Docare

Project 2

Our Team

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Product Manager and Business Analyst

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Data Scientist

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Data Modelling Specialist

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Data Engineer

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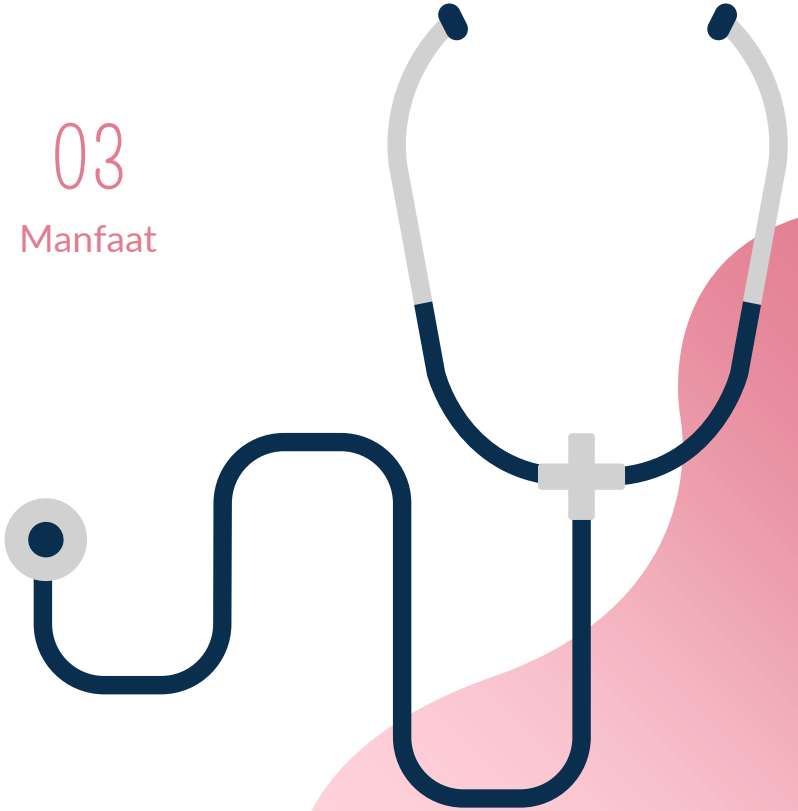


