```
In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

In [2]: data=pd.read_csv(r"C:\Users\user\Desktop\Vicky\8_BreastCancerPrediction.csv")

In [3]: data.shape
Out[3]: (569, 33)
```

In [4]: data.head

| Out[4]: | <bou< th=""><th>nd method NDFran</th><th>ne.he</th><th>ad of</th><th>id diagnosis</th><th>radius_mean</th><th>texture_m</th></bou<> | nd method NDFran  | ne.he   | ad of   | id diagnosis   | radius_mean  | texture_m  |
|---------|---|---|---|---|--|--|--|
|         | ean   | perimeter_mean  | are   | a_mean \  |  |  |  |
|         | 0   | 842302  | М   | 17.99   | 10.38  | 122.80   | 1001.0   |
|         | 1   | 842517  | М   | 20.57   | 17.77  | 132.90   | 1326.0   |
|         | 2   | 84300903  | М   | 19.69   | 21.25  | 130.00   | 1203.0   |
|         | 3   | 84348301  | М   | 11.42   | 20.38  | 77.58  | 386.1  |
|         | 4   | 84358402  | М   | 20.29   | 14.34  | 135.10   | 1297.0   |
|         |   | • • •   |   | • • •   | • • •  | • • •  |  |
|         | 564   | 926424  | М   | 21.56   | 22.39  | 142.00   | 1479.0   |
|         | 565   | 926682  | М   | 20.13   | 28.25  | 131.20   | 1261.0   |
|         | 566   | 926954  | M   | 16.60   | 28.08  | 108.30   | 858.1  |
|         | 567   | 927241  | M   | 20.60   | 29.33  | 140.10   | 1265.0   |
|         | 568   | 92751   | В   | 7.76  | 24.54  | 47.92  | 181.0  |
|         | 508   | J27 J1  | D   | 7.70  | 24.34  | 47.72  | 101.0  |
|         |   | smoothness_mear   | ו כס  | mpactness_mean  | concavity_mean   | concave noi  | nts mean   |
|         | \   | 511100 cm 1055_111cu  |   | inpaceriess_incari  | concavicy_mean   | concave por  | ires_illean  |
|         | o<br>O  | 0.11840   | <b>a</b>  | 0.27760   | 0.30010  |  | 0.14710  |
|         | 1   | 0.08474   |   | 0.07864   | 0.08690  |  | 0.07017  |
|         |   | 0.10966   |   |   | 0.19740  |  |  |
|         | 2   |   |   | 0.15990   |  |  | 0.12790  |
|         | 3   | 0.14256   |   | 0.28390   | 0.24140  |  | 0.10520  |
|         | 4   | 0.10036   | )   | 0.13280   | 0.19800  |  | 0.10430  |
|         | ··  | 0.11100   |   | 0 11500   | 0.24200  |  | 0 12000  |
|         | 564   | 0.11100   |   | 0.11590   | 0.24390  |  | 0.13890  |
|         | 565   | 0.09786   |   | 0.10340   | 0.14400  |  | 0.09791  |
|         | 566   | 0.08455   |   | 0.10230   | 0.09251  |  | 0.05302  |
|         | 567   | 0.11786   |   | 0.27700   | 0.35140  |  | 0.15200  |
|         | 568   | 0.05263   | 3   | 0.04362   | 0.00000  |  | 0.00000  |
|         |   | texture_wo  | orst  | perimeter_worst   | : area_worst   | smoothness_wo  | rst \  |
|         | 0   | 17  | 7.33  | 184.60  |  | 0 <mark>.</mark> 16  |  |
|         |   |   |   |   |  |  |  |
|         | 1   | 23  | 3.41  | 120.06  | 1956.0   | 0.12   | שסכ  |
|         | 1<br>2  |   | 3.41<br>5.53  | 158.80<br>152.50  |  | 0.12<br>0.14   |  |
|         | 2   | 25  | 5.53  | 152.50  | 1709.0   | 0.14   | 440  |
|         | 2   | 25  | 5.53<br>5.50  | 152.50<br>98.87   | 1709.0<br>567.7  | 0.14<br>0.20   | 440<br>980   |
|         | 2<br>3<br>4   | 25<br>26<br>16  | 5.53<br>5.50<br>5.67  | 152.50<br>98.87<br>152.20   | 1709.0<br>567.7<br>1575.0  | 0.14<br>0.20<br>0.13   | 440<br>980<br>740  |
|         | 2<br>3<br>4   | 25  | 5.53<br>5.50<br>5.67  | 152.50<br>98.87<br>152.20   | 1709.0<br>567.7<br>1575.0  | 0.14<br>0.20<br>0.13   | 440<br>980<br>740<br>  |
|         | 2<br>3<br>4<br><br>564  | 25<br>26<br>16<br>  | 5.53<br>5.50<br>5.67<br><br>5.40  | 152.50<br>98.87<br>152.20<br><br>166.10   | 1709.0<br>567.7<br>1575.0<br><br>2027.0  | 0.14<br>0.20<br>0.13<br>0.14   | 440<br>980<br>740<br><br>100   |
|         | 2<br>3<br>4<br><br>564<br>565   | 25<br>26<br>16<br>26  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0                              | 0.14<br>0.20<br>0.13<br>0.14<br>0.11   | 440<br>980<br>740<br><br>100<br>660  |
|         | 2<br>3<br>4<br><br>564<br>565<br>566  | 25<br>26<br>16<br>26<br>38  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0                    | 0.14<br>0.20<br>0.13<br>0.14<br>0.11   | 440<br>980<br>740<br><br>100<br>660<br>390   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567   | 25<br>26<br>16<br>26<br>38<br>32  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0          | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.11   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500  |
