**AI Based Opto-Lexical Pattern Analysis for Behavior Classification**

During the 2016 – 2017 school year, I expanded upon my previous project – Lexical Syntax Analysis for Hostile Behavior Identification – in order to add more features and make the classification algorithm more robust. While my previous project was focused more upon linguistic queues to identify potentially dangerous accounts, this project also incorporated image recognition to extract features such as the number of people per image, average age, and auto-generated image caption. These parameters (27 in total) where then inputted into an artificial neural network to correctly identify the hostility and threat of an account.

### Lexical Syntax Analysis for Hostile Behaviour Identification

During the 2015 – 2016 school year, I created a machine learning algorithm that would collect user data from Twitter, process that data to determine linguistic patterns, and classify accounts as being related to possible terrorist accounts. This project arose from the necessity of an algorithm to quickly and effectively monitor social media to remove terrorist accounts, especially since 90 percent of terrorist communications happens through that medium. My algorithm analyzed account features such as the most common words, account interaction patterns, and geolocational probability. If implemented, this tool could serve as an early warning system designed to mitigate hostile threats.

### Using IR Sensors to Limit the Screen-On Time of a Computer

During the 2014 – 2015 school year, I created and tested IRES, a device that would intelligently track a user’s presence at a computer in order to limit computer power consumption by automatically issuing a series of commands that would either turn off the computer screen, put the computer to sleep, or hibernate it depending on what function would optimize power savings while minimizing user frustration. IRES consisted of an Arduino Leonardo with an infrared sensor to track the user’s presence; the entire setup was encased a custom 3D printed capsule designed to attach to the top of the user’s computer.

### DrawBoard: A Handwriting Recognition Algorithm

### DrawBoard is a handwriting recognition algorithm implemented in Java. The program uses a Java Swing GUI that allows the user to write letters or words which is then identified by the computer using an artificial neural network that I designed.

### Pittsburgh Forensics Institute Website

### During the summer of 2017, I was responsible for organizing, running, and teaching at Pittsburgh Forensics Institute, which is a Speech &amp; Debate camp for the greater Pittsburgh Area. One of my responsibilities was to develop a new website to replace the old one. This site utilizes dynamic elements in order to automatically update key data using JSON and JavaScript.

### VIRtual eTracker

### VIRtual eTracker is a “proof-of-concept” product designed to monitor a building’s energy consumption by plugging into a wall outlet. This device then uses an Arduino to interface with a computer, which can either use WiFi or Bluetooth to connect to a smartphone to display power consumption data.

### Literatim

### Literatim is a Chrome extension designed to help debaters “cut cards” (create website citations along with a block of text from the site).

### Code One Website

### During the 2016 – 2017 school, I founded an organization called Code One. The organization is designed to increase computer science exposure at the middle school level by offering programming classes around my community. One of the responsibilities that I had was creating a website that would serve as a landing page with logistical information about the program.

### Student Planner

### Student Planner is an Android app designed to act as a virtual assignment book with approximately 10,000 downloads. Some key features of this app include assignment prediction, notifications / assignment reminders, settings, and the ability to archive old assignments.

### Optical Character Recognition Algorithm

### This is an Android application and OCR algorithm that can take pictures of text or numbers and identify what letters of numbers are in that picture. The application and OCR algorithm utilize machine learning (Artificial Neural Networks) and image processing in order to complete this task effectively.

### Word Search Solver and Generator

### This is an Android application designed to both create and solve word searches up to 100 rows by 100 rows.

### Calculator X

### Calculator X was my first programming project ever. It is the first fully functional material design Android calculator app with stunning animations and the ability to solve complex algebraic and trigonometric functions.

**Code One**

Code One is an organization that I started to increase computer science exposure in my community by offering programming classes. So far, we have had sessions at Millvale Community Library and we plan to hold lessons at more locations in the future! Lessons first begin with Scratch, a simple drag and drop programming language designed to familiarize students with computer logic. Students then progress onto Python, a versatile language with easy-to-learn syntax.

**HackNA website**

During the 2017 - 2018 school year, I founded and directed HackNA, a high school hackathon for the Greater Pittsburgh Area. Hosted by North Allegheny, HackNA allows more middle and high schools to become interested in computer science and robotics at an earlier age. One of my responsibilities for this event was to create the website, which would serve as the event's landing page.

**Leadership**

**HackNA**

After noticing a lack of introductory computer science opportunities and programming competitions in the Pittsburgh area, a friend and I co-founded HackNA—a twelve-hour high school hackathon located at my high school. A hackathon is a competition during which teams design, develop, and build software or hardware hacks (e.g. websites, robots, Android/iOS apps) on site and compete to win sponsored prizes and awards. The event, on December 16, 2017, plans on bringing together about 350 middle and high school students from schools across Pittsburgh in order to foster a high school tech community. Moreover, the event is designed so that absolutely no prior experience is necessary! We’ll be providing mentor expertise and optional workshops to help beginners get started and experts excel.

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