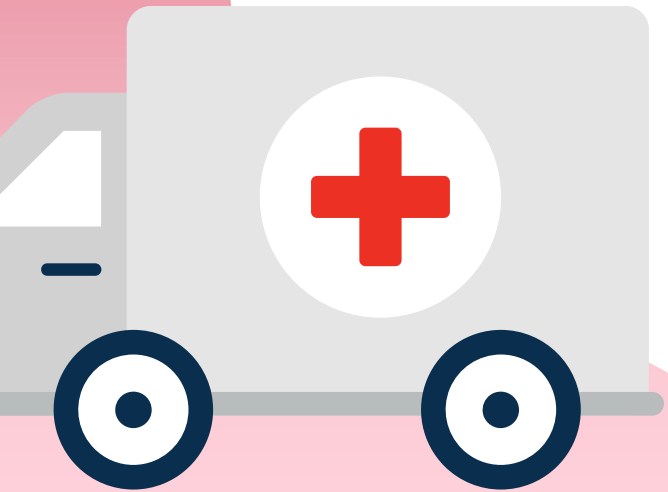
01

Business Understanding

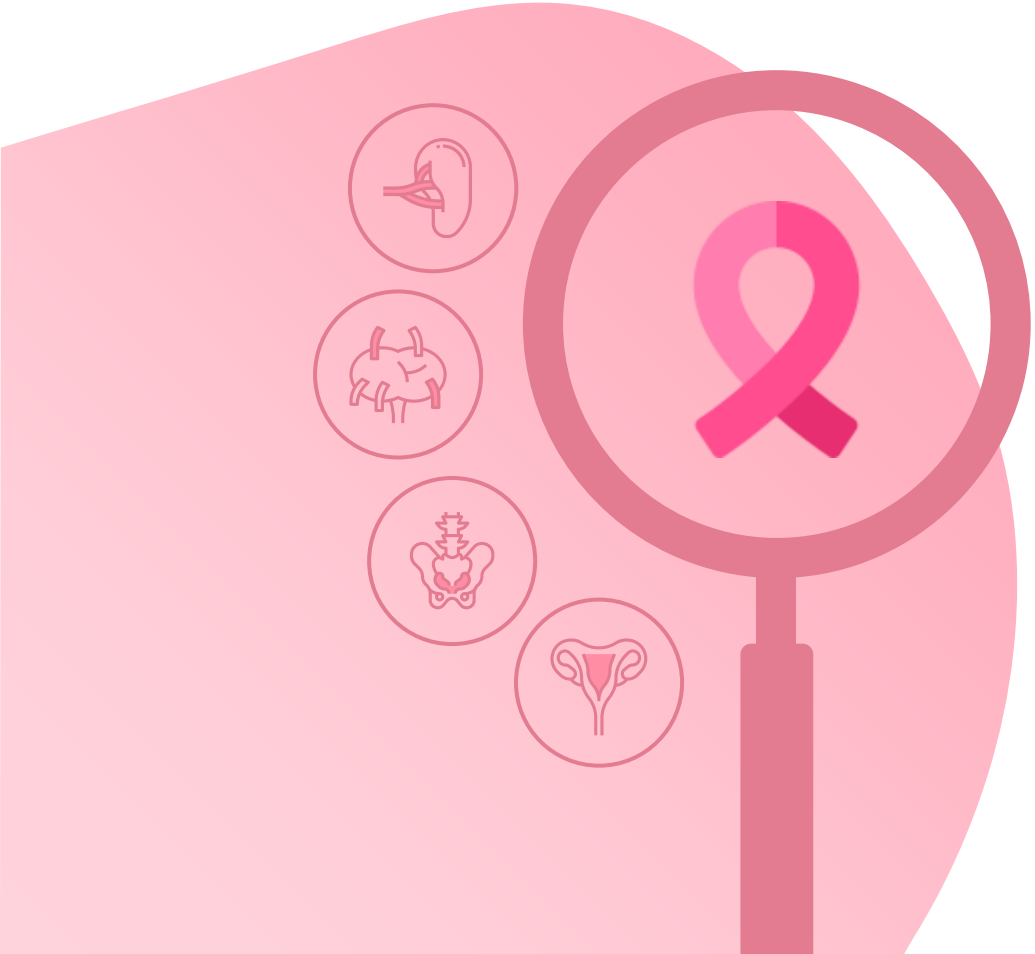
Docare merupakan sebuah perusahaan yang bergerak dalam bidang kesehatan, dimana saat ini bidang kesehatan merupakan garda terdepan dalam menanggulangi penyakit. Berfokus pada menganalisis data penyakit, Docare berinovasi dan meningkatkan pelayanan guna memenuhi kebutuhan di bidang kesehatan ini.

Tim Data Science kami akan membantu Anda untuk mengklasifikasikan penyakit dalam mengetahui tingkatan penyakit yang diderita seseorang.

02 Tujuan



Mengetahui tingkatan penyakit yang diderita seorang pasien kanker payudara dengan menggunakan klasifikasi. Hasil klasifikasi ini kemudian akan dianalisa tingkatan kanker tersebut. Kemudian akan dibentuk pengklasifikasian apakah kanker tersebut termasuk kanker payudara jinak atau ganas.



03 Manfaat

Mengetahui penyakit kanker payudara yang diderita seseorang berdasarkan klasifikasi kanker tersebut malignant (ganas) atau benign (jinak).

04

Data Understanding

Menggunakan Breast Cancer Wisconsin (Diagnostic) Data Set untuk dilakukan klasifikasi kanker.

```
RangeIndex: 569 entries, 0 to 568
Data columns (total 33 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
 16  smoothness_se            569 non-null    float64
 17  compactness_se           569 non-null    float64
 18  concavity_se             569 non-null    float64
 19  concave points_se        569 non-null    float64
 20  symmetry_se              569 non-null    float64
 21  fractal_dimension_se     569 non-null    float64
 22  radius_worst             569 non-null    float64
 23  texture_worst            569 non-null    float64
 24  perimeter_worst          569 non-null    float64
 25  area_worst               569 non-null    float64
 26  smoothness_worst         569 non-null    float64
 27  compactness_worst        569 non-null    float64
 28  concavity_worst          569 non-null    float64
 29  concave points_worst     569 non-null    float64
 30  symmetry_worst           569 non-null    float64
 31  fractal_dimension_worst  569 non-null    float64
 32  Unnamed: 32              0 non-null      float64
dtypes: float64(31), int64(1), object(1)
```

