BREAST CANCER DATA

Problem Statement

- Breast Cancer is a disease commonly found in women, an abnormally grown cells in the breast tissue are referred to as a tumor. These tumors are not always cancer cells, these are sometimes benign, pre-malignant, or malignant. To identify and diagnose this various tests such as MRI, ultrasound, biopsy, and mammograms are used.

- The data set we considered has details regarding the breast cancer results from the breast fine-needle aspiration test, which involves collecting some fluid or cells from a breast cyst and results are classified and reported as ‘1’ and ‘0’ which refers to Malignant(presence of cancer cells) and Benign(absence of cancer cells).

- This is considered a classification problem in machine learning. The goal or the objective of this project is to classify whether the breast cancer is malignant or benign and also predict the recurrence and non-recurrence of the cases using Logistic Regression.

Data Source Details

- The data set is considered from Kaggle: https://www.kaggle.com/datasets/yasserh/breast-cancer-dataset
- Dataset Size: 125 KB

```
In [14]: len(df_cancer.index)

Out[14]: 569
```

```
In [6]: len(df_cancer.columns)

Out[6]: 32
```

```
In [7]: df_cancer.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 569 entries, 0 to 568
Data columns (total 32 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   id                      569 non-null    int64
 1   diagnosis               569 non-null    object
 2   radius_mean             569 non-null    float64
 3   texture_mean            569 non-null    float64