|         | 2<br>3<br>4<br><br>564<br>565<br>566  | 25<br>26<br>16<br>26<br>38<br>32  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0          | 0.14<br>0.20<br>0.13<br>0.14<br>0.11   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500  |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567   | 25<br>26<br>26<br>38<br>32<br>39  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568  | 25<br>26<br>26<br>38<br>32<br>39  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16  | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568  | 25<br>26<br>26<br>38<br>32<br>39  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>1.12<br>9.42<br>9.37  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16  | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568  | 25 26 36 36 36 36 36  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>1.12<br>9.42<br>9.37  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568  | 25 26 36 36 36 36 36  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42<br>9.37<br>rst   | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568  | 25 26 36 32 35 36 compactness_work  0.665 0.186   | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42<br>9.37<br>rst   | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568  | 25 26 38 32 39 39 36 36 36 36 36 36 36  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>1.12<br>9.42<br>9.37<br>rst   | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568<br>\<br>0<br>1<br>2<br>3   | 25 26 38 32 39 36 | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>1.12<br>9.42<br>9.37<br>rst   | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504<br>0.6869   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430<br>0.2575   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613<br>0.6638   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568<br>\<br>0<br>1<br>2<br>3<br>4  | 25 26 38 32 39 36 | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42<br>9.37<br>rst<br>560<br>660<br>450<br>530<br>600  | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504<br>0.6869<br>0.4000   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430<br>0.2575<br>0.1625   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613<br>0.6638<br>0.2364   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568<br>\<br>0<br>1<br>2<br>3<br>4  | 25 26 36 36 37 36 | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42<br>9.37<br>25t<br>560<br>560<br>450<br>530<br>500<br>600                                       | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504<br>0.6869<br>0.4000   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430<br>0.2575<br>0.1625   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613<br>0.6638<br>0.2364<br>   |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568<br>\<br>0<br>1<br>2<br>3<br>4<br><br>564   | 25 26 38 32 39 39 39 36 | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>1.12<br>9.42<br>9.37<br>rst<br>560<br>660<br>150<br>530<br>530<br>530<br>530                                | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504<br>0.6869<br>0.4000<br>   | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430<br>0.2575<br>0.1625<br>   | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613<br>0.6638<br>0.2364<br><br>0.2060                               |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568<br>\<br>0<br>1<br>2<br>3<br>4<br><br>564<br>565                                  | 25 26 38 36 39 39 36 36 36 36 36 36 36 36 36 36 36 36 37 38 | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>1.12<br>9.42<br>9.37<br>Pst<br>560<br>150<br>150<br>150<br>150<br>150<br>150<br>150<br>150<br>150<br>15     | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504<br>0.6869<br>0.4000<br><br>0.4107<br>0.3215                     | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430<br>0.2575<br>0.1625<br><br>0.2216<br>0.1628                     | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613<br>0.6638<br>0.2364<br><br>0.2060<br>0.2572                     |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568<br>\<br>0<br>1<br>2<br>3<br>4<br><br>564<br>565<br>566<br>567                    | 25 26 38 36 39 39 30 30 30 30 30 30 30  | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42<br>9.37<br>2.51<br>5.60<br>6.60<br>4.50<br>5.00<br>5.00<br>5.00<br>5.00<br>5.00<br>5.00<br>5.0 | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504<br>0.6869<br>0.4000<br><br>0.4107<br>0.3215<br>0.3403           | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430<br>0.2575<br>0.1625<br><br>0.2216<br>0.1628<br>0.1418           | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613<br>0.6638<br>0.2364<br><br>0.2060<br>0.2572<br>0.2218           |
|         | 2<br>3<br>4<br><br>564<br>565<br>566<br>567<br>568<br>\<br>0<br>1<br>2<br>3<br>4<br><br>564<br>565<br>566<br>567                    | 25 26 38 32 39 39 36 30 30 30 30 30 30 30 30 30 30 30 30 30 30 30   | 5.53<br>5.50<br>5.67<br><br>5.40<br>3.25<br>4.12<br>9.42<br>9.37<br>2.51<br>5.60<br>6.60<br>4.50<br>5.00<br>5.00<br>5.00<br>5.00<br>5.00<br>5.00<br>5.0 | 152.50<br>98.87<br>152.20<br><br>166.10<br>155.00<br>126.70<br>184.60<br>59.16<br>concavity_worst<br>0.7119<br>0.2416<br>0.4504<br>0.6869<br>0.4000<br><br>0.4107<br>0.3215<br>0.3403<br>0.9387 | 1709.0<br>567.7<br>1575.0<br><br>2027.0<br>1731.0<br>1124.0<br>1821.0<br>268.6 | 0.14<br>0.20<br>0.13<br>0.14<br>0.11<br>0.16<br>0.08<br>s_worst symm<br>0.2654<br>0.1860<br>0.2430<br>0.2575<br>0.1625<br><br>0.2216<br>0.1628<br>0.1418<br>0.2650 | 440<br>980<br>740<br><br>100<br>660<br>390<br>500<br>996<br>etry_worst<br>0.4601<br>0.2750<br>0.3613<br>0.6638<br>0.2364<br><br>0.2060<br>0.2572<br>0.2218<br>0.4087 |

