# RINEX

## Major Project

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3rd Year

Code :

```
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.metrics import  accuracy_score
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.neighbors import KNeighborsClassifier
from sklearn.tree import DecisionTreeClassifier
```

```
df=pd.read_csv('https://raw.githubusercontent.com/knmonishgh/dataset/main/heart_failure_clinical_records_dataset.csv')
df
```

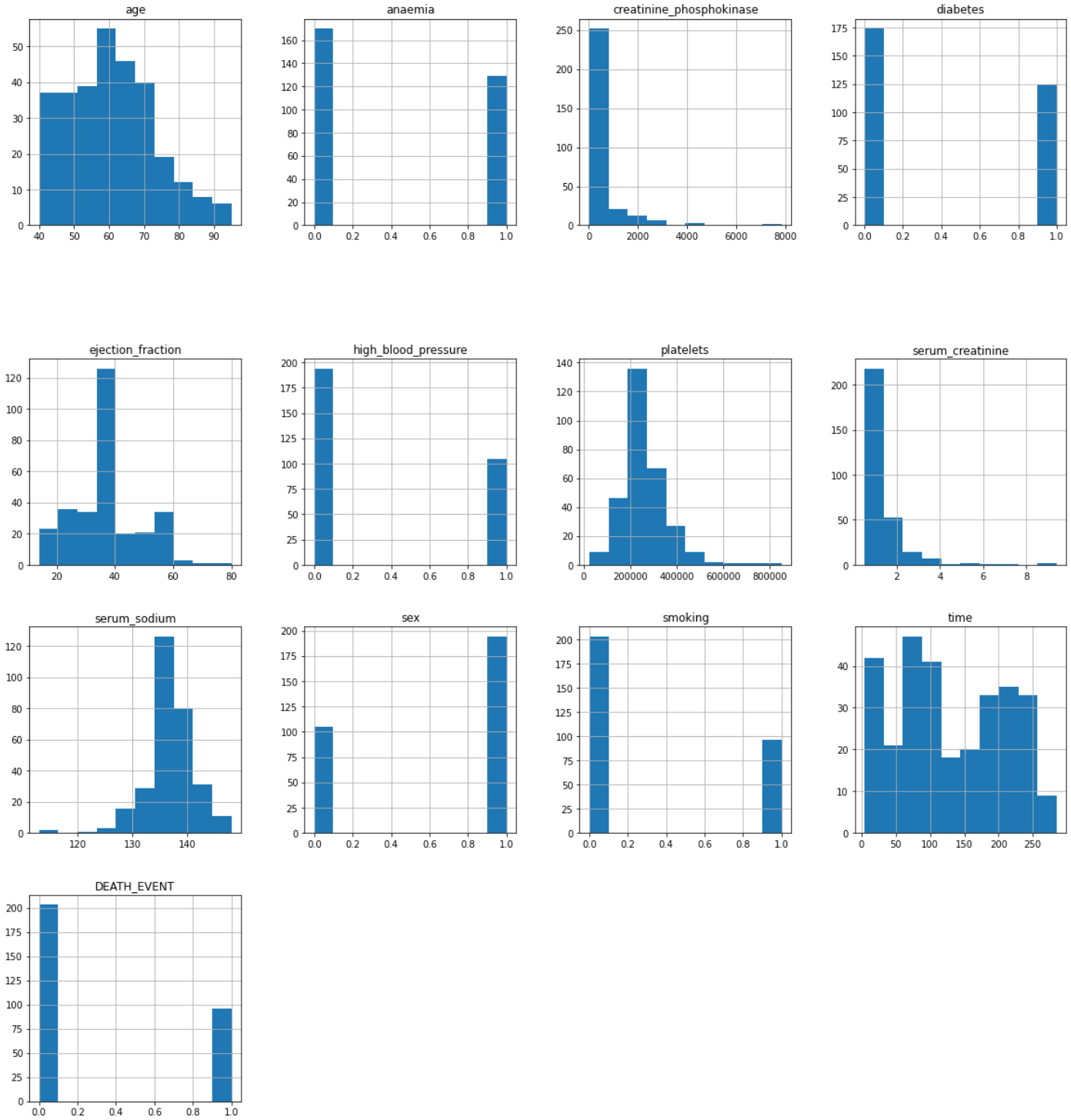
| | age | anaemia | creatinine_phosphokinase | diabetes | ejection_fraction | high_blood_pressure | platelets | serum_creatinine | serum_sodium | sex | smoking | time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 75.0 | 0 | 582 | 0 | 20 | 1 | 265000.00 | 1.9 | 130 | 1 | 0 | 4 |
