DS 5110 Final Project Iteration 1
October 4th, 2024

Members: Mia Khan, Onn Ye Young

Roles & Responsibilities:
- Mia & Onn Ye
  - Design, model, implement, and launch the database
  - Problem solving and utilizing analytical skills throughout the project
  - Communicate and collaborate to generate high-quality deliverables on time
- Mia
  - Use big data for data processing frameworks
  - Implement a cloud based storage and processing services such as Amazon S3
- Onn Ye
  - Create data visualizations that convey the data clearly such that the user can understand the data and draw conclusions quickly
  - Utilize data integration techniques to create our database

Potential Topic Ideas:

We have come up with a few topic ideas, listed below, relating to the healthcare industry. This industry is of interest to us, as we are thinking about working in the healthcare industry in the future. Onn Ye is a Bioengineering major and Mia majors in Data Science, so these topics are a great intersection of our interests and fields.

- **Creating a data visualization dashboard for monitoring key metrics and performance indicators in a hospital setting**
  - General idea
    - Routine data (patient entry time, condition, urgency, length of stay, satisfaction) entered by hospital staff is recorded and compiled into a data visualization dashboard for easy monitoring of key metrics and performance indicators
    - This allows the hospital to make decisions about places for improvement, answering questions like:
      - Which step of a patient's hospital visit needs optimization?
      - How long do patients have to wait to be seen?
      - How satisfied are patients with the care that they have received?

- What are the conditions that patients are coming to the hospital with? Are these conditions something that the hospital can raise awareness about to prevent future visits?
  - Possible visualizations
    - Graphs for patients in the waiting room
      - Condition/symptom
      - Urgency of visit
      - Length of wait time
    - Graphs for patients being seen
      - Duration between check-ins
      - Severity of condition
      - Estimated length of stay (overnight, multiple days, etc)
    - Patient satisfaction
      - Wait length
      - Quality of care
      - Bedside manner
    - Historical data
      - Number of patients treated
      - Conditions of patients treated
      - Average wait times
      - Average time until condition resolution (maybe this would be better in an ER setting)
  - Key skills used
    - Data visualization
      - Patients in waiting room, patients being seen, patient satisfaction, historical data
    - Big data
      - Hospitals have a lot of data, creating a data visualization dashboard will assist hospital staff in understanding general trends without having to sort through all the data themselves
    - Cloud platforms
      - Allow for real-time tracking
      - Storage and management of data in the cloud
- **Creating a database system for managing hospital patients, including patient records (basic information, insurance), patient conditions and symptoms, medical staff assigned.**
  - General idea
    - Upon admittance of a patient, patient records and insurance are recorded. Once a patient has been evaluated, their symptoms and

diagnosis can be inputted into the system by medical staff. When done for all patients, hospital staff can search through diagnoses and symptoms to compare to their own patient if they are presenting an unfamiliar set of symptoms, or reach out to the medical staff assigned to similar patients for help.

- Key skills used
  - Data visualization
    - Chart of various patient demographics for each diagnosis would allow the hospital to understand whether some demographics are more susceptible to certain conditions
    - Chart of symptoms seen for specific diagnoses would allow hospital staff to see if their patient is presenting the expected symptoms
  - Big data
    - Hospitals have a lot of data, creating a data visualizations will assist hospital staff in understanding general trends without having to sort through all the data themselves
    - Allowing hospital staff to specifically search through the data for certain conditions or symptoms may allow them to diagnose patients quicker or find someone who can
  - Cloud
    - Allow for real-time tracking
    - Storage and management of data in the cloud
- **Creating a database for a charity medical foundation based off of written reports of patients asking for aid for medical procedures (charity foundation helps patients pay for medical procedures)**
  - General Idea
    - Patient Request Records:
      - Basic Information:
        - Name, age, contact information, address
      - Medical Condition:
        - Description of the medical condition requiring aid
      - Requested Procedure:
        - Specific medical procedures or treatments requested
      - Financial Information:
        - Current financial situation, insurance status (if any), and amount requested
    - Fraud Detection Mechanism:
      - Tracking Requests:

- - - Monitor the frequency and amount of requests from individual patients.
    - Audit Trail:
      - Maintain logs of all requests to identify patterns or anomalies in the data.
    - Alerts:
      - Notify administrators of suspicious activity, such as repeated requests for the same procedure from the same patient.
  - Review and Approval Process:
    - Status Tracking:
      - Each request can be marked as pending, approved, or denied.
    - Comments Section:
      - Medical staff can leave notes regarding the request or the patient's condition.
  - Database Management:
    - Design and implementation of a relational database to store patient requests, statuses, and financial information.
  - Data Visualization:
    - Create charts and graphs for reporting purposes to visualize trends in aid requests and demographics
    - Request Trends:
      - Line charts showing the number of requests over time.
    - Procedure Requests:
      - Pie charts showing the distribution of different procedures requested.
    - Demographic Analysis:
      - Bar charts or heatmaps to analyze patient demographics requesting aid.
    - Financial Analysis:
      - Stacked bar charts showing total funds requested vs. funds granted over time.
  - Cloud Storage:
    - Explore cloud platforms for storing and managing data securely, allowing easy access and scalability.
  - Fraud Detection Techniques:
    - Implement algorithms or data analysis methods to detect unusual patterns in the requests.