fractal\_dimension\_worst Unnamed: 32 0.11890 NaN

0

| 1   | 0.08902 | NaN   |
|-----|---------|-------|
| 2   | 0.08758 | NaN   |
| 3   | 0.17300 | NaN   |
| 4   | 0.07678 | NaN   |
| • • | • • •   | • • • |
| 564 | 0.07115 | NaN   |
| 565 | 0.06637 | NaN   |
| 566 | 0.07820 | NaN   |
| 567 | 0.12400 | NaN   |
| 568 | 0.07039 | NaN   |
|     |         |       |

[569 rows x 33 columns]>

# In [5]: data.tail()

# Out[5]:

|     | id     | diagnosis | radius_mean | texture_mean | perimeter_mean | area_mean | smoothness_m |
|-----|--------|-----------|-------------|--------------|----------------|-----------|--------------|
| 564 | 926424 | М         | 21.56       | 22.39        | 142.00         | 1479.0    | 0.11         |
| 565 | 926682 | М         | 20.13       | 28.25        | 131.20         | 1261.0    | 0.09         |
| 566 | 926954 | М         | 16.60       | 28.08        | 108.30         | 858.1     | 0.08         |
| 567 | 927241 | М         | 20.60       | 29.33        | 140.10         | 1265.0    | 0.11         |
| 568 | 92751  | В         | 7.76        | 24.54        | 47.92          | 181.0     | 0.05         |

