Impact and Project Problem Description

## Part 1: Hello World – Chapter 1

Read [HELLO WORLD - Ch. 1.pdf](https://drive.google.com/file/d/1Lc84d4lSNmkTCNAb3BAd46E48-NduAzR/view?usp=sharing) Being Human in the Age of Algorithms

Answer the questions in your own words.

### 1.1 Algorithms

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| 1.1.1 What is an algorithm? How does Hannah Fry define it in both simple and technical terms?  Hannah Fry lists the official definition of an Algorithm as a, “A step-by-step procedure for solving a problem or accomplishing some end especially by a computer.” She describes that an algorithm is used to complete a task in a series of steps. Using simple examples such as making a cake with a recipe, and building IKEA furniture with instructions, she uses basic abstractions to visualize how a complex algorithm is used to accomplish tasks in computers.  She then describes the different type of algorithms for, prioritization, classification, association, and filtering, all of which include examples of how they are applied. These algorithms have different uses such as using google to find relevant information on the web (prioritization), verses, being recommended on what your next purchase should be on Amazon (association). |
| 1.1.2 What’s the difference between rule-based algorithms and machine learning algorithms?  Rule-based algorithms are made with rules that are clearly defined by humans. They are direct and ambiguous. This means that there are parameters created for how an algorithm works and a program will work with only these defined rules.  Machine Learning algorithms mimic how living things work in nature. There is a less precise set of rules, but there is a clearly defined outcome. In return, a machine learning algorithm uses feedback to establish if it’s on the right track or if it gave incorrect information. Machine learning establishes the best way to achieve an outcome on it’s own, similar to author’s example of attempting to train a dog to high-five. |
| 1.1.3 What are the four real-world tasks that most algorithms are designed to perform?  Prioritization – This type of algorithm simply prioritizes some pieces of data out of a list. This is reflected in Google search results, GPS routes, and streaming suggestions. The goal of this type of algorithm is to give the best possible outcomes with the data provided, with goal of giving the best results to the user in a list of priority.  Classification – This algorithm is used to target ‘something’ based on a category that was clearly defined in the algorithm. Hannah Fry describes being in her late-20s and being advertised diamond rings. Once she was married, new ads for pregnancy tests and fertility kits appeared later, as this was likely based on her age, gender, and any other possible information that may have hinted that she had already gotten married. This algorithm classifies an individual into a group that can otherwise be targeted with ads or other information, with the hope of getting the user to interact with the content  Association – Similar to Classification algorithm, association algorithms attempt to ‘find a link’ with a small piece of information, and associate it with another piece of information. This is less broad than classification algorithms as it focuses on smaller details, rather than grouping several pieces of data, it still uses larger pieces of data as reference as to what can be associated to the one piece of information. An example of this is a Reddit user buying a baseball bat and being recommended a balaclava face covering, which may reference a crime-motive for buying a baseball bat.  Filtering – Filtering is used to omit results that may not be relevant for processing data. Using sound as the simplest analogy, separating white-noise from a person talking can ensure only the important data – the voice – is captured and then passes on. This is the case with Siri, and other similar voice-assistant apps that exists on smartphones. With social media, certain habits such as repetitively looking for specific type of content may, reflect on what stories you see on Facebook. This isolates the information relevant to the user. |

### 1.2 Analyzing Impact

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| 1.2.1 The author describes multiple examples where algorithms failed or had unintended consequences (e.g., GPS leading to a cliff, Idaho Medicaid cuts).  What happened?  Robert Jones was driving in England after visiting his friends. When he realized he was running out of gas, he decided to find a route to gas station. His GPS found a short route to take and he was confident in the route that was given. He realized that the terrain was changing and the road had turned to a narrow dirt path, but did not believe he was taking a bad route, with his driving background. With no reason to doubt the GPS, he continued on the path before hitting a fence with his BMW and getting stuck on a cliff.  What went wrong?  The road that the GPS was instructing the Driver to take a path not intended for cars and off of a cliff. Something on the GPS was allowing the algorithm to ‘decide’ that the path was an acceptable road to drive on.  What assumptions did the algorithm or user make?  The driver never once doubted that his GPS would mistake a dirt path that was too narrow for cars and lead him toward a cliff that could have killed him. In a scenario where a GPS wouldn’t have been used, it’s possible the driver would not have mistaken the path for a road to begin with. It’s not clear how the GPS mistook the path for a road, but the driver could have made conclusion sooner. |
| 1.2.2 What are your thoughts on how people view algorithms?  Algorithms are a simple concept and are used in several forms of application. How they are used is a subject of debate. Algorithms are intended to solve and identify problems, or abstract larger pieces of information, but can also be used to manipulate how people behave. Using algorithms to predict human behavior such as marketing or putting content in front of people who are likely to interact with, is a controversial topic that deserves conversation. Algorithms serve as a paradox as it can be used for great things in innovating technology, and also very negative outcomes such as targeting vulnerable people who lack self-control (such as people addicted to social media, online shopping, etc.). |