| 1 | 55.0 | 0 | 7861 | 0 | 38 | 0 | 263358.03 | 1.1 | 136 | 1 | 0 | 6 |
| 2 | 65.0 | 0 | 146 | 0 | 20 | 0 | 162000.00 | 1.3 | 129 | 1 | 1 | 7 |
| 3 | 50.0 | 1 | 111 | 0 | 20 | 0 | 210000.00 | 1.9 | 137 | 1 | 0 | 7 |
| 4 | 65.0 | 1 | 160 | 1 | 20 | 0 | 327000.00 | 2.7 | 116 | 0 | 0 | 8 |
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 294 | 62.0 | 0 | 61 | 1 | 38 | 1 | 155000.00 | 1.1 | 143 | 1 | 1 | 270 |
| 295 | 55.0 | 0 | 1820 | 0 | 38 | 0 | 270000.00 | 1.2 | 139 | 0 | 0 | 271 |
| 296 | 45.0 | 0 | 2060 | 1 | 60 | 0 | 742000.00 | 0.8 | 138 | 0 | 0 | 278 |
| 297 | 45.0 | 0 | 2413 | 0 | 38 | 0 | 140000.00 | 1.4 | 140 | 1 | 1 | 280 |
| 298 | 50.0 | 0 | 196 | 0 | 45 | 0 | 395000.00 | 1.6 | 136 | 1 | 1 | 285 |