 4   perimeter_mean          569 non-null    float64
 5   area_mean               569 non-null    float64
 6   smoothness_mean         569 non-null    float64
 7   compactness_mean        569 non-null    float64
 8   concavity_mean          569 non-null    float64
 9   concave points_mean     569 non-null    float64
 10  symmetry_mean           569 non-null    float64
 11  fractal_dimension_mean  569 non-null    float64
 12  radius_se               569 non-null    float64
 13  texture_se              569 non-null    float64
 14  perimeter_se            569 non-null    float64
 15  area_se                 569 non-null    float64
```

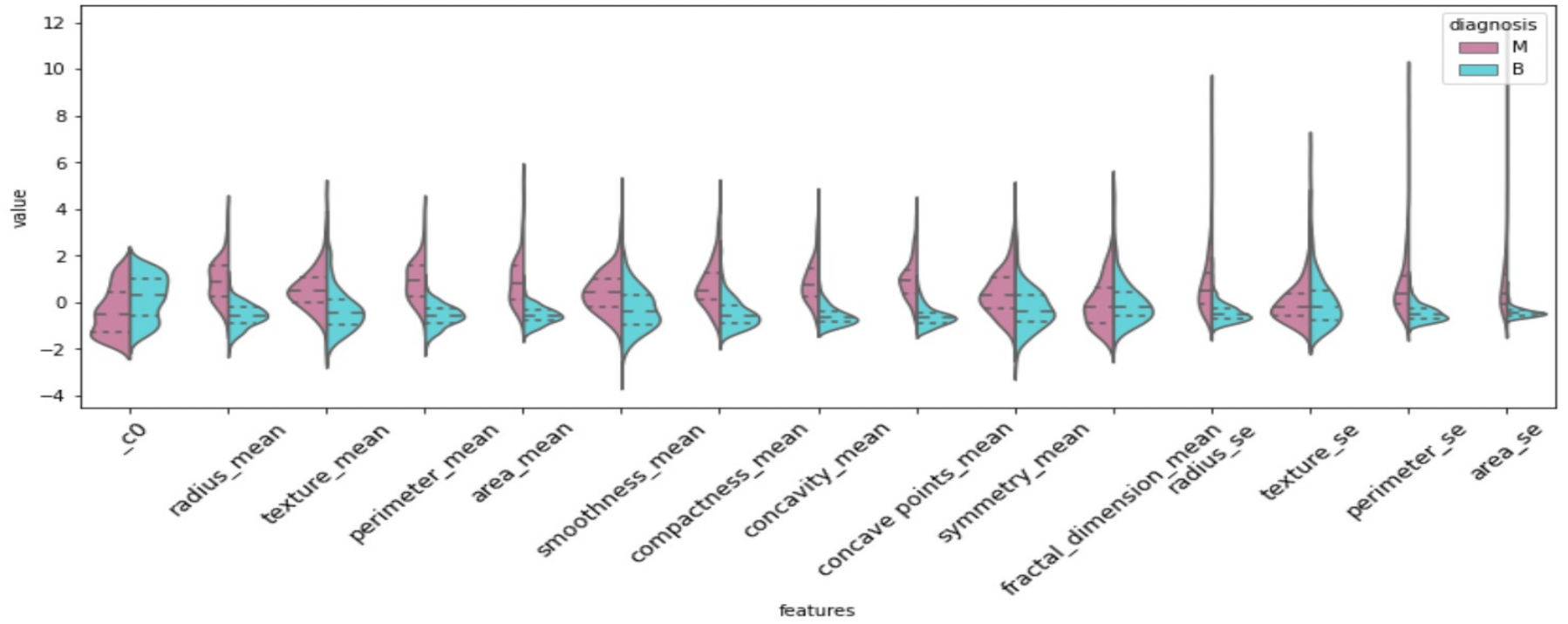
```
In [9]: df_cancer.columns

Out[9]: Index(['id', 'diagnosis', 'radius_mean', 'texture_mean', 'perimeter_mean',
               'area_mean', 'smoothness_mean', 'compactness_mean', 'concavity_mean',
               'concave points_mean', 'symmetry_mean', 'fractal_dimension_mean',
               'radius_se', 'texture_se', 'perimeter_se', 'area_se', 'smoothness_se',
               'compactness_se', 'concavity_se', 'concave points_se', 'symmetry_se',
               'fractal_dimension_se', 'radius_worst', 'texture_worst',
               'perimeter_worst', 'area_worst', 'smoothness_worst',
               'compactness_worst', 'concavity_worst', 'concave points_worst',
               'symmetry_worst', 'fractal_dimension_worst'],
              dtype='object')
```

Exploratory Data Analysis

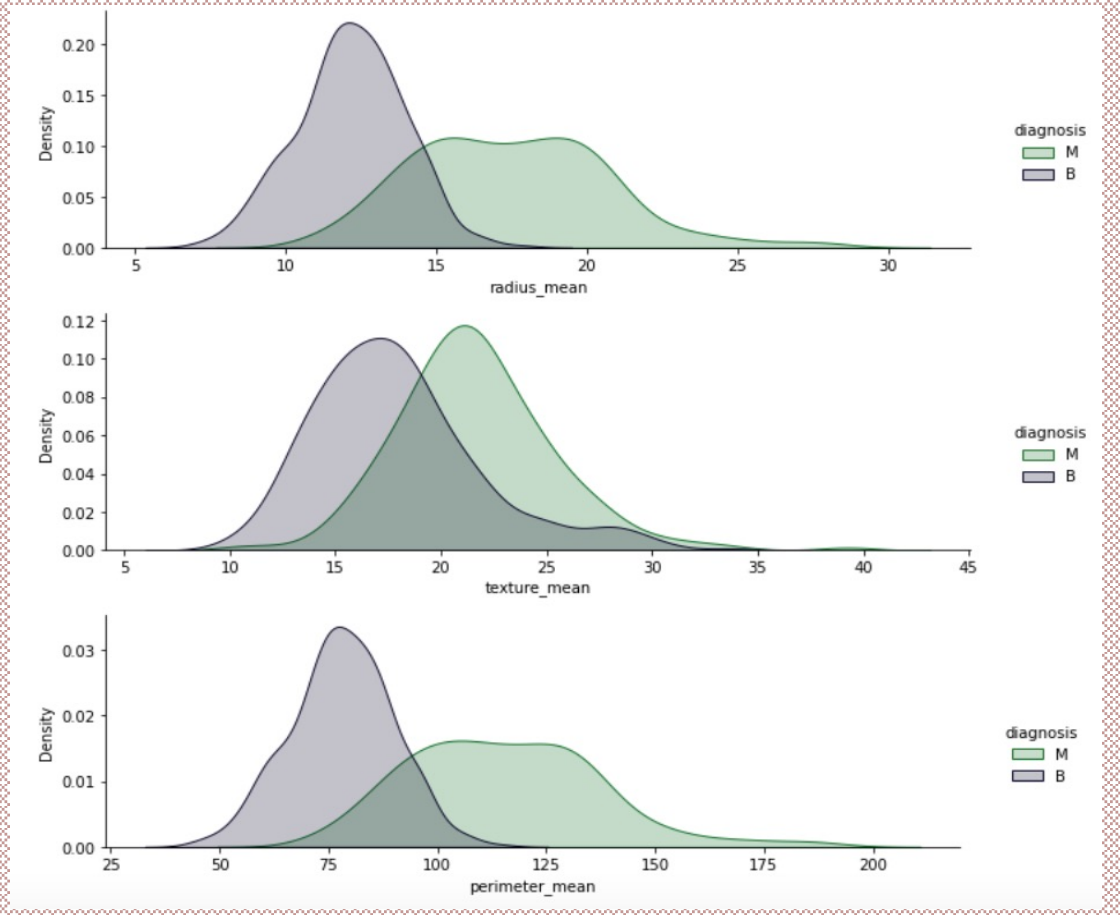
1. **VIOLIN PLOT:** This is used to visualize the distribution of numerical data of different variables.

