Data Glacier Internship – Week 09

Group Name: Persistency of my own

Name	E-mail	Country	College	Specialization
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Healthcare - Persistency of a drug

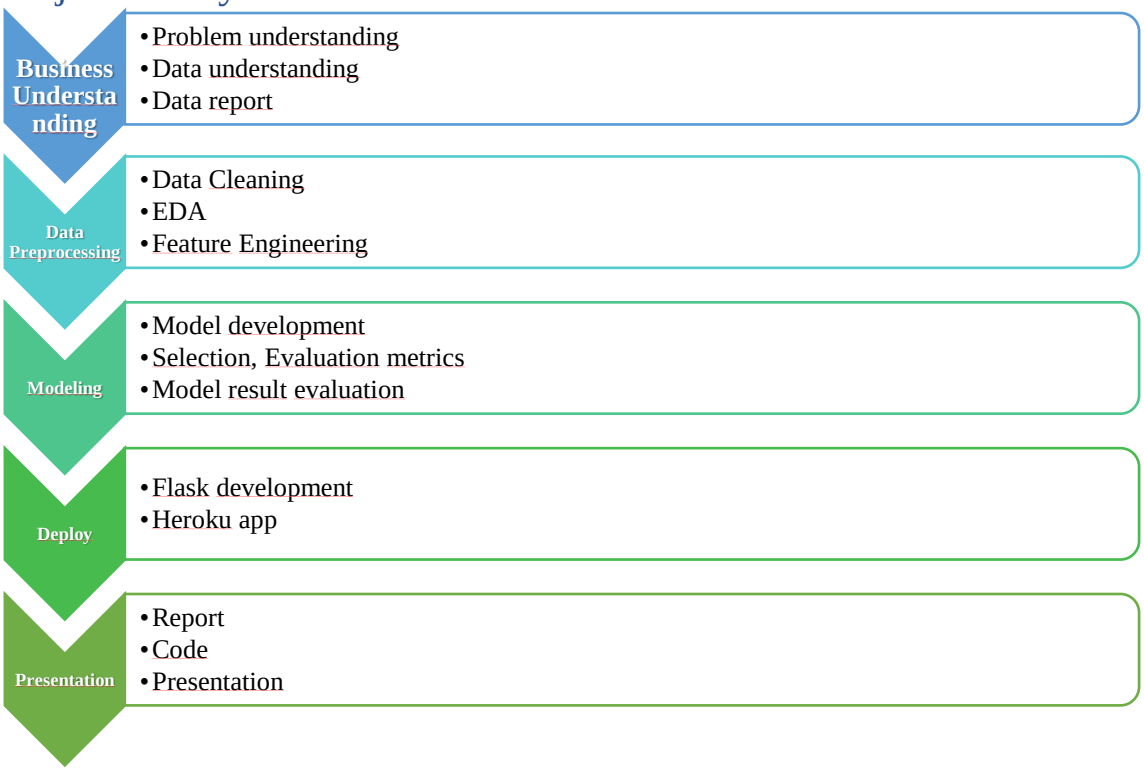
Problem Description

One of the challenges for all pharmaceutical companies is to understand the persistence of drugs as per the physician's prescription. To solve this problem, ABC pharma company approached an analytics company to automate this process of identification.

Business Understanding

We aim to develop a web app for a pharmaceutical company to predict if a patient will get or not a drug schedule. Since we want to split the patients into categories considering their characteristics, we will develop a classification model.

Project Lifecycle



Deadline: January 30th, 2023

Data Intake Report

Name: Healthcare – persistency of a drug
Report date: December 26th
Internship Batch: LISUM15
Version:1.0
Data intake by: Nahari Terena
Data intake reviewer: Data Glacier
Data storage location: local

Tabular data details: Healthcare_dataset

Total number of observations	3424
Total number of files	1
Total number of features	69
Base format of the file	csv
Size of the data	913359 KB

Data Understanding

The dataset corresponds to 69 variables about the 3424 patients. Our tag is “Persistency Flag” and the “Ptid” is the identification column. There is no duplicated row.
The description of the 69 input features is given below.

