Challenge Project: Search Program

Project Description / Requirements
- Write a program that searches a **2 dimensional matrix of integers** for the row(s) that match a criteria (each criteria to be implemented as a separate search function/class)
- Write another program that generate the matrix. The program parameters (argc/argv) should allow us to set the row and column count.
- Assume that the matrix data contains sensitive information.
- There are 3 search functions to implement:
    - Find all rows that have a specific sequence of numbers (if that number sequence appears more than once for that row, you only need to print it once)
    - Find all rows that contain all of the required numbers (if number repeats, that row must contain at least that many number)
    - Find the row that has the closest match to a specific number sequence (just need to consider the number of matches)
- The program needs a **CLI** (command line interface) to perform the search
    - 'searchSequence 1 3 4 3 234 6 7' performs the first search function with the given number sequence
    - 'searchUnordered 1 3 4 2' will perform the second search function with the given number sequence and so on
    - 'searchBestMatch 2 4 5 3 5' will perform the third search function with the given number sequence
- When the search program starts up, user must be **able to indicate the matrix data file** using parameters (argc/argv) **and alternatively** include a file to include the sequence of search
    - ./searchProgram matrix.dat [this will run our program with matrix.dat as our matrix file
    - ./searchProgram matrix.dat search.txt
        - This will run our program with matrix.dat as our matrix file and use the sequence of text in search.txt instead of the CLI
        - So for e.g. search.txt will have
        searchSequence 67 3 4 3 234 65 74
        searchSequence 3 333 4 3 234 66 87
        searchSequence 1 3 455 31 234 62 73
        searchUnordered 1 3 455 31 234 62 73
- Assume that the **search function can be performed multiple times** (with different number sequence) but **using the same matrix data file**
- You are expected to **speed up the search time** (ie. it should not be linear to the matrix element count)
- You are expected to write a report on how you optimize the search function and the design choices made in your code
- You are expected to design the class with maintainability in mind, e.g. consider
    - What if we need to add more search functions in future?
- You are expected to **write test cases to ensure the accuracy of your search function**
- Expected timeline: 1-2 weeks
- The goal here is to evaluate your technical as well as effective communication skills in a real-world environment

Development Requirements
- Ubuntu (16.04)
- C++
- Setup a git repos

Project Communication
- For all challenge project communications, please kindly send via your challenge project channel on Slack. You should receive a separate email invitation to join that channel.
- Your assigned challenge project reviewer will receive your feedback & questions via the above Slack channel and communicate with you accordingly
- Key communication checkpoints include (but not limited to):
    - Setup a project plan (i.e. divide the project into short manageable sprints and estimate the time required for each) and discuss with your challenge project reviewer
    - Feel free to communicate with your reviewer with any questions you may have on the project .. it's much better to clarify any doubts you may have upfront rather than to spend time implementing a feature that is not 100% well thought out
    - Update your reviewer at the completion of each sprint
    - If you're unable to complete any sprint for any reason (eg. unexpected technical challenges, new issues discovered, personal reasons), please kindly update your reviewer and possibly discuss the new timeline / path moving forward
- Remember, your ability to communicate well is as important to us as your technical skills. Both are vital to your success!!