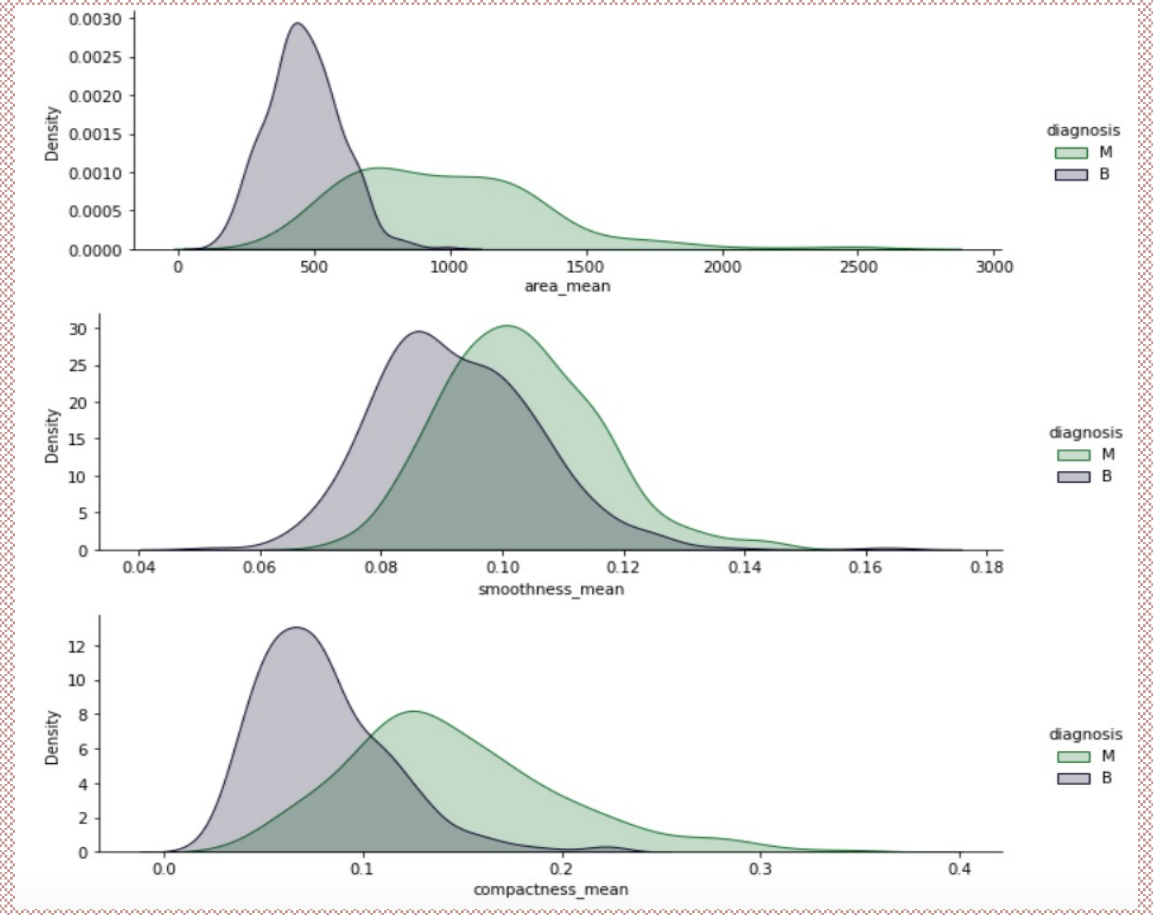
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14]),
 <a list of 15 Text major ticklabel objects>)
```