299 rows × 13 columns

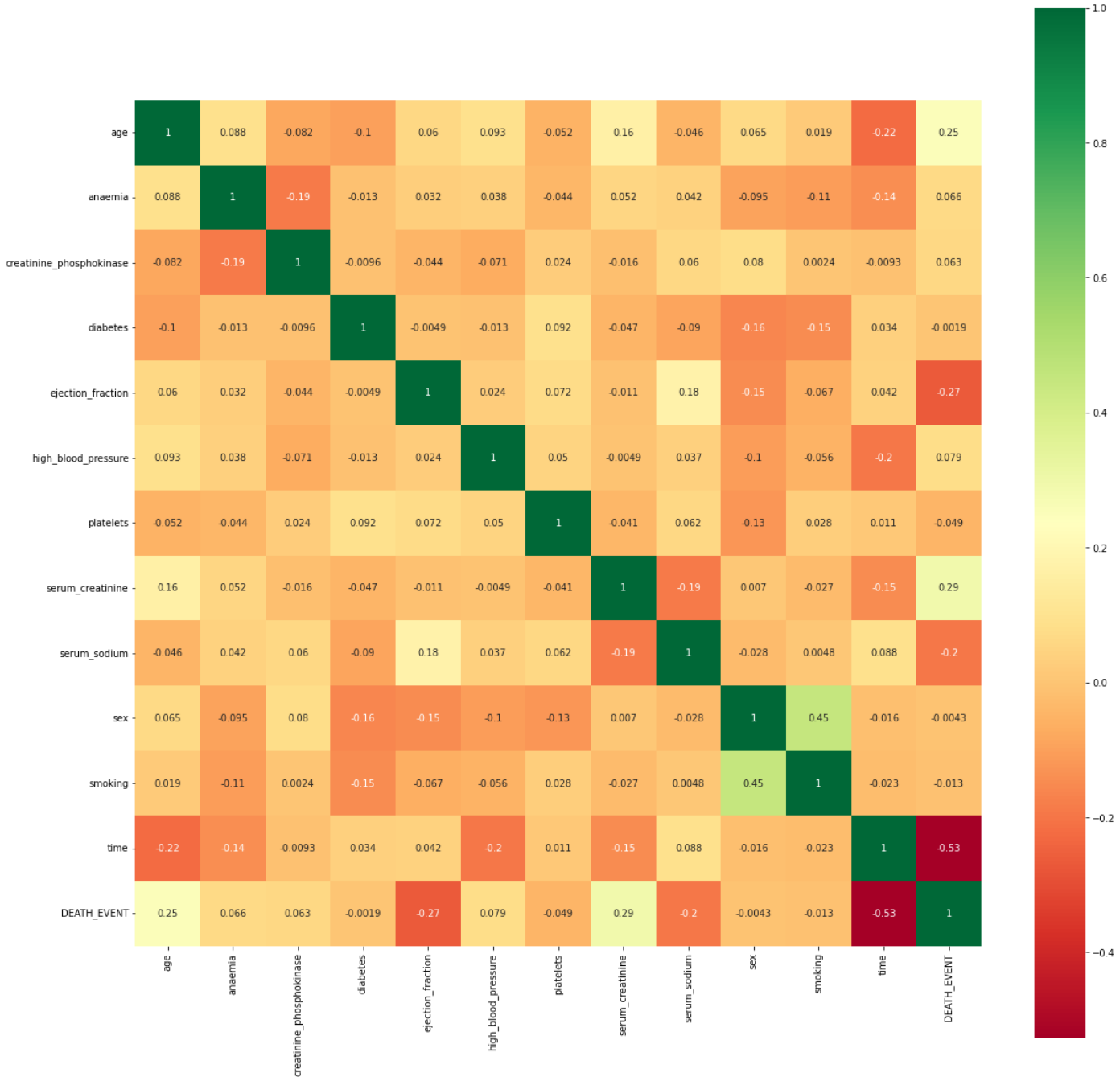
```
df.describe()
```

| | age | anaemia | creatinine_phosphokinase | diabetes | ejection_fraction | high_blood_pressure | platelets | serum_creatinine | serum_sodium | |
|---|---|---|---|---|---|---|---|---|---|---|
| count | 299.000000 | 299.000000 | 299.000000 | 299.000000 | 299.000000 | 299.000000 | 299.000000 | 299.00000 | 299.000000 | 299.0 |
| mean | 60.833893 | 0.431438 | 581.839465 | 0.418060 | 38.083612 | 0.351171 | 263358.029264 | 1.39388 | 136.625418 | 0.6 |
| std | 11.894809 | 0.496107 | 970.287881 | 0.494067 | 11.834841 | 0.478136 | 97804.236869 | 1.03451 | 4.412477 | 0.4 |
| min | 40.000000 | 0.000000 | 23.000000 | 0.000000 | 14.000000 | 0.000000 | 25100.000000 | 0.50000 | 113.000000 | 0.0 |
| 25% | 51.000000 | 0.000000 | 116.500000 | 0.000000 | 30.000000 | 0.000000 | 212500.000000 | 0.90000 | 134.000000 | 0.0 |
| 50% | 60.000000 | 0.000000 | 250.000000 | 0.000000 | 38.000000 | 0.000000 | 262000.000000 | 1.10000 | 137.000000 | 1.0 |
| 75% | 70.000000 | 1.000000 | 582.000000 | 1.000000 | 45.000000 | 1.000000 | 303500.000000 | 1.40000 | 140.000000 | 1.0 |
| max | 95.000000 | 1.000000 | 7861.000000 | 1.000000 | 80.000000 | 1.000000 | 850000.000000 | 9.40000 | 148.000000 | 1.0 |