5 rows × 33 columns

In [6]: data.describe()

## Out[6]:

|                     | id           | radius_mean | texture_mean | perimeter_mean | area_mean   | smoothness_mea |
|---------------------|--------------|-------------|--------------|----------------|-------------|----------------|
| count               | 5.690000e+02 | 569.000000  | 569.000000   | 569.000000     | 569.000000  | 569.00000      |
| mean                | 3.037183e+07 | 14.127292   | 19.289649    | 91.969033      | 654.889104  | 0.09636        |
| std                 | 1.250206e+08 | 3.524049    | 4.301036     | 24.298981      | 351.914129  | 0.01406        |
| min                 | 8.670000e+03 | 6.981000    | 9.710000     | 43.790000      | 143.500000  | 0.05263        |
| 25%                 | 8.692180e+05 | 11.700000   | 16.170000    | 75.170000      | 420.300000  | 0.08637        |
| 50%                 | 9.060240e+05 | 13.370000   | 18.840000    | 86.240000      | 551.100000  | 0.09587        |
| 75%                 | 8.813129e+06 | 15.780000   | 21.800000    | 104.100000     | 782.700000  | 0.10530        |
| max                 | 9.113205e+08 | 28.110000   | 39.280000    | 188.500000     | 2501.000000 | 0.16340        |
| 8 rows × 32 columns |              |             |              |                |             |                |

In [7]: data.isna()

Out[7]:

|     | id    | diagnosis | radius_mean | texture_mean | perimeter_mean | area_mean | smoothness_mea |
|-----|-------|-----------|-------------|--------------|----------------|-----------|----------------|
| 0   | False | False     | False       | False        | False          | False     | Fals           |
| 1   | False | False     | False       | False        | False          | False     | Fals           |
| 2   | False | False     | False       | False        | False          | False     | Fals           |
| 3   | False | False     | False       | False        | False          | False     | Fals           |
| 4   | False | False     | False       | False        | False          | False     | Fals           |
|     |       |           |             |              |                |           |                |
| 564 | False | False     | False       | False        | False          | False     | Fals           |
| 565 | False | False     | False       | False        | False          | False     | Fals           |
| 566 | False | False     | False       | False        | False          | False     | Fals           |
| 567 | False | False     | False       | False        | False          | False     | Fals           |
| 568 | False | False     | False       | False        | False          | False     | Fals           |
|     |       |           |             |              |                |           |                |