### 1.3 Evaluating from Multiple Perspectives

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| 1.3.1 Consider the Idaho Medicaid example. What perspectives are important to evaluate this situation? Choose at least two:   * Scientific (Did it use valid data?) Yes and No:   The data that was used in calculating benefits was real data. Without knowing the formulas used, I feel confident in saying if the math was ever correct, it was in the planning phase. This isn’t a given. The software used bad math in the final product and gave bad results.  When the software was first used, it was not recognized that there were issues in the formula that was implemented. It is not known if there were issues with how the formula was interpreted by the spreadsheet program, or if it was complete user error *and* bad math. With either reason, Excel should never have been used for a confidential math calculation that affects the disabled population of an entire state. The fact that that this agency decided to implement and defend the use of this algorithm is sloppy and shows how mismanagement can affect many people negatively.   * Ethical (Was it fair?)   Everything that resulted from this state agency using this program was unethical. There were obvious issues that arose from the people affected by this and the Idaho Department of Health and Welfare refused to review the issue. When the issue was taken to court, they refused to compromise their “trade secret” as they were confident that it was working as intended. With various issues found, it leaves a scenario where the government agency either knew about the problem and refused to fix it, or didn’t know they were wrong, even when there were many tell-tale signs to consider that possibility.   * Sociological (Who was affected?) * Economics (Did it save money at what cost?) * Community (Was the tool helping or harming?) * Cultural (Was anyone left out?) * Global (Could a similar problem happen in other places?) |

### 1.4 Reflection

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| 1.4.1 What is one example of a time you trusted a computer, GPS, or app and it didn’t go as planned?  In 2020, I was driving from Aurora, Colorado to Jacksonville, North Carolina. I was driving with my ex-wife to my new duty station and used Google Maps the entire trip. When I entered St. Louis, I was given a very strange instruction to enter an exit ramp, ***at*** the junction of 3 exit ramps. With 4 lanes of traffic, I was forced to stay in my lane and Google kept me on a route.  At some point, I was on an interstate in Kentucky, and was instructed to leave this route. As traffic became less dense, I began to feel the route was unusual as the highways gradually turned into ranches with no traffic in sight. At 2 in the morning, I was instructed to take a turn on a dirt road that was one-car wide. The road gradually became harder to drive on, and no sedan would have survived some of the spots. At one point I was driving up and down bumps on the road that were impossible to look over without driving over them.  With half-hearted jokes about running into a Klu Klux Klan neighborhood, this path gave us concern as I drove on a one lane dirt road for 45 minutes. We were a bit concerned about stopping. When I had come across my first Opossum, we were at the end of the dirt road and re-entered normal roads. With several opinions received after the fact, everyone thought it was a strange ‘best’ route.  Speaking to another Kentucky-Native in North Carolina a year or two later, they did verify that I was in a ‘weird’ part of North-Eastern Kentucky. My original route was to drive through Tennessee. |
| 1.4.2 Fry ends with the quote: “The future doesn’t just happen. We create it.”  What does this mean in the context of algorithms and computing?  The way algorithms are created are defined by us in the present. Algorithms will not be ‘perfect’ unless we go about creating fundamentally sound examples now. Understanding flawed examples of algorithms makes room and growth for newer and better examples. Reusing old algorithms might be okay for some uses, but may also carry old problems forward. Using old algorithms as examples to improve leave room for innovation.  How does it connect to your own role in a future career?  In cybersecurity, almost every aspect of computers and networking involves algorithms and standards. The OSI model is a fundamental concept of algorithms that explain how computers communicate. Understanding those types of fundamentals is essential for mitigating exploits from bad actors, and understanding the algorithms for methods used in hacking are required for anyone wanting to prevent an unexpected form of attack. Encryption also requires algorithms, and understanding how these methods work in the industry, can elevate a better understanding for how to improve these methods. |