2. KERNEL DENSITY ESTIMATE (KED) PLOTTING:

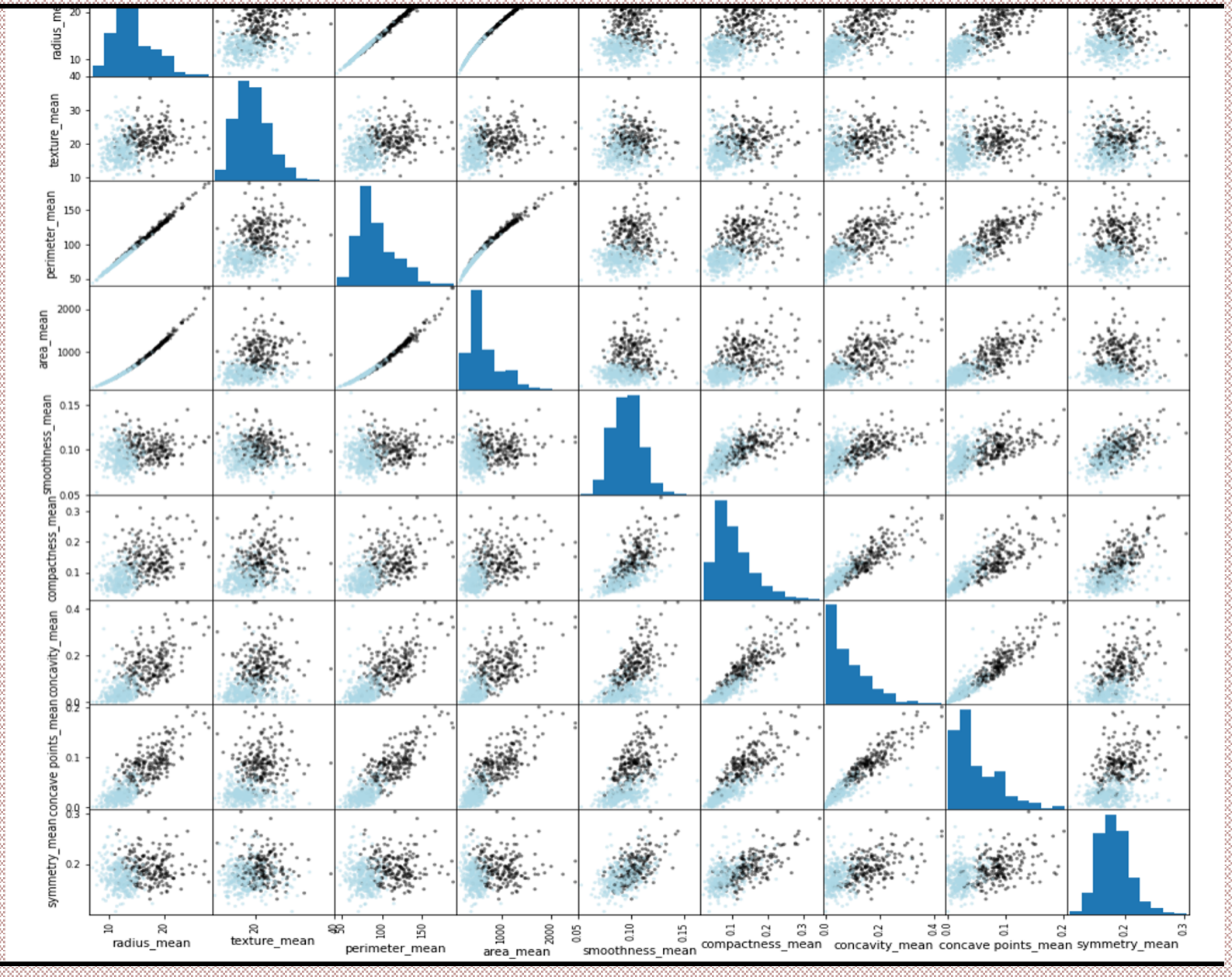
Used to understand the probability density of continuous variables.