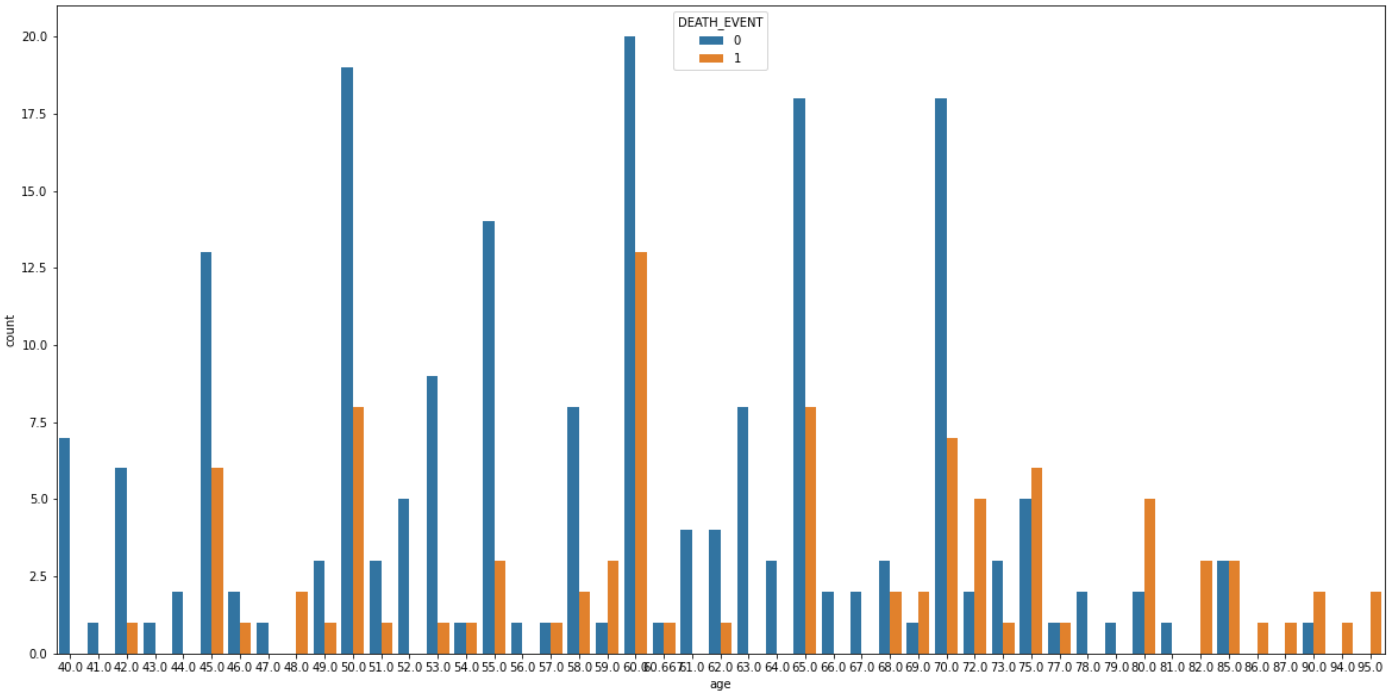
```
df.hist(figsize = (20,20))
plt.show()
```



```
plt.figure(figsize=(20,20))
p=sns.heatmap(df.corr(), annot=True,cmap='RdYlGn',square=True)
```



```
plt.figure(figsize=(20,10))
sns.countplot(x ="age", data=df, hue ="DEATH_EVENT");
```



```
X = np.array(df.drop(['DEATH_EVENT'], axis=1))
y = np.array(df['DEATH_EVENT'])
```

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=0)
print(X_train.shape)
print(X_test.shape)
```

```
(239, 12)
(60, 12)
```

```
#using Decision tree


DT_clf = DecisionTreeClassifier()
DT_clf.fit(X_train, y_train)
y_pred = DT_clf.predict(X_test)
y_pred
```

```
array([0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 0, 0, 0, 1, 1,
       0, 0, 1, 0, 1, 0, 0, 0, 0, 1, 1, 0, 0, 0, 0, 0, 0, 1, 0, 1, 0, 1,
       1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 1, 0, 1, 0, 0], dtype=int64)
```

```
DT_clf.predict([[68,1,220,0,35,1,289000,0.9,140,1,1,20]])
```

```
array([1], dtype=int64)
```

```
KNN_clf = KNeighborsClassifier()
KNN_clf.fit(X_train, y_train)
y_pred = KNN_clf.predict(X_test)

KNN_clf.predict([[60,0,2656,1,30,0,305000,2.3,137,1,0,30]])
```

```
array([0], dtype=int64)
```