05 Data Preparation

Data yang kami gunakan mencakup semua kolom, kecuali untuk kolom id, diagnosis dan kolom ke-33 tidak kami masukan karena tidak memiliki nama dan datanya juga tidak tersedia.

```
RangeIndex: 569 entries, 0 to 568
Data columns (total 30 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   radius_mean             569 non-null    float64
 1   texture_mean            569 non-null    float64
 2   perimeter_mean          569 non-null    float64
 3   area_mean               569 non-null    float64
 4   smoothness_mean         569 non-null    float64
 5   compactness_mean        569 non-null    float64
 6   concavity_mean          569 non-null    float64
 7   concave points_mean     569 non-null    float64
 8   symmetry_mean           569 non-null    float64
 9   fractal_dimension_mean  569 non-null    float64
 10  radius_se               569 non-null    float64
 11  texture_se              569 non-null    float64
 12  perimeter_se            569 non-null    float64
 13  area_se                 569 non-null    float64
 14  smoothness_se           569 non-null    float64
 15  compactness_se          569 non-null    float64
 16  concavity_se            569 non-null    float64
 17  concave points_se       569 non-null    float64
 18  symmetry_se             569 non-null    float64
 19  fractal_dimension_se    569 non-null    float64
 20  radius_worst            569 non-null    float64
 21  texture_worst           569 non-null    float64
 22  perimeter_worst         569 non-null    float64
 23  area_worst              569 non-null    float64
 24  smoothness_worst        569 non-null    float64
 25  compactness_worst       569 non-null    float64
 26  concavity_worst         569 non-null    float64
 27  concave points_worst    569 non-null    float64
 28  symmetry_worst          569 non-null    float64
 29  fractal_dimension_worst 569 non-null    float64
dtypes: float64(30)
```

06 Modelling

Menggunakan Metode Supervised Learning

“Algoritma yang kami gunakan adalah KNN (K-Nearest Neighbour)”

“Karena data tersebut bersifat multi-variabel”

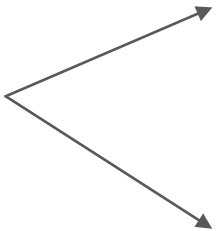
Input

Proses

Output

Dataset Breast Cancer Wisconsin berlabel Malignant dan Benign

Training Model



Clasification Malignant

Clasification Benign

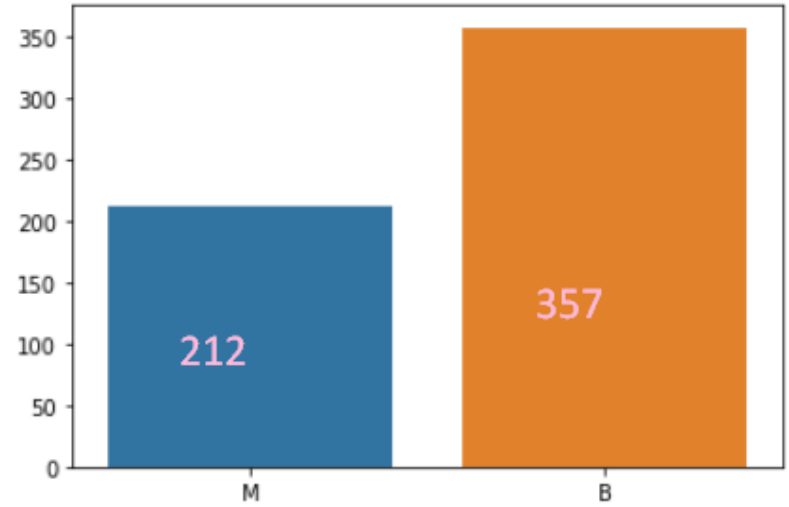
Tools

Pengerjaan Project menggunakan Bahasa Python 3 pada Google Colab, dan Github untuk media penyimpanan. Selain itu Menggunakan Library Python seperti Pandas, ScikitLearn, Seaborn dan Matplotlib