569 rows × 33 columns

In [8]: data.size

Out[8]: 18777

In [9]: data.isna

| Out[9]: | <bou< th=""><th>nd method DataFr<br/>n perimeter_mea</th><th></th><th></th><th>id diagnosis</th><th>radius_mean</th><th>texture</th></bou<> | nd method DataFr<br>n perimeter_mea     |        |                 | id diagnosis                            | radius_mean    | texture    |
|---------|---|---|--------|-----------------|---|----------------|------------|
|         | _iiica<br>0   | 842302                                  | M M    | 17.99           | 10.38                                   | 122.80         | 1001 0     |
|         |   |   |        |                 |   |                | 1001.0     |
|         | 1   | 842517                                  | М      | 20.57           | 17.77                                   | 132.90         | 1326.0     |
|         | 2   | 84300903                                | М      | 19.69           | 21.25                                   | 130.00         | 1203.0     |
|         | 3   | 84348301                                | М      | 11.42           | 20.38                                   | 77.58          | 386.1      |
|         | 4   | 84358402                                | М      | 20.29           | 14.34                                   | 135.10         | 1297.0     |
|         | <br>564   | • • • • • • • • • • • • • • • • • • •   | <br>М  | <br>21.56       | <br>22.39                               | <br>142.00     | <br>1479.0 |
|         | 565   | 926682                                  | М      | 20.13           | 28.25                                   | 131.20         | 1261.0     |
|         | 566   | 926954                                  | М      | 16.60           | 28.08                                   | 108.30         | 858.1      |
|         | 567   | 927241                                  | M      | 20.60           | 29.33                                   | 140.10         | 1265.0     |
|         | 568   |   | В      | 7.76            |   |                |            |
|         | 208   | 92751                                   | В      | 7.76            | 24.54                                   | 47.92          | 181.0      |
|         |   | smoothness_mean                         | cor    | mpactness_mean  | concavity_mean                          | concave point  | s_mean     |
|         | \   |   |        |                 |   |                |            |
|         | 0   | 0.11840                                 |        | 0.27760         | 0.30010                                 | 6              | .14710     |
|         | 1   | 0.08474                                 |        | 0.07864         | 0.08690                                 | 6              | .07017     |
|         | 2   | 0.10960                                 |        | 0.15990         | 0.19740                                 | e              | .12790     |
|         | 3   | 0.14250                                 |        | 0.28390         | 0.24140                                 |                | .10520     |
|         | 4   | 0.10030                                 |        | 0.13280         | 0.19800                                 |                | .10430     |
|         | ••  | • |        | • • • •         | • | C              |            |
|         | 564   | 0.11100                                 |        | 0.11590         | 0.24390                                 | 6              | .13890     |
|         | 565   | 0.09780                                 |        | 0.10340         | 0.14400                                 | e              | .09791     |
|         | 566   | 0.08455                                 |        | 0.10230         | 0.09251                                 |                | .05302     |
|         | 567   | 0.11780                                 |        | 0.27700         | 0.35140                                 |                | .15200     |
|         | 568   | 0.05263                                 |        | 0.04362         | 0.00000                                 |                | .00000     |
|         | 308   | 0.03203                                 |        | 0.04302         | 0.00000                                 |                | .00000     |
|         |   | texture_wo                              |        | perimeter_worst |   | moothness_wors |            |
|         | 0   | 17                                      | .33    | 184.60          | 2019.0                                  | 0.1622         | .0         |
|         | 1   | 23                                      | .41    | 158.80          | 1956.0                                  | 0.1238         | 80         |
|         | 2   | 25                                      | .53    | 152.50          | 1709.0                                  | 0.1444         | -0         |
|         | 3   |   | .50    | 98.87           |   | 0.2098         |            |
|         | 4   |   | .67    | 152.20          |   | 0.1374         |            |
|         | ••  |   | • • •  |                 |   | •••            |            |
|         | 564   | 26                                      | .40    | 166.10          | 2027.0                                  | 0.1410         | 10         |
|         | 565   | 38                                      | . 25   | 155.00          | 1731.0                                  | 0.1166         | 60         |
|         | 566   |   | .12    | 126.70          |   | 0.1139         |            |
|         | 567   |   | .42    | 184.60          |   | 0.1650         |            |
|         | 568   |   | .37    | 59.16           |   | 0.0899         |            |
|         | 508   | 30                                      | . 57   | 39.10           | 200.0                                   | 0.0893         | .0         |
|         | ,   | compactness_wor                         | st (   | concavity_worst | concave points                          | _worst symmet  | ry_worst   |
|         | \   | 2                                       |        |                 |   | 0.0654         | 0 4601     |
|         | 0   | 0.665                                   |        | 0.7119          |   | 0.2654         | 0.4601     |
|         | 1   | 0.186                                   | 60     | 0.2416          |   | 0.1860         | 0.2750     |
|         | 2   | 0.424                                   | 50     | 0.4504          |   | 0.2430         | 0.3613     |
|         | 3   | 0.866                                   | 30     | 0.6869          |   | 0.2575         | 0.6638     |
|         | 4   | 0.205                                   | 00     | 0.4000          |   | 0.1625         | 0.2364     |
|         | <br>564   | 0.211                                   | <br>30 | <br>0.4107      |   | 0.2216         | 0.2060     |
|         | 565   | 0.192                                   |        | 0.3215          |   | 0.1628         | 0.2572     |
|         |   |   |        |                 |   |                |            |
|         | 566   | 0.309                                   |        | 0.3403          |   | 0.1418         | 0.2218     |
|         | 567   | 0.868                                   |        | 0.9387          |   | 0.2650         | 0.4087     |
|         | 568   | 0.064                                   | 44     | 0.0000          |   | 0.0000         | 0.2871     |
|         |   | fractal dimensi                         | on w   | onst Unnamod: 3 | າງ                                      |                |            |

