In [1]:
```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np
```

In [2]:
```
# load the dataset
df = pd.read_csv("breast-cancer.csv")
```

In [3]:
```
df
```

Out[3]:

	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	concave points_mean	...	radius_worst	texture_worst	perimeter_worst	area_worst	smoothness_
0	842302	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.30010	0.14710	...	25.380	17.33	184.60	2019.0	0
1	842517	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.08690	0.07017	...	24.990	23.41	158.80	1956.0	0
2	84300903	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.19740	0.12790	...	23.570	25.53	152.50	1709.0	0
3	84348301	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.24140	0.10520	...	14.910	26.50	98.87	567.7	0
4	84358402	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.19800	0.10430	...	22.540	16.67	152.20	1575.0	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
564	926424	M	21.56	22.39	142.00	1479.0	0.11100	0.11590	0.24390	0.13890	...	25.450	26.40	166.10	2027.0	0
565	926682	M	20.13	28.25	131.20	1261.0	0.09780	0.10340	0.14400	0.09791	...	23.690	38.25	155.00	1731.0	0
566	926954	M	16.60	28.08	108.30	858.1	0.08455	0.10023	0.09251	0.05302	...	18.980	34.12	126.70	1124.0	0
567	927241	M	20.60	29.33	140.10	1265.0	0.11780	0.27700	0.35140	0.15200	...	25.740	39.42	184.60	1821.0	0
568	92751	B	7.76	24.54	47.92	181.0	0.05263	0.04362	0.00000	0.00000	...	9.456	30.37	59.16	268.6	0

569 rows × 32 columns

In [4]:
```
# drop the 'id' column
df = df.drop('id', axis=1)

# Compute the correlation matrix
corr = df.corr()

# Generate a mask for the upper triangle
mask = np.triu(np.ones_like(corr, dtype=bool))

# Set up the matplotlib figure
fig, ax = plt.subplots(figsize=(20, 20))

# Generate a custom diverging colormap
cmap = sns.diverging_palette(220, 20, as_cmap=True)

# Draw the heatmap with the mask and correct aspect ratio
sns.heatmap(corr, mask=mask, cmap=cmap, vmax=1, vmin=-1, center=0,
            square=True, linewidths=.5, cbar_kws={"shrink": .5})

plt.show()
```



```
C:\Users\Sucharshana\Anaconda3\lib\site-packages\ipykernel_launcher.py:2: FutureWarning: The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the value of numeric_only to silence this warning.
  corr = df.corr()
```

In [5]:
```
df.head()
```

Out[5]:

	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	concave points_mean	symmetry_mean	...	radius_worst	texture_worst	perimeter_worst	area_worst	smoothness_worst	smoothn
0	M	17.99	10.38	122.80	1001.0	0.11840	0.27760	0.3001	0.14710	0.2419	...	25.38	17.33	184.60	2019.0	0.1622	
1	M	20.57	17.77	132.90	1326.0	0.08474	0.07864	0.0869	0.07017	0.1812	...	24.99	23.41	158.80	1956.0	0.1238	
2	M	19.69	21.25	130.00	1203.0	0.10960	0.15990	0.1974	0.12790	0.2069	...	23.57	25.53	152.50	1709.0	0.1444	
3	M	11.42	20.38	77.58	386.1	0.14250	0.28390	0.2414	0.10520	0.2597	...	14.91	26.50	98.87	567.7	0.2098	
4	M	20.29	14.34	135.10	1297.0	0.10030	0.13280	0.1980	0.10430	0.1809	...	22.54	16.67	152.20	1575.0	0.1374	

5 rows × 31 columns

In [6]:
```
df.shape
```

Out[6]:
```
(569, 31)
```

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

Out[7]:
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 569 entries, 0 to 568
Data columns (total 31 columns):
 #   Column                   Non-Null Count  Dtype
---  ------                   --------------  -----
 0   diagnosis                569 non-null    object
 1   radius_mean              569 non-null    float64
 2   texture_mean             569 non-null    float64
 3   perimeter_mean           569 non-null    float64
 4   area_mean                569 non-null    float64
 5   smoothness_mean          569 non-null    float64
 6   compactness_mean         569 non-null    float64
 7   concavity_mean           569 non-null    float64
 8   concave points_mean      569 non-null    float64
 9   symmetry_mean            569 non-null    float64
 10  fractal_dimension_mean   569 non-null    float64
 11  radius_se                569 non-null    float64
 12  texture_se               569 non-null    float64
 13  perimeter_se             569 non-null    float64
 14  area_se                  569 non-null    float64
 15  smoothness_se            569 non-null    float64
 16  compactness_se           569 non-null    float64
 17  concavity_se             569 non-null    float64
 18  concave points_se        569 non-null    float64
 19  symmetry_se              569 non-null    float64
 20  fractal_dimension_se     569 non-null    float64
 21  radius_worst             569 non-null    float64
 22  texture_worst            569 non-null    float64
 23  perimeter_worst          569 non-null    float64
 24  area_worst               569 non-null    float64
 25  smoothness_worst         569 non-null    float64
 26  compactness_worst        569 non-null    float64
 27  concavity_worst          569 non-null    float64
 28  concave points_worst     569 non-null    float64
 29  symmetry_worst           569 non-null    float64
 30  fractal_dimension_worst  569 non-null    float64
dtypes: float64(30), object(1)
memory usage: 137.9 KB
```

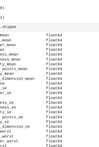
In [8]:
```
df.isnull().sum()
```

Out[8]:
```
diagnosis                  0
radius_mean                0
texture_mean               0
perimeter_mean             0
area_mean                  0
smoothness_mean            0
compactness_mean           0
concavity_mean             0
concave points_mean        0
symmetry_mean              0
fractal_dimension_mean     0
radius_se                  0
texture_se                 0
perimeter_se               0
area_se                    0
smoothness_se              0
compactness_se             0
concavity_se               0
concave points_se          0
symmetry_se                0
fractal_dimension_se       0
radius_worst               0
texture_worst              0
perimeter_worst            0
area_worst                 0
smoothness_worst           0
compactness_worst          0
concavity_worst            0
concave points_worst       0
symmetry_worst             0
fractal_dimension_worst    0
dtype: int64
```

In [9]:
```
df['diagnosis'].value_counts()
```

Out[9]:
```
B    357
M    212
Name: diagnosis, dtype: int64
```

In [10]:
```
plt.figure(figsize=(6,4))
sns.barplot(df['diagnosis'].value_counts().keys(),df['diagnosis'].value_counts(),color=['green','red'])
plt.show()
```



In [11]:
```
df.dtypes
```

Out[11]:
```
diagnosis                 object
radius_mean              float64
texture_mean             float64
perimeter_mean           float64
area_mean                float64
smoothness_mean          float64
compactness_mean         float64
concavity_mean           float64
concave points_mean      float64
symmetry_mean            float64
fractal_dimension_mean   float64
radius_se                float64
texture_se               float64
perimeter_se             float64
area_se                  float64
smoothness_se            float64
compactness_se           float64
concavity_se             float64
concave points_se        float64
symmetry_se              float64
fractal_dimension_se     float64
radius_worst             float64
texture_worst            float64
perimeter_worst          float64
area_worst               float64
smoothness_worst         float64
compactness_worst        float64
concavity_worst          float64
concave points_worst     float64
symmetry_worst           float64
fractal_dimension_worst  float64
dtype: object
```

In [12]:
```
plt.figure(figsize=(12,8))
sns.heatmap(df.corr(),annot=True,fmt='.0%')
```

```
C:\Users\Sucharshana\Anaconda3\lib\site-packages\ipykernel_launcher.py:2: FutureWarning: The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the value of numeric_only to silence this warning.
  sns.heatmap(df.corr(),annot=True,fmt='.0%')
```

Out[12]:
```
<Axes: >
```


In [13]:
```
from sklearn.preprocessing import LabelEncoder
Numericlabelencoder = LabelEncoder()
df['diagnosis']=Numericlabelencoder.fit_transform(df['diagnosis'])
```

In [14]:
```
x= df.drop('diagnosis', axis=1)

y = df['diagnosis']
print("okay")
```

Out[14]:
```
okay
```

In [15]:
```
from sklearn.model_selection import train_test_split

x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.33, random_state = 42)
```

In [16]:
```
x_train.shape, x_test.shape
```

Out[16]:
```
((381, 30), (188, 30))
```

In [17]:
```
print(x_train.shape)
print(y_train.shape)
print(x_test.shape)
print(y_test.shape)
print(df.shape)
```

Out[17]:
```
(381, 30)
(381,)
(188, 30)
(188,)
(569, 31)
```

In [18]:
```
x_train.dtypes
```

Out[18]:
```
radius_mean              float64
texture_mean             float64
perimeter_mean           float64
area_mean                float64
smoothness_mean          float64
compactness_mean         float64
concavity_mean           float64
concave points_mean      float64
symmetry_mean            float64
fractal_dimension_mean   float64
radius_se                float64
texture_se               float64
perimeter_se             float64
area_se                  float64
smoothness_se            float64
compactness_se           float64
concavity_se             float64
concave points_se        float64
symmetry_se              float64
fractal_dimension_se     float64
radius_worst             float64
texture_worst            float64
perimeter_worst          float64
area_worst               float64
smoothness_worst         float64
compactness_worst        float64
concavity_worst          float64
concave points_worst     float64
symmetry_worst           float64
fractal_dimension_worst  float64
dtype: object
```

In [19]:
```
#Import library from library
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.model_selection import train_test_split #Train Test Split

from sklearn.naive_bayes import GaussianNB  # Naive Bayes Classifier

from sklearn import preprocessing           # Label Encoder

from sklearn.neighbors import KNeighborsClassifier # KNN Classifiers
```

In [20]:
```
#Train Test split

x = df[['radius_mean', 'texture_mean', 'perimeter_mean', 'area_mean', 'smoothness_mean', 'compactness_mean', 'concavity_mean','concave points_mean', 'symmetry_mean', 'fractal_dimension_mean']]

y = df['diagnosis']

x_train, x_test, y_train, y_test = train_test_split(x, test_size=0.30, random_state=0)

x_train.shape
```

Out[20]:
```
(398, 29)
```

In [21]:
```
from sklearn.linear_model import LinearRegression
model=LinearRegression()
```

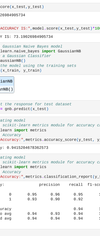
In [22]:
```
model.fit(x_train,y_train)
```

Out[22]:
```
LinearRegression()
```

In [23]:
```
predictions=model.predict(x_test)

plt.scatter(y_test,predictions)
plt.xlabel('y test(true values)')
plt.ylabel('predicted values')
```

Out[23]:
```
Text(0, 0.5, 'predicted values')
```



In [24]:
```
model.score(x_test,y_test)
```

Out[24]:
```
0.7819280964965734
```

In [25]:
```
print("ACCURACY IS",model.score(x_test,y_test)*100)
```

Out[25]:
```
ACCURACY IS 78.19280964965734
```

In [26]:
```
#Import Gaussian Naive Bayes model
from sklearn.naive_bayes import GaussianNB
#Create a Gaussian Classifier
gnb = GaussianNB()
#Train the model using the training sets
gnb.fit(x_train, y_train)
```

Out[26]:
```
GaussianNB
```

```
GaussianNB()
```

In [27]:
```
#Predict the response for test dataset
y_pred = gnb.predict(x_test)
```

In [28]:
```
# Evaluating model
#Import scikit-learn metrics module for accuracy calculation
from sklearn import metrics
# Model Accuracy
print("Accuracy:",metrics.accuracy_score(y_test, y_pred))
```

```
Accuracy: 0.9415204678362573
```

In [29]:
```
# Evaluating model
#Import scikit-learn metrics module for accuracy calculation
from sklearn import metrics
# Model Accuracy
print("Accuracy:",metrics.classification_report(y_test, y_pred))
```

```
Accuracy:              precision    recall  f1-score   support

           0       0.95      0.96      0.95       108
           1       0.93      0.90      0.92        63

    accuracy                           0.94       171
   macro avg       0.94      0.93      0.94       171
weighted avg       0.94      0.94      0.94       171
```

In [ ]:
```

```

In [ ]:
```

```

In [ ]:
```

```

In [ ]:
```

```

In [ ]:
```

```