Bucket	Variable	Type	Missing Value	Missing values (%)	Unique values
Demographics	Gender	Obj	No	0	"Male", "Female"
	Race	Obj	No	0	"Caucasian", "Asian", "African American", "Other/Unknown"
	Ethnicity	Obj	Yes	2.7	"Not hispanic", "Hispanic", "Unknown"
	Region	Obj	No	0	"Midwest", "West", "South", "Northeast"
	Age_Bucket	Obj	No	0	"<55", "55-65","65-75",">75"
	Idn_Indicator	Obj	No	0	"Y", "N"
Provider Attibutes	Ntm_Speciality	Obj	Yes	9.1	GENERAL PRACTITIONER', 'CARDIOLOGY', 'CLINICAL NURSE SPECIALIST', 'EMERGENCY MEDICINE', 'ENDOCRINOLOGY', 'GASTROENTEROLOGY', 'GERIATRIC MEDICINE', 'HEMATOLOGY & ONCOLOGY', 'HOSPICE AND

					PALLIATIVE MEDICINE', 'HOSPITAL MEDICINE', 'NEPHROLOGY', 'NEUROLOGY', 'NUCLEAR MEDICINE', 'OBSTETRICS & OBSTETRICS & GYNECOLOGY & OBSTETRICS & GYNECOLOGY', 'OBSTETRICS AND GYNECOLOGY', 'OCCUPATIONAL MEDICINE', 'ONCOLOGY', 'OPHTHALMOLOGY', 'ORTHOPEDIC SURGERY', 'ORTHOPEDICS', 'OTOLARYNGOLOGY', 'PAIN MEDICINE', 'PATHOLOGY', 'PEDIATRICS', 'PHYSICAL MEDICINE AND REHABILITATION', 'PLASTIC SURGERY', 'PODIATRY', 'PSYCHIATRY AND NEUROLOGY', 'PULMONARY MEDICINE', 'RADIOLOGY', 'RHEUMATOLOGY', 'SURGERY AND SURGICAL SPECIALTIES', 'TRANSPLANT SURGERY', 'Unknown', 'UROLOGY', 'VASCULAR SURGERY'
	Ntm_Specialist_Flag	Obj	No	0	"Others", "Specialist"
	Ntm_Speciality_Bucket	Obj	No	0	OB/GYN/Others/PCP/Unknown', 'Endo/Onc/Uro', 'Rheum'
Clinical Factors	Gluco_Record_Prior_Ntm	Obj	No	0	"Y", "N"
	Gluco_Record_During_Rx	Obj	No	0	"Y", "N"
	Dexa_Freq_During_Rx	Int	No	0	Median: 0 Mean: 3.016 Max: 146
	Dexa_During_Rx	Obj	No	0	"Y", "N"

	Frag_Frac_Prior_Ntm	Obj	No	0	"Y", "N"
	Frag_Frac_During_Rx	Obj	No	0	"Y", "N"
	Risk_Segment_Prior_Ntm	Obj	No	0	"VLR_LR", "HR_VHR"
	Tscore_Bucket_Prior_Ntm	Obj	No	0	">-2.5", "<=-2.5"
	Risk_Segment_During_Rx	Obj	Yes	43.7	"VLR_LR", "HR_VHR", "Unknown"
	Tscore_Bucket_During_Rx	Obj	Yes	43.7	">-2.5", "<=-2.5", "Unknown"
	Change_T_Score	Obj	Yes	43.7	"No change", "Unknown", "Worsened", "Improved"
	Change_Risk_Segment	Obj	Yes	65.1	"No change", "Unknown", "Worsened", "Improved"
	Adherent_Flag	Obj	No	0	"Non-Adherent", "Adherent"
Disease/Treatment Factor	Injectable_Experience_During_Rx	Obj	No	0	"Y", "N"
	NTM - Risk Factors	Obj	No	0	"Y", "N"
	NTM - Comorbidity	Obj	No	0	"Y", "N"
	NTM - Concomitancy	Obj	No	0	"Y", "N"
	Count_Of_Risks	Int	No	0	Median: 1 Mean: 1.239 Max: 7

Data Problems

1) Missing Values

   About six features have a column with at least one missing value. Therefore, we have a specific approach to each one.

   a) “Ethnicity”: We considered “unknown” as a “not Hispanic” category. There 75% of which the respondent "Unknown" had their race classified as “Caucasian”, “Asian” or “African American”.

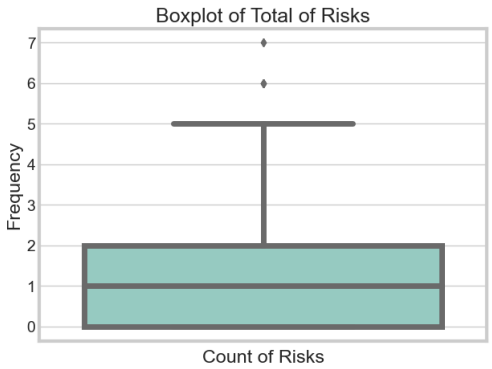
   b) “Ntm_Speciality”: we decided to consider “unknown” as a specific category.

   c) "Risk_Segment_During_Rx", "Tscore_Bucket_During_Rx", “Change_T_Score" and “Change_Risk_Segment": These features were excluded as over 40% of their answer were “unknown”.

