**Capstone Proposal**

**Problem statement:**

Can use machine learning to help predict hospital admission at the time of ED triage using patient history in addition to information collected at triage?

**Context:**

According to CDC, the national number of Emergency Department visit is 130 million in year 2018. Out of those visits, there were about 12.4% (16.2 million) resulting in hospital admission. Many times, patients who has long ED length of stay were waiting the bed to be available in Hospital Inpatient units. To help the hospital providing adequate resources and shorten the ED Length of Stay for a patient, it will be very helpful if there is a way to predict hospital admissions right after Triage.

**Criteria for Success:**

Predict Hospital admission right after Triage with accuracy.

**Scope of Solution Space:**

Using the dataset provided on figshare uploaded from Woo Suk Hon, Adrian Daniel Haimovich and R. Andrew Taylor.

**Constraints within Solution Space:**

* There are 972 variables, 498 Binary Type, 461 Numeric Type and 13 Categorical Type
* Total of 560,486 adult patients only visited were included in the study. The visits were between March 2014 and July 2017 from one academic and two community emergency room that resulted in either admission or discharge. However, there were some null values that needs to be clean.
* Historical Vitals - Last, Min, max and the median recorded value of all vitals taken in the ED within one year of the current visit
* Historical Labs - Last, Min, max and the median recorded value of selected numeric labs ordered in the ED within one year of the current visit

**Stakeholders:**

* Figshare: provided patient data
* Emergency Department
* Hospital In Patient Unit
* Patients who visit ED

**Key Data Sources:**

From figshare: Predicting Hospital Admission at Emergency Department Triage Using Machine Learning

List of Variables:

|  |  |  |
| --- | --- | --- |
| Variable Categories | Number of Variables | Data type |
| Response Variable | 1 | Binary |
| Demographics | 9 | Numeric, Binary, Categorical |
| Triage Variables | 13 | Categorical, Numeric, Binary |
| Hospital Usage | 4 | Categorical, Numeric |
| Chief Complaint | 200 | Binary |
| Past Medical History | 281 | Binary |
| Outpatient Medications | 48 | Numeric |
| Imaging | 9 | Numeric |
| Historical Vitals (Last, Min, max and the median recorded value of all vitals taken in the ED within one year of the current visit) | 28 | Numeric, Binary |
| Historical Labs (numeric) (Last, Min, max and the median recorded value of selected numeric labs ordered in the ED within one year of the current visit) | 352 | Numeric |
| Historical Labs (Categorical)  (Last, Min, max and the median recorded value of selected numeric labs ordered in the ED within one year of the current visit) | 27 | Binary, numeric |