**Sumaya Hashim Week 1 Task**

**Git and GitHub:**

**Introduction:**

**1. Git:**

Git is a distributed version control system (DVCS) that allows developers to track changes in their codebase, collaborate with others, and revert to previous stages when needed. It operates locally on your computer and does not require a central server to store all the versions of a project. Each developer has a copy of the entire repository on their machine, including its full history.

**Key Features:** Branching, merging, committing changes, and maintaining different versions of files are fundamental operations supported by Git.

**Usage:** Developers use Git to manage their source code, track changes over time, and collaborate with others on projects.

**2. GitHub:**

GitHub is a platform built around Git that provides a web-based interface to Git repositories and adds a suite of features that enhance collaboration, code review, project management, and more. GitHub hosts Git repositories in a centralized location on its servers, making it easier for teams to collaborate remotely. It also offers additional features like issue tracking, pull requests, project wikis, and actions (CI/CD).

**Key Features:** Social coding (following other developers, forking repositories), code review tools, and integration with various third-party services are some of the distinctive features of GitHub.

**Usage:** GitHub is widely used by developers and teams to host their Git repositories, manage projects, and facilitate collaboration through features like pull requests and issue tracking.

**The Journey:**The process was a bit longer than I imagined but it was fun nonetheless. I will break it down into steps:

1. I installed Git for my Windows from <https://git-scm.com/>
2. I then installed VS Code as the local code editor on my laptop
3. I created a sample file named index.html and wrote some code on it to try the functionality of Git.
4. Then I configured Git using my username and Gmail on GitHub using the commands **git config –global user.name “My name”** and **git config –global user.email “my email”**
5. To save a change in Git you need to first create a file, make the changes and the create the repository in which to save the file.
6. After that you need to add the file in the git-repo using the **git add** command which then takes the file into the staging area which can be checked by using the **git status** command.
7. Since Git is a Version Control System you can also check the differences between the version by using **git diff**.
8. After adding a file into the git repository, you need to commit the file using the **git commit -m** command. This is basically the final confirmation to change something your code or file.
9. Since all of the above steps are done on the local repositories connecting them to GitHub turns it into a remote repo
10. This is done by connecting the **VS Code** account to my GitHub account and then pushing all the local files to GitHub using the **git push** command. The reverse process can also be done when you need a file from someone else and this done using the **git pull** command.

**git remote add origin https://github.com/yourusername/yourrepository.git**

**git push -u origin main**

1. There were also a number of commands useful in different scenarios when restoring previous version or showing the last version by its commit id and **git reset** which deletes the last reset and comes back a version which are used in more practical applications.
2. Finally, I uploaded this doc file on GitHub directly

**Git commands /terminal/repos:**

|  |  |
| --- | --- |
| Git init | Creates a repository on the local system |
| Git status | Check the status of the repo |
| Git diff | Shows difference b/w the current and past version of the code or file |
| Git add | Adds file to the repository |
| Git commit | Commits file to the repository with description |
| Git remote -v | Checks if the local repo is connected to the remote repo |
| Git branch | checks under which branch the user currently is |
| Git push | Uploads the file or code from local to remote |
| Git pull | Downloads the code from remote to local repo |
| Git log | Shows the history from past commits along with the author who committed those changes and the time and description |
| Git restore | Restores the last version of the code |

**Diff between Artificial Intelligence/Machine Learning/Deep Learning/Data Science:**

**Artificial Intelligence (AI):**

AI refers to the simulation of human intelligence in machines that are programmed to think and learn like humans. It encompasses a wide range of techniques and approaches aimed at mimicking cognitive functions such as learning, problem-solving, reasoning, and decision-making.

**Applications:** AI is applied across various domains, including natural language processing, computer vision, robotics, expert systems, and more.

**Machine Learning (ML):**

ML is a subset of AI that focuses on the development of algorithms and statistical models that enable computers to learn from and make decisions or predictions based on data. ML algorithms iteratively learn from data, identifying patterns and making decisions without being explicitly programmed for each task.

**Types:** ML includes supervised learning (where models learn from labeled data), unsupervised learning (where models find patterns in unlabeled data), and reinforcement learning (where models learn to make decisions through trial and error).

**Deep Learning (DL):**

DL is a subset of ML that uses neural networks with many layers (hence "deep") to learn representations of data through hierarchical levels of abstraction. DL algorithms are particularly effective for tasks such as image and speech recognition, natural language processing, and other complex pattern recognition problems.

**Architecture:** Deep learning architectures include convolutional neural networks (CNNs) for image processing, recurrent neural networks (RNNs) for sequential data, and transformers for natural language understanding, among others.

**Data Science:**

Definition: Data Science is an interdisciplinary field that uses scientific methods, processes, algorithms, and systems to extract knowledge and insights from structured and unstructured data. Data scientists combine domain expertise, programming skills, and statistical knowledge to analyze and interpret complex data sets.

Skills: Data Science involves data preprocessing, exploratory data analysis, statistical modeling, machine learning, data visualization, and communication of insights.

**Key Differences:**

**Focus:** AI aims to create systems that can simulate human intelligence. ML focuses on developing algorithms that allow computers to learn from and make predictions or decisions based on data. DL is a specific type of ML using neural networks with deep architectures.

**Methodology:** AI encompasses a broader range of techniques beyond machine learning, including expert systems, knowledge representation, and reasoning. ML relies on statistical techniques to learn patterns from data. DL uses deep neural networks for learning hierarchical representations of data.

**Applications:** AI has applications across various domains including robotics, natural language processing, and gaming. ML is used for tasks such as recommendation systems, predictive analytics, and image recognition. DL excels in tasks requiring complex pattern recognition, like image and speech recognition.

**Skills and Tools:** Data Science combines skills from mathematics, statistics, programming, and domain expertise to derive insights from data. ML and DL require knowledge of algorithms, data manipulation, and model evaluation techniques. AI involves understanding cognitive functions and implementing systems that mimic human intelligence.