Karena metode yang digunakan adalah klasifikasi, maka persebaran data harus diperiksa terlebih dahulu untuk menghindari unbalanced Dataset. Program berikut digunakan untuk memvisualisasi data label.

```
jum = [df['diagnosis'].loc[df.diagnosis == 1].count(),
       df['diagnosis'].loc[df.diagnosis == 0].count()]
sns.barplot( x=['M','B'],
                y=jum)
```

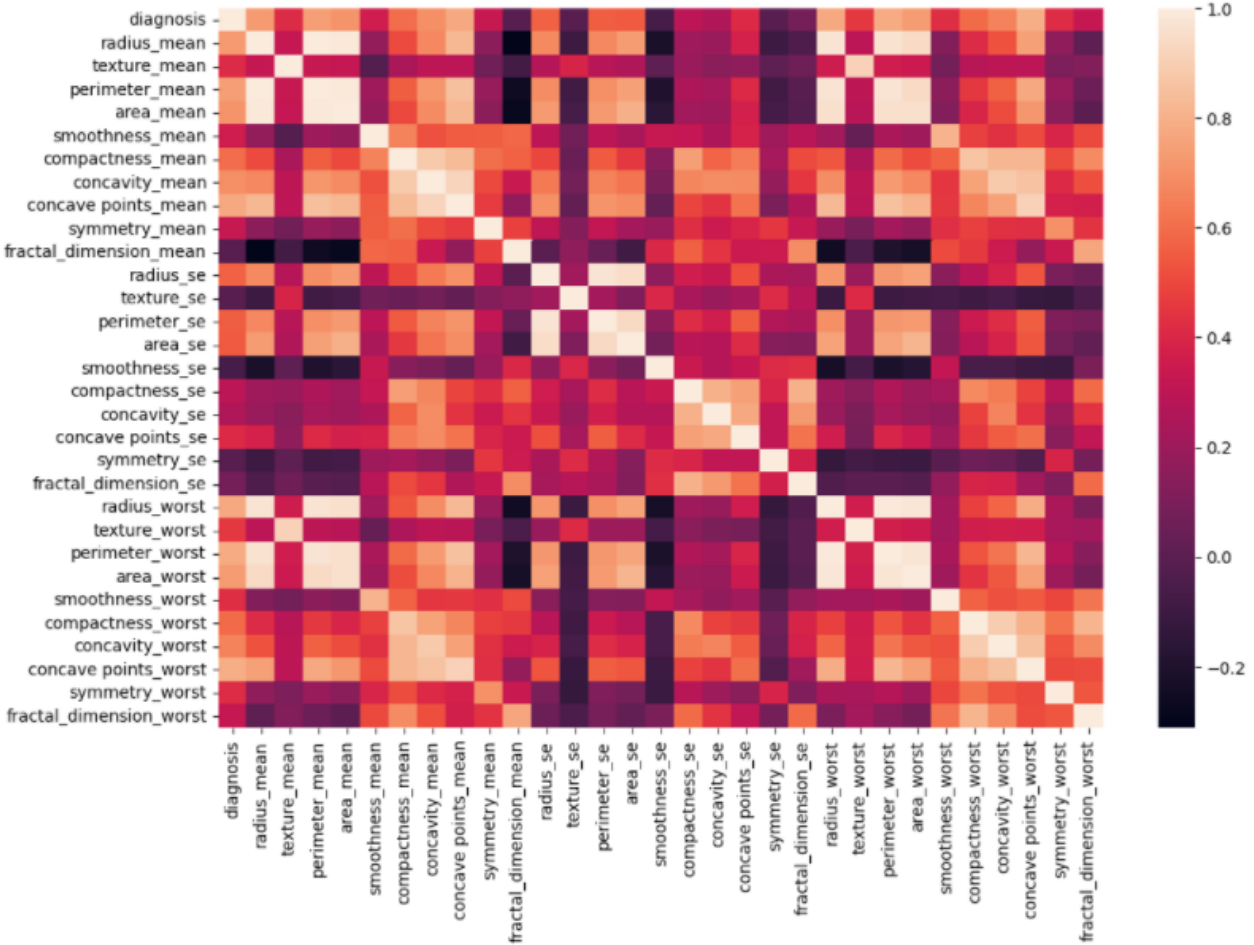
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3b9f29b190>
```



Grafik menunjukan korelasi setiap atribut terhadap atribut lainnya. Korelasi biasa digunakan untuk pemilihan feature.