fractal\_dimension\_worst Unnamed: 32 0.11890 NaN

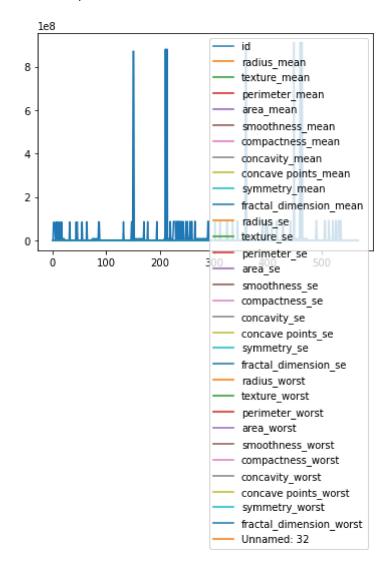
0

| 1   | 0.08902 | NaN |
|-----|---------|-----|
| 2   | 0.08758 | NaN |
| 3   | 0.17300 | NaN |
| 4   | 0.07678 | NaN |
| • • | • • •   |     |
| 564 | 0.07115 | NaN |
| 565 | 0.06637 | NaN |
| 566 | 0.07820 | NaN |
| 567 | 0.12400 | NaN |
| 568 | 0.07039 | NaN |
|     |         |     |

[569 rows x 33 columns]>

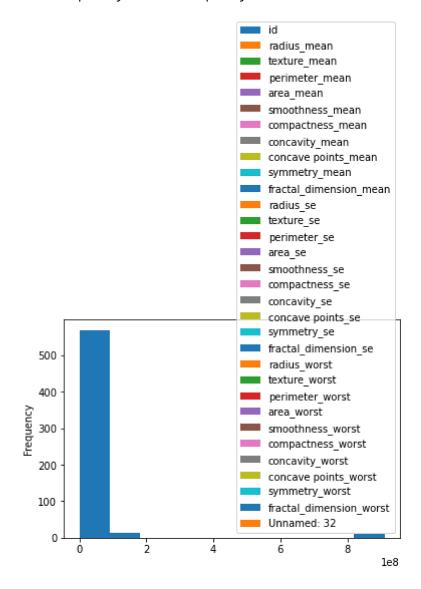
### In [10]: data.plot.line()

#### Out[10]: <AxesSubplot:>



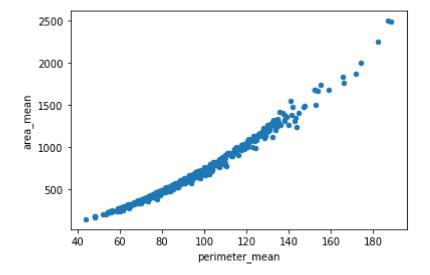
In [11]: data.plot.hist()

Out[11]: <AxesSubplot:ylabel='Frequency'>



In [14]: data.plot.scatter(x="perimeter\_mean",y='area\_mean')

Out[14]: <AxesSubplot:xlabel='perimeter\_mean', ylabel='area\_mean'>



In [17]: data.fillna(value=5)

## Out[17]:

|     | id       | diagnosis | radius_mean | texture_mean | perimeter_mean | area_mean | smoothness_ |
|-----|----------|-----------|-------------|--------------|----------------|-----------|-------------|
| 0   | 842302   | М         | 17.99       | 10.38        | 122.80         | 1001.0    | 0.          |
| 1   | 842517   | М         | 20.57       | 17.77        | 132.90         | 1326.0    | 0.          |
| 2   | 84300903 | М         | 19.69       | 21.25        | 130.00         | 1203.0    | 0.          |
| 3   | 84348301 | М         | 11.42       | 20.38        | 77.58          | 386.1     | 0.          |
| 4   | 84358402 | М         | 20.29       | 14.34        | 135.10         | 1297.0    | 0.          |
|     |          |           |             |              |                |           |             |
| 564 | 926424   | М         | 21.56       | 22.39        | 142.00         | 1479.0    | 0           |
| 565 | 926682   | М         | 20.13       | 28.25        | 131.20         | 1261.0    | 0.          |
| 566 | 926954   | М         | 16.60       | 28.08        | 108.30         | 858.1     | 0.          |
| 567 | 927241   | М         | 20.60       | 29.33        | 140.10         | 1265.0    | 0.          |
| 568 | 92751    | В         | 7.76        | 24.54        | 47.92          | 181.0     | 0.          |