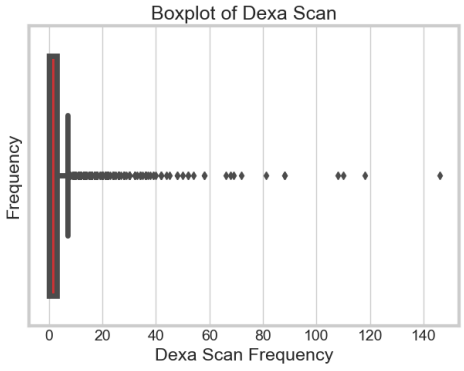
2) Outliers

   An outlier is when an observation differs significantly from other observations from other values. It can occur due to an error or data collection. Outliers can affect the mean of the distribution. There are two numeric columns and both have outliers.

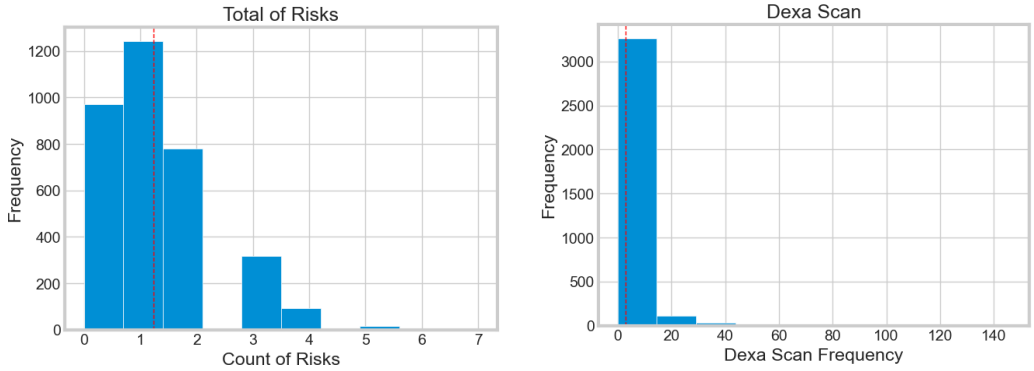
   a) “Count_Of_Risks”: we maintain the outliers (6 and 7) as they reflect the reality.



b) "Dexa_Freq_During_Rx": We decided to apply Tukey's boxplot method which distinguishes between possible and probable outliers. A possible outlier is located between the inner and the outer fence, whereas a probable outlier is located outside the outer fence. For this method, only the probable outliers are treated. However, 272 observations are probable outlier and 460 are possible outliers. Nevertheless, we decided to maintain as we aim to classify the patients, it's possible to have a group that take many scans during the year.



3) <u>Skweness and Kurtosis</u>



a) Skewness is a measure of asymmetry of a distribution. When the value of the skewness is negative, the tail of the distribution is longer towards the left hand side of the curve. When the value of the skewness is positive, the tail of the distribution is longer towards the right hand side of the curve.

b) Kurtosis is one of the two measures that quantify shape of a distribution. Kurtosis determine the volume of the outlier. If the distribution is tall and thin it is called a leptokurtic distribution (Kurtosis > 3). Values in a leptokurtic distribution are near the mean or at the extremes.

Along with skewness, kurtosis is an important descriptive statistic of data distribution. However, the two concepts must not be confused with each other. Skewness essentially measures the symmetry of the distribution, while kurtosis determines the heaviness of the distribution tails.

Data Cleansing and Transformation

We decided to maintain the outliers so we may probably identify these patients as a group itself. Also, we've decided to excluded the columns with more than 40% of “Unknown” answer, as we can’t justify replacing or considering it as a group.

We’ve replaced all the features listed with “Y” or “N” for “1” and “0”.

The “Ethnicity” column: We considered “unknown” as a “Not Hispanic” category. And the “Ntm_Speciality” column: we decided to consider “unknown” as a specific category labeled as “Other”.

Likewise, “Tscore_Bucket” replaced ">-2.5" to “1” and "<=-2.5" to “0”, as well as “Risk_Segment” replaced "VLR_LR" to “1” and "HR_VHR" to “0”.

Thus, there is no missing value and the columns with two categories are now with one and zero.

Github Repo https://github.com/naharift/DataGlacier/tree/main/Week9