```
plt.figure(figsize=(12,8), dpi = 100)
sns.heatmap(df_corr)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f3ba1036150>
```



```python
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler
from sklearn.neighbors import KNeighborsClassifier

X = df.drop(['diagnosis'], axis=1)
y = df['diagnosis']
X_train, X_test, y_train, y_test = train_test_split(X, y,test_size = 0.2, random_state=40)

scaler = MinMaxScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.fit_transform(X_test)

n_neighbors = 45
knn = KNeighborsClassifier(n_neighbors=n_neighbors)
knn.fit(X_train_scaled, y_train)
print('Accuracy of K-NN classifier on training set: {:.4f}'.format(knn.score(X_train_scaled, y_train)))
print('Accuracy of K-NN classifier on test set: {:.4f}'.format(knn.score(X_test_scaled, y_test)))
```

```
Accuracy of K-NN classifier on training set: 0.9473
Accuracy of K-NN classifier on test set: 0.9912
```

Proses Modeling diawali dengan melakukan import library, kemudian memisahkan feature dan target. Setelah dipisahkan data dibagi menjadi dua bagian yaitu data train, dan data test. Setiap feature dikonversi untuk penyetaraan bobot menggunakan minmaxscaler. Setelah itu Data Train dilatih dan dibandingkan dengan data test.

07 Evaluation

01

Akurasi cukup bagus: 0.993/1

02

Akurasi antara ***data training*** dengan ***data testing*** tidak berbeda jauh (tidak overfit maupun underfit).

03

Maka, model yang dibuat sudah cukup baik memprediksikan apakah tumor kanker tsb. ***malignant*** atau ***benign*** dari 30 variabel.

```
from sklearn.metrics import f1_score
```

```
y_pred=knn.predict(X_test_scaled)
from sklearn.metrics import classification_report,confusion_matrix,accuracy_score,mean_squared_error,r2_score
print(classification_report(y_test,y_pred))
print(confusion_matrix(y_test,y_pred))
print("Training Score: ",knn.score(X_train_scaled,y_train)*100)
print("Test Score: ", knn.score(X_test_scaled,y_test)*100)
```

```
              precision    recall  f1-score   support

         0.0       0.99      1.00      0.99        75
         1.0       1.00      0.97      0.99        39

    accuracy                           0.99       114
   macro avg       0.99      0.99      0.99       114
weighted avg       0.99      0.99      0.99       114

[[75  0]
 [ 1 38]]
Training Score:  94.72527472527472
Test Score:  99.12280701754386
```

Model KNN yang dibuat berhasil memprediksi dengan benar 38 kasus kanker payudara dari total 39 kasus yang ada

Perbandingan dengan Decision Tree

```
from sklearn.tree import DecisionTreeClassifier
dtree = DecisionTreeClassifier(max_depth=8)