569 rows × 33 columns

localhost:8888/notebooks/matplotlib.ipynb

In [16]: pd.isna(data)

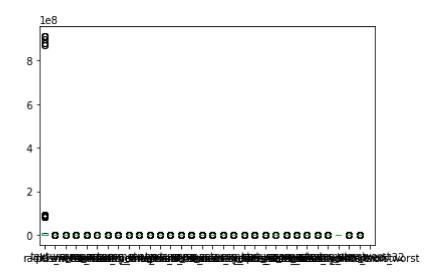
## Out[16]:

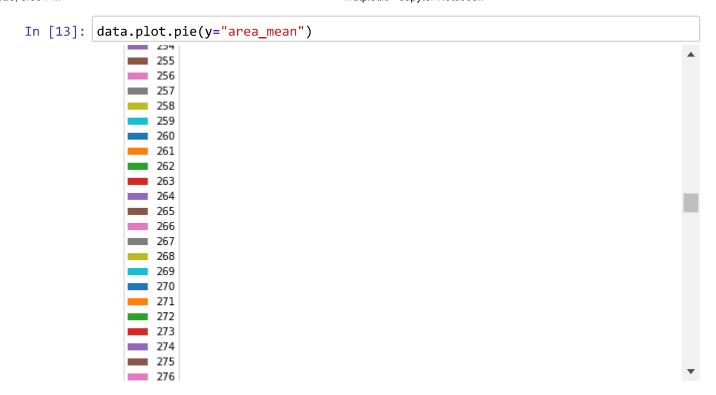
|     | id    | diagnosis | radius_mean | texture_mean | perimeter_mean | area_mean | smoothness_mea |
|-----|-------|-----------|-------------|--------------|----------------|-----------|----------------|
| 0   | False | False     | False       | False        | False          | False     | Fals           |
| 1   | False | False     | False       | False        | False          | False     | Fak            |
| 2   | False | False     | False       | False        | False          | False     | Fak            |
| 3   | False | False     | False       | False        | False          | False     | Fak            |
| 4   | False | False     | False       | False        | False          | False     | Fak            |
|     |       |           |             |              |                |           |                |
| 564 | False | False     | False       | False        | False          | False     | Fak            |
| 565 | False | False     | False       | False        | False          | False     | Fak            |
| 566 | False | False     | False       | False        | False          | False     | Fak            |
| 567 | False | False     | False       | False        | False          | False     | Fak            |
| 568 | False | False     | False       | False        | False          | False     | Fak            |

569 rows × 33 columns

In [15]: data.plot.box()

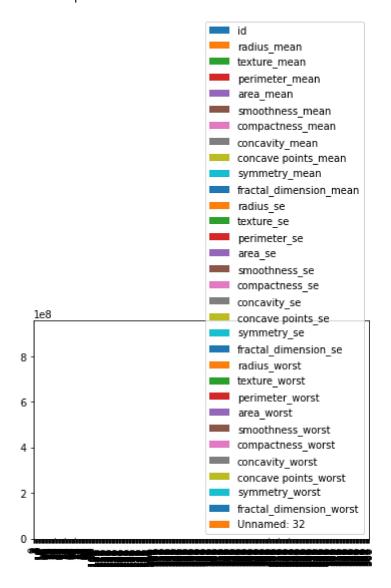
## Out[15]: <AxesSubplot:>





In [18]: data.plot.bar()

Out[18]: <AxesSubplot:>



In [ ]: