**Use Case 2: Company XYZ in Healthcare**

**Questions that are solvable by classification:**

* Does the recent patient have any chronic disease?
  + Does the patient’s return involve issues concerning or related to their chronic disease?
* When did the patient return?
  + Within a week?
  + beyond 1-2 weeks?
  + beyond 3-4 weeks?
* How was the assigned doctor’s engagement in inquiring and surveying health and comfort levels? (survey from 1-5)
* Who were the discharge instructions signed by?
  + Assigned doctor
  + Assigned doctor and personal physician
  + Assigned doctor, personal physician, and pharmacist
* Did the Patient receive adequate discharge instructions and follow-up care?

**Sources of Data**

* Healthcare Data
  + Hospital branch/location, doctor/nurse attendee
* Hospital Records
* Walk-in/Emergency Appointments
  + Date/Time/Cause/Attending Doctor
* Customer Surveys/Reviews

**Tabular Data - Raw**

| **Basic Patient Information** | **Attending Doctor name** | **Patients Chronic Disease** |
| --- | --- | --- |
| Name/Age/Nationality/Gender/Address | Classify each patient under the doctor they were assigned to | Identify whether the patient returning has an underlying chronic condition and then classify each patient by condition.  If a patient has no comorbidities, they are classified as N/A. |

**Tabular Data - Vectorized**

**One-hot encoding**

| **x1** | **x2** | **x3** | **x4** | **x5** | **x6** | **x7** |
| --- | --- | --- | --- | --- | --- | --- |
| Name = randomly generated ID | Age = [12 and below, 13-20, 21-39, 40-59, 60 +]  Age is one hot encoded. | Nationality is one hot encoded. | Gender ={ Male, Female, Other} is one hot encoded. | Address = {NCR, Luzon, Visayas, Mindanao}  One hot encoded | One hot encoded  [doctor\_name1, doctor\_name2,...] | One hot encoded  [heart\_disease, cancer,..., NA] |

| **Date/Time** | **Level of engagement by attending doctor** | **Discharge Instructions** | **Readmitted** |
| --- | --- | --- | --- |
| Recorded check-in and check-out by online appointment / walk-in at reception. | Recorded survey for patients from 1-5? | Identify who signed the discharge papers, and who has signed and checked the instructions for the patients (including instructions involving medicines/drugs for purchase) | Whether or not the patient was readmitted due to complications for the same disease |

| **x8** | **x9** | **x10** | **x11** |
| --- | --- | --- | --- |
| Month: One Hot encoded | Rated from 1 to 5 stars  Not engaging to Very Engaging | [assigned doctor, w/ personal physician, w/ personal physician and pharmacist] | One Hot Encoded  [Readmitted, Not Readmitted] |

**Classification Applications**

| **Name of Application** | **Stakeholders** | **Key Performance Indicators** |
| --- | --- | --- |
| 1. Level of engagement between doctor and patient | Patients: Allows them to know which doctors to look for based on their preferences  Doctors: Allows them to know how patients generally want to be treated | Average 4.5 out of 5 rating for each doctor |
| 2. Treatment Classification:  Predict the most effective treatment for a patient based on medical records and test results.  Possible Treatments: Antibiotics, Rest, Antiviral medicines, Surgery, Amputation | Patients: Save them a lot of time and money to spent on other less effective treatments  Doctors: Conserve time to allocate and treat other patients | At least 95% of discharge instructions should be signed off with physician and pharmacist (only if applicable) |
| 3. Accurately classify the disease of the patient based on comorbidity history  Labels: Common Comorbidities | Doctors: more accurate diagnoses  Logistics Personnel: More efficient allocation of resources  Out-patient Department: Better protocols to handle out-patient care | Less than 1% of all out-going patients are readmitted within 30 days |

**Clustering Applications**

| **Name of Application** | **Stakeholders** | **Key Performance Indicators** |
| --- | --- | --- |
| 1. Patient Segmentation | Out-patient Department: Allows for better aftercare service to patients that require more attention so they’re less likely to have future complications while also allocating limited resources and manpower efficiently. | Less than 1% of all out-going patients are readmitted within 30 days |
| 2. Disease Clustering Analysis | Admin: Identify which diseases/complications occur frequently together so that the hospital can hire more doctors that are specialists in the relevant fields and procure resources or invest in equipment that are to be used for the concerned diseases. | All patients are able to have their operations addressed within the hospital and not have to transfer to other facilities. |
| 3. Patient Outcome Prediction | Attending Physicians:  Allow doctors to have more effective preparation in treating patients to lessen the time of a patient’s stay or increase the rate of recovery of patients that have the respective diseases. | Recovery rate greater than 99% of all patients per disease |