dtree.fit(X_train_scaled,y_train)
y_pred=dtree.predict(X_test_scaled)
from sklearn.metrics import classification_report,confusion_matrix,accuracy_score,mean_squared_error
print(classification_report(y_test,y_pred))
print(confusion_matrix(y_test,y_pred))
print("Training Score: ",dtree.score(X_train_scaled,y_train)*100)
print("Test Score :",accuracy_score(y_test,y_pred)*100)
```

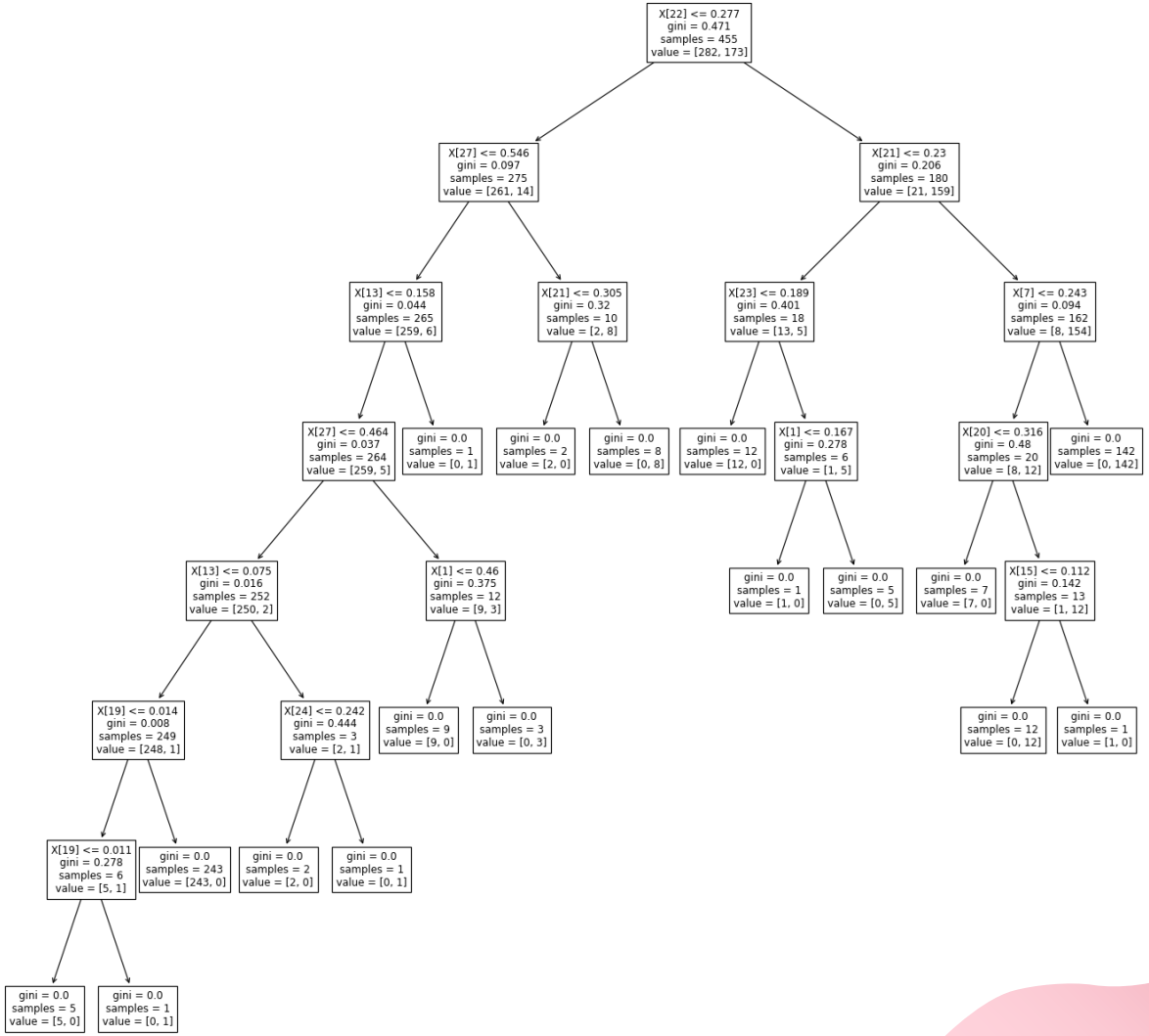
```
              precision    recall  f1-score   support

         0.0       0.96      0.91      0.93        75
         1.0       0.84      0.92      0.88        39

    accuracy                           0.91       114
   macro avg       0.90      0.91      0.90       114
weighted avg       0.92      0.91      0.91       114

[[68  7]
 [ 3 36]]
Training Score:  100.0
Test Score : 91.22807017543859
```

Visualisasi



References

- https://www.kaggle.com/uciml/breast-cancer-wisconsin-data/code
- https://colab.research.google.com/drive/1hhRm4C1ZGYEbbBoTWpz1SE9UoGjNmzVJ?usp=sharing

Thanks

Please give us critics and suggestions ^^