## Part 2: Final Project: Define Problem/Need

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| 2.1 Think about issues you're passionate about. Select one and explain *why* it matters.  Password security and account management are overlooked issues with the web users of today. Speaking to family members who have asked me for help on simple tech-related troubleshooting, I have seen what their interpretations of account management is and I find flaws that leave users at risk for brute-force attacks. I find a common trend of using repeated phrases and also including naming conventions. I would like to make a simple password manager that offers basic password manager features and utilizes some form of encryption in storing information. Additionally, I want to include resources that clearly explains what a person should consider when making a password and how to manage several account logins.  I believe I have a good system for managing passwords and I use a password manager. The issue I recognize, is that the popular password managers that offer these ready-to-use services require that you have a subscription plan or account to access the password manage. This is troublesome and leaves an opportunity for them to charge unnecessary amounts of money to users simply needing to manage their credentials. |
| 2.2 Your goal is to find more about a similar solution that already exists.  Put link to a similar solution  <https://nordpass.com/plans/?utm_source=google&utm_medium=cpc&utm_campaign=22166902224&utm_content=st-pricing&utm_term=nordpass&gad_source=1&gbraid=0AAAAACc38-qQ36321k93A4znnKOWQXVQv&gclid=Cj0KCQjwzYLABhD4ARIsALySuCQM80cwjlHOQH768OO53VGw3Ztq-4FzCi9OkEf7FUocLVUtUrB3L2EaAlpaEALw_wcB>  nordpass – 1 user subscription for one device is free. Multiple-logins require a subscription.  Who is the target user?  Everyone who feels they need to manage their account credentials securely and in an organized manner. This likely applies to everyone who uses several email accounts, social media, etc.  What features do you like?  Password Generation, Password strength analyzer, miscellaneous information about passwords, password storage, encrypted aspect of data.  What works well?  Password storage and easy to navigate  Who is included or excluded?  Technically, anyone with user accounts and passwords is included. Excluded users would be anyone not wanting to go through the effort of making an account with Nord and anyone feeling that they need to pay for certain features. Users without internet may get stuck if they cant access the server containing their information.  Where is there bias or inaccessibility?  Better features are aimed toward people who are willing to pay for them. Users who use the free version are forced to logout of one device and go through the inconvenience of having to verify their login every time they ty to access their credentials.  What can be improved?  Accessibility and convenience. |
| 2.3 Write your problem statement  Who?[User group] needs   * **All users** who have online accounts need at least a basic, free, and easy-to-use application for managing account information.   What? a way to [do something]   * User can use a password manager when ever they get on their computer and still keep their information secure   Why? because [insight about the need or frustration].   * CISA standards are unenforceable, and 3 out of 4 websites may not already enforce password creation standards. With this, most users who do not know these standards don’t use them. Users are more than likely not forced to make a good password and therefore don’t know what a good standard looks like.   Source: https://research.gatech.edu/largest-study-its-kind-shows-outdated-password-practices-are-widespread |
| 2.4 Prototype Description  What will you create? Website or python program   * Python Program – Password Manager.   What will your prototype do?   * Run independently and use a GUI (Tkinter). Eliminate use of Python IDE and terminal interface. * Generate passwords that can also be Saved and exported to another saved file. * Utilize a password manager feature to store information. * Utilize some form of encryption that is only decrypted using the program.(Cryptography lib) * Provide additional resources for password creation and account management.   **Features**:   * Generate Passwords, save passwords, keep a log of accounts, export information, keep information encrypted on the local devices.   **List 3 features**   * Easy-to-navigate GUI. * Encryption/decryption – ensuring information is encrypted and decrypted while using the program. Ensuring information is not accessible by simply opening the files in the directory. * Keeping a log of accounts and passwords that can be deleted and overwritten with ease (in GUI) – This topic seems a bit advanced as understanding and managing a list seems do-able in a python terminal, but to simplify it by creating features to do this for me seems to fall under what a query language may be able to do.   **Which one will be the most challenging to implement? Why?**   * Encryption/decryption – A lot of test scenarios will need to be created to ensure there won’t be any ‘leaks’ of information outside of using the program. This is a new topic for me and the most important for this project. |
| 2.5 Search for 2 to 3 resources that will help you implement what you want to do websites (HTML,  Do not worry if you don’t understand what you find. Next week you will work in groups that want to do something similar after I approve so that you aren’t trying something that is too difficult.  Currently I have a bare-bones GUI for my password generator code. The GUI can create passwords but not store them. The focus I have on finishing this project is the encryption aspect.   * Youtube Channel – freecodecamp.org <https://www.youtube.com/watch?v=YXPyB4XeYLA&list=WL&index=44&t=4372s> * Youtube Channel – PracticalPythonSolutions   <https://www.youtube.com/@practicalpythonsolutions-b4478>   * Cryptography Library Resource – cryptography.io   <https://cryptography.io/en/latest/fernet/> |