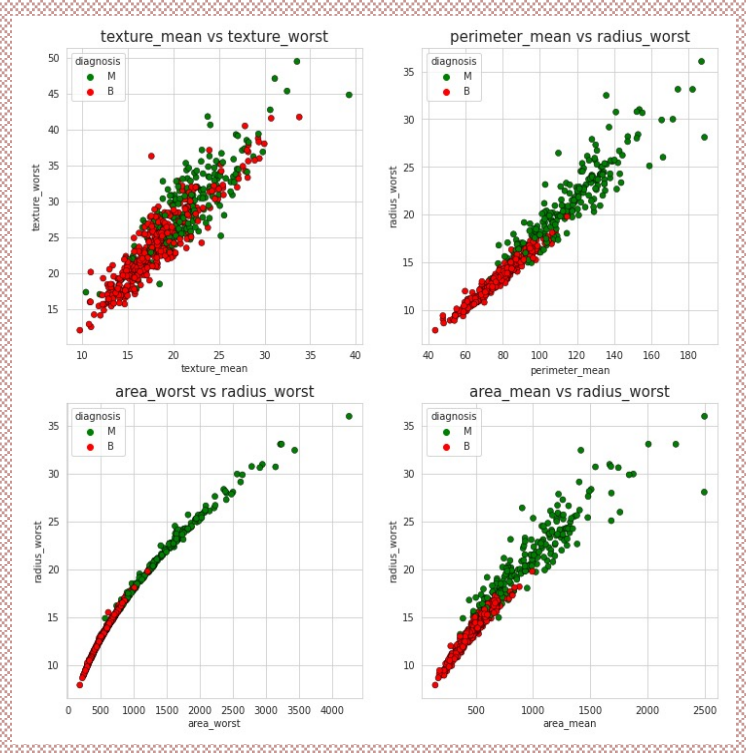


3. HEATMAP for CORRELATION

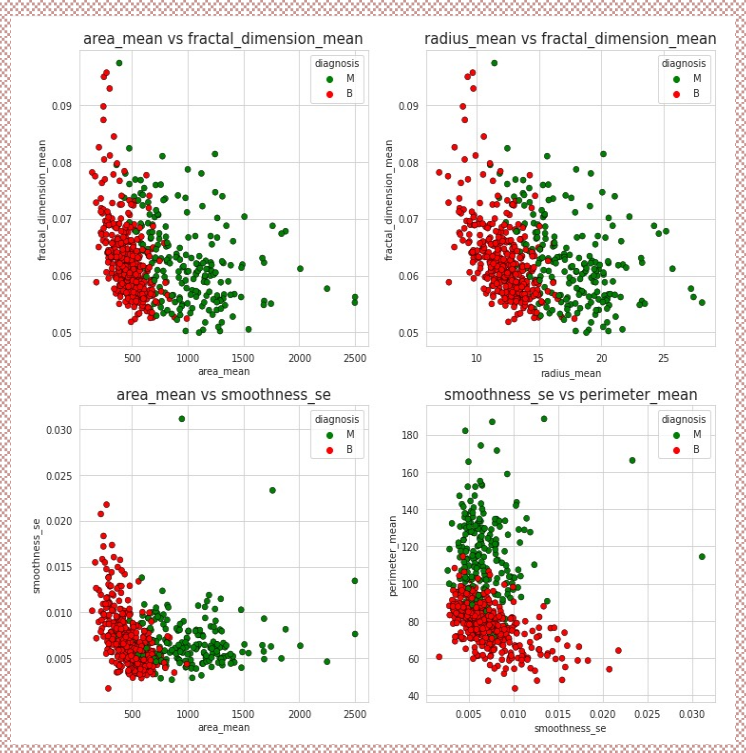
4. SCATTER MATRIX



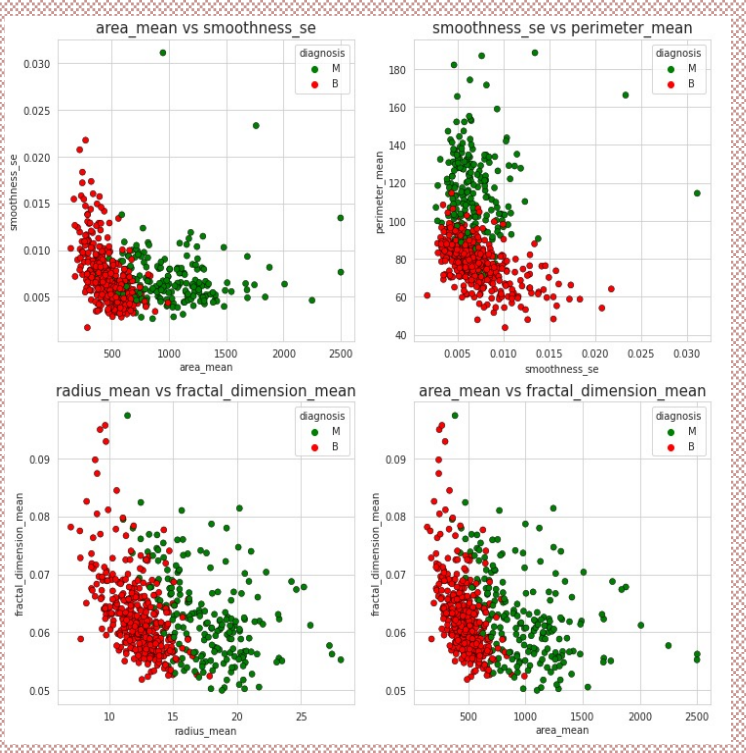
POSITIVELY CORRELATED:



NEGATIVELY CORRELATED:

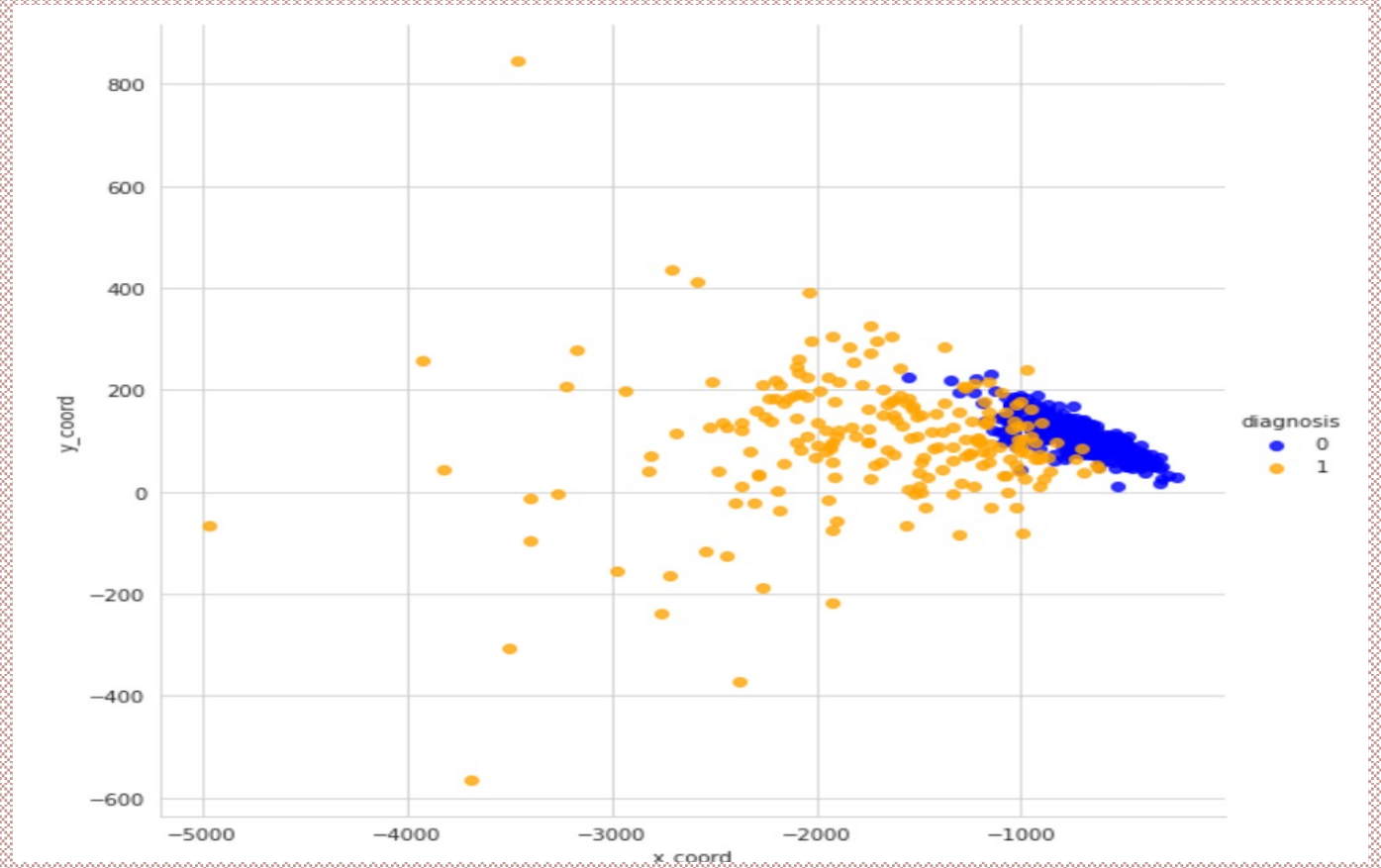


UN-CORRELATED:



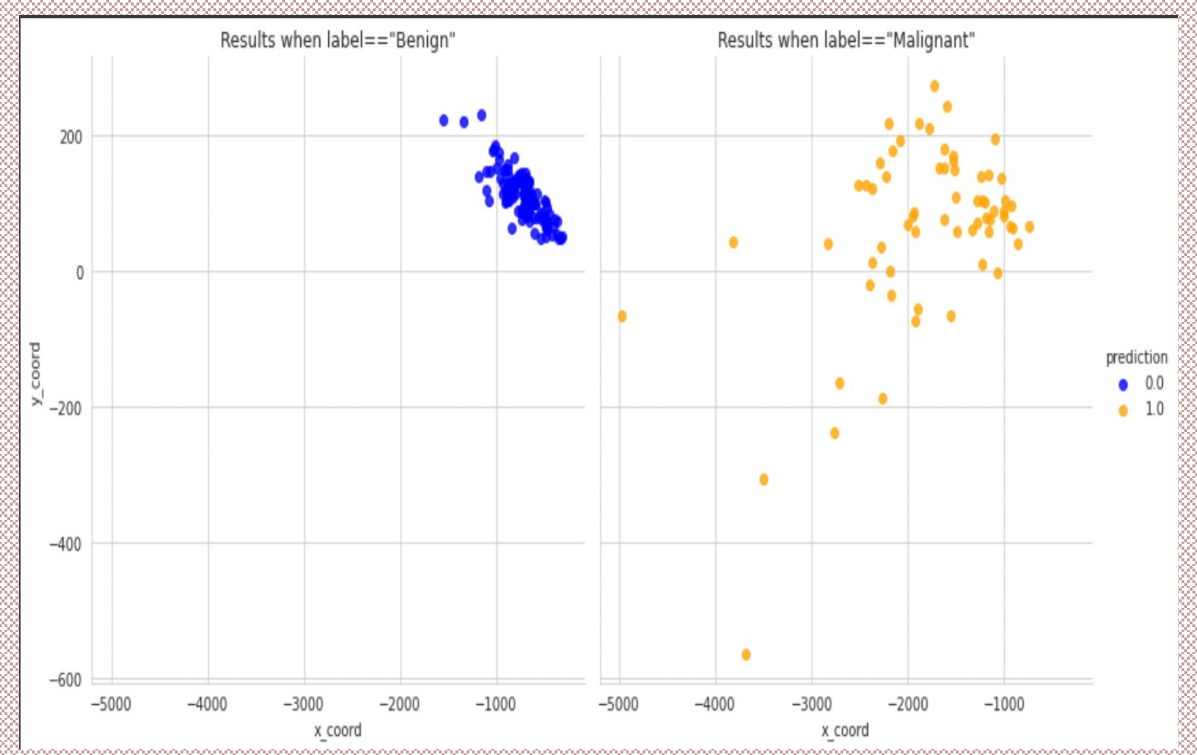
Principal Component Analysis(PCA):

https://towardsdatascience.com/dive-into-pca-principal-component-analysis-with-python-43ded13ead21



LOGISTIC REGRESSION

Reference link: https://towardsdatascience.com/logistic-regression-for-malignancy-prediction-in-cancer-27b1a1960184



Thank You!