithm that the model will be trained on.
8. Implement a GUI that will be interfaced with from a user.
9. User will be able to specify a timeframe in the VGA stream where the software will search
10. Users will be able to input their own picture or identify their own region for the software to search.
11. Train a machine learning model to predict the confidence that the output is correct

Anticipated Platform/Tooling
- Will be built to run on PetaLinux
- Will be written in Python
- Looking to use TensorFlow as the machine learning platform solution, or will be writing our own.
- Will use Microsoft Paint or a tool of similar type to test VGA input data.
- Will be integrating Python specific API's

Relevant Ethical Principles
2.01. Provide service in their areas of competence, being honest and forthright about any limitations of their experience and education.
2.06. Identify, document, collect evidence and report to the client or the employer promptly if, in their opinion, a project is likely to fail, to prove too expensive, to violate intellectual property law, or otherwise to be problematic.

3.02. Ensure proper and achievable goals and objectives for any project on which they work or propose.

3.10. Ensure adequate testing, debugging, and review of software and related documents on which they work.

5.09. Ensure that there is a fair agreement concerning ownership of any software, processes, research, writing, or other intellectual property to which a software engineer has contributed.

6.08. Take responsibility for detecting, correcting, and reporting errors in software and associated documents on which they work.

7.02. Assist colleagues in professional development.

8.02. Improve their ability to create safe, reliable, and useful quality software at reasonable cost and within a reasonable time.