**DAB – 402 Capstone Project**

**CRITICALITY INDEX PREDICTION USING MACHINE LEARNING**

**Group – 9**

**Group Members:**

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**PROBLEM STATEMENT:**

Human decision-making involves the deliberate formulation of hypotheses and plans as well as the use of subconscious means of judging probability, likely outcomes, and proper action. As a result, we are not confident enough to decide in the healthcare industry. To help doctors and nurses understand the likelihood of their hypotheses and plans, I propose we provide some assistance. Data Analysis, and dynamic modeling using machine learning, combined with creativity, refine the result as nurses can find specific solutions to specific problems with trust, where traditional interventions are not effective. Our idea can help nurses and junior doctors to generate a quick understanding of the situation, get flexible and natural, create original solutions to problems, act independently and with confidence, even under pressure, and demonstrate originality.

**WHY IS IT IMPORTANT?**

Our idea of research is as below: Experienced Health care professionals generally decide on which treatment to give a patient whereas junior doctors do not have the authority to make the final decision. So, we would like to develop a decision-making algorithm that can predict and make decisions for patients which could help junior doctors.

**How are you going to solve the problem and which knowledge/skills/tech is needed for this solution?**

As a result of this decision-making, the current situation would be changed by reducing the dependency on the senior doctors, and the patient would wait less time for their treatments because there would be other doctors who can handle the situation. Also, we evaluate by using the Machine Learning Algorithms prediction accuracy.

We will be collecting the data from MIMIC Database where we will have to evaluate multiple tables and create relationships between the different tables to develop a single entity which will be analyzed using different tools like SQL, tableau, Azure ML, and libraries in Machine learning and python. The process of finding the criticality index requires data engineering.

**How does this solution compare to existing solutions, or to previous attempts to solve this problem?**

The solution we are aiming to build is a relatively new concept where we are calculating the criticality of the patient by taking into consideration of different factors such as the Severity of the medical condition, Urgency of treatment, Patient's age and underlying health conditions, and clinical judgments.

**What are the metrics available to you?**

It is beneficial to organize and summarise data while we undertake descriptive analytics in order to give a broad overview of the data collection. Some common metrics used in descriptive analytics include measures of dispersion and measures of central tendency such as mean, range, and score.

**How are you evaluating your solution? And how feasible is it?**

To check the criticality, index many hospitals use a variety of software systems. The backend of these software systems can make use of several databases and table structures. Therefore, we intend to offer a template for criticality index ML models and dashboards on the MIMIC dataset, and other software tools utilizing alternative database architectures can benefit from this concept.

**What is the estimated impact of this solution on all stakeholders?**

Patients who need immediate assistance will be helpful with a system like this, there are millions of deaths happening around the world because of delayed initiation of treatment this process will help in prioritizing the patient’s care and understanding the severity of the health condition.

**Are there any ethical concerns?**

The work we're doing has no ethical implications. We can access the deidentified data we're working with after completing the necessary training.

**What are the data sources?**

* MIMIC-III clinical data(dataset)
* Entity relationship modeling
* Data Cleaning: MS Excel (power query) & SQL
* Exploratory Data Analysis: Jupiter (Python)
* Modelling: Azure ML, Jupiter (Python)
* Data Visualization: Excel, Tableau

**What references did you use?**

[**https://physionet.org/content/mimiciii-demo/1.4/#files-panel**](https://physionet.org/content/mimiciii-demo/1.4/#files-panel)

Johnson, A. E. W., Pollard, T. J., Shen, L., Lehman, L. H., Feng, M., Ghassemi, M., Moody, B., Szolovits, P., Celi, L. A., & Mark, R. G. (2016). MIMIC-III, a freely accessible critical care database. Scientific data, 3, 160035.

[**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7790867/**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7790867/)

[**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4720506/**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4720506/)