Diabetes 130-US hospitals for years 1999-2008

Catalin Banu

January 2010

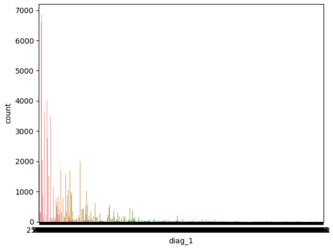
Dataset

Abstract

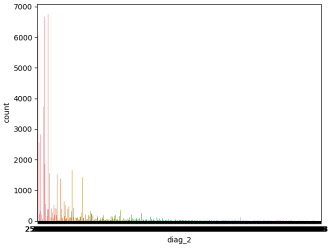
Exploratory Data Analysis

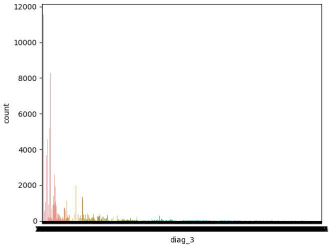
A couples of observations are made

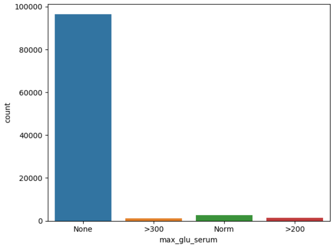
- `?` is used for `na` value



- some categorical are imbalanced: `readmitted`, `a1Cresult`, `diag_1`, `diag_2`, `diag_3`







###Types

type	count
int64	13
object	37

###Missing Values

name	%
race	2.234
weight	96.858
payer_code	39.557
medical_specialty	49.082
diag_1	0.021
diag_2	0.352
diag_3	1.398

Looking at the missing values, I will:

- drop columns: weight, payer_code. medical_speciality
- drop na rows for diag_1, diag , diag_3, race

##Variation

##Data processing and feature engineering

- categorical fields into numerical: readmitted, age
- some numeric intro categorical: diag_1 , diag_2, diag_3
- categories with low counts (less than 1%) were remooed
-

Kmean and DB-Scan perform well on numeric features as they need a distance between to points, so I transformed as many as I could from categorical to numeric

- age ranges into - age median
- medications that were taken generated a sum of the meds

For categorical features I reduced their unique values and after that LabeledEncoder and dummied

##Unsupervised Learning

###K-means

K-means is a type of unsupervised learning and one of the popular methods of clustering unlabelled data into k clusters. One of the trickier tasks in clustering is identifying the appropriate number of clusters k.

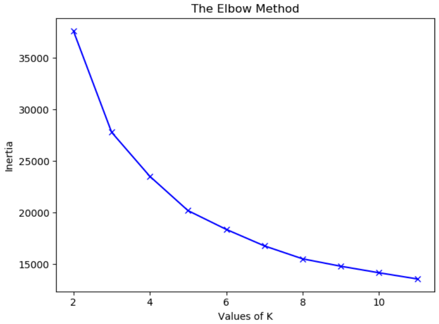
Evaluation metrics and choosing K

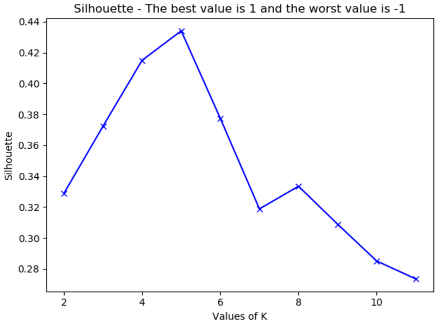
Several metrics are used to choose K.

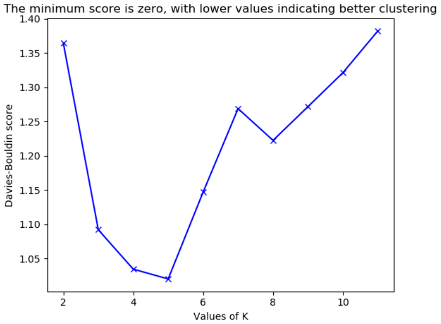
- *Inertia* - Choose k such that adding another cluster will not explain the variance in data by much

- *Davies-Bouldin score* [1] - average similarity measure of each cluster with its most similar cluster. The minimum score is zero, with lower values indicating better clustering.
- *Silhouette Coefficient* [2] - the mean intra-cluster distance (a) and the mean nearest-cluster distance (b) for each sample. The best value is 1 and the worst value is -1. Values near 0 indicate overlapping clusters.

Looking at these tree graphs it looks that the best value for K would be 3 or 4


The Elbow Method


Silhouette - The best value is 1 and the worst value is -1


The minimum score is zero, with lower values indicating better clustering

1. Davies, David L.; Bouldin, Donald W. (1979). "A Cluster Separation Measure". IEEE Transactions on Pattern Analysis and Machine Intelligence. PAMI-1 (2): 224-227

. Wikipedia entry on the Silhouette Coefficient

##DBSCAN

DBSCAN is data clustering algorithm that groups points which are closely packed together in feature space

Choosing paramaters

Epsilon : choos 3

###Hyperparameter tuning

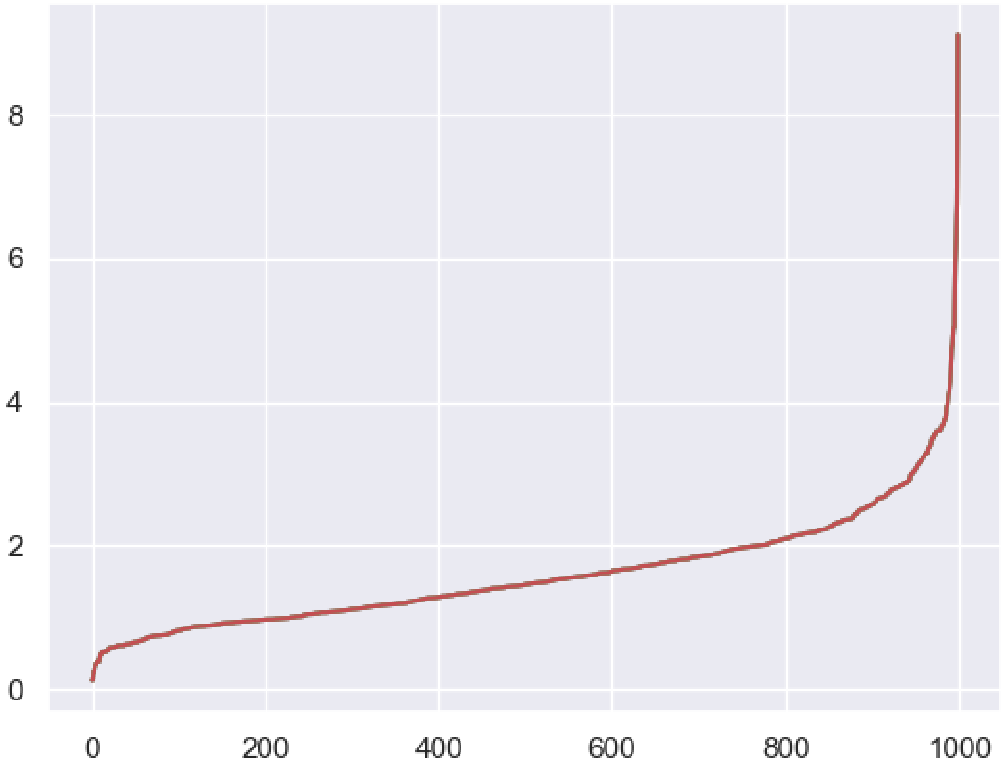


Figure 1: epsilon