

```
In [1]: import warnings, requests, zipfile, io
warnings.simplefilter('ignore')
import pandas as pd
from scipy.io import arff
```

```
In [2]: f_zip = 'http://archive.ics.uci.edu/ml/machine-learning-databases/00212/vertebra
r = requests.get(f_zip, stream=True)
Vertebral_zip = zipfile.ZipFile(io.BytesIO(r.content))
Vertebral_zip.extractall()
```

```
In [3]: data = arff.loadarff('column_2C_weka.arff')
df = pd.DataFrame(data[0])
```

```
In [4]: df.shape
```

```
Out[4]: (310, 7)
```

```
In [5]: df.columns
```

```
Out[5]: Index(['pelvic_incidence', 'pelvic_tilt', 'lumbar_lordosis_angle',
              'sacral_slope', 'pelvic_radius', 'degree_spondylolisthesis', 'class'],
              dtype='object')
```

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

```
Out[6]: pelvic_incidence      float64
pelvic_tilt                  float64
lumbar_lordosis_angle        float64
sacral_slope                 float64
pelvic_radius                float64
degree_spondylolisthesis     float64
class                       object
dtype: object
```

```
In [7]: df['pelvic_incidence'].describe()
```

```
Out[7]: count      310.000000
mean         60.496653
std          17.236520
min          26.147921
25%          46.430294
50%          58.691038
75%          72.877696
max          129.834041
Name: pelvic_incidence, dtype: float64
```

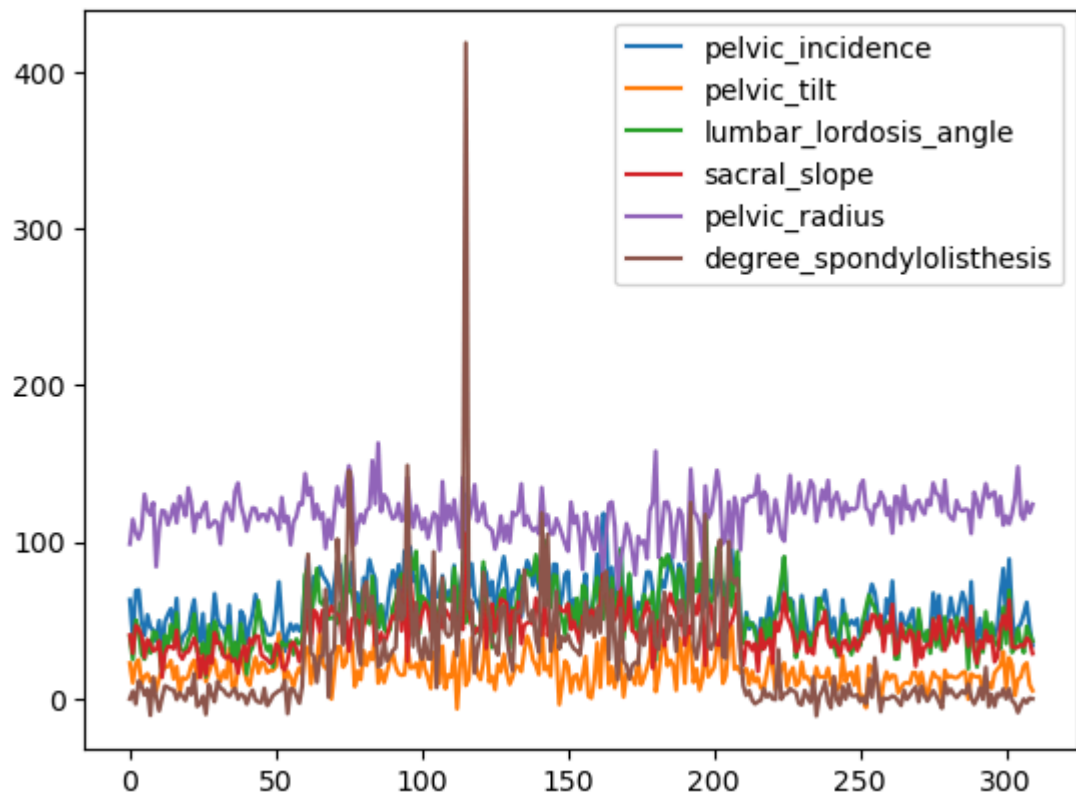
```
In [8]: df.describe()
```

Out[8]:

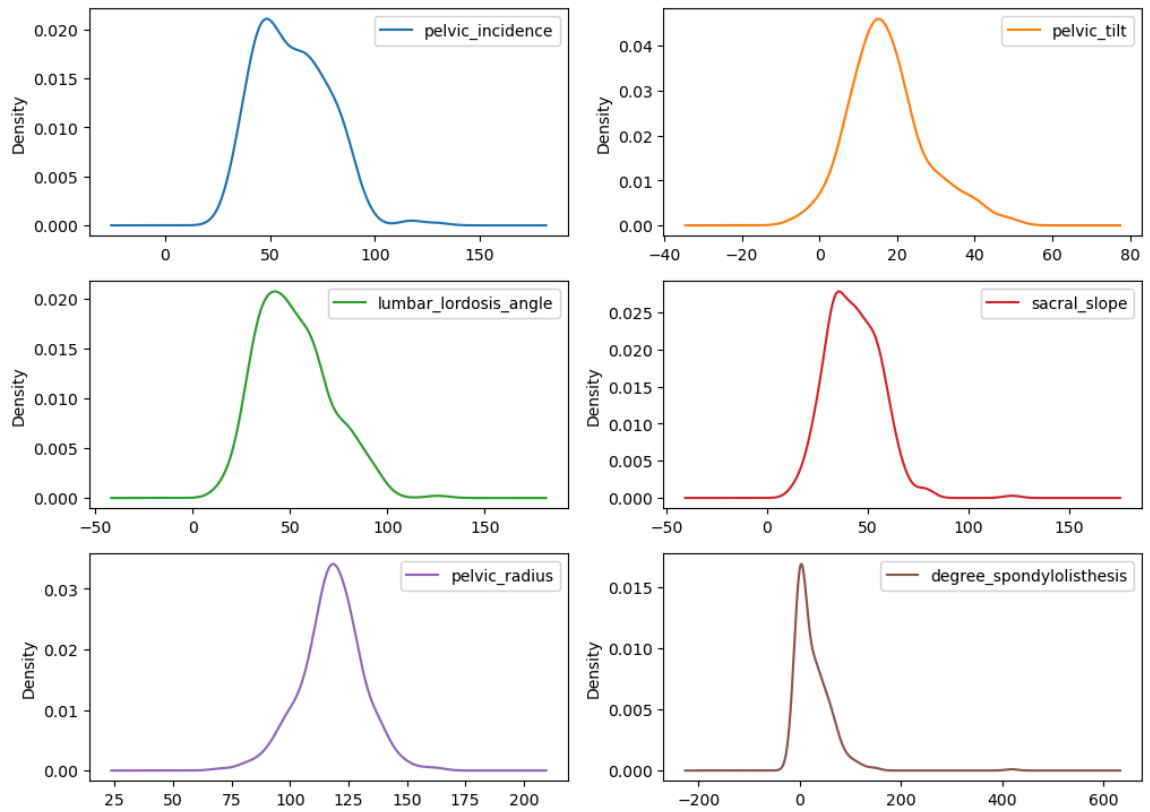
	pelvic_incidence	pelvic_tilt	lumbar_lordosis_angle	sacral_slope	pelvic_radius	degree_s
<b>count</b>	310.000000	310.000000	310.000000	310.000000	310.000000	
<b>mean</b>	60.496653	17.542822	51.930930	42.953831	117.920655	
<b>std</b>	17.236520	10.008330	18.554064	13.423102	13.317377	
<b>min</b>	26.147921	-6.554948	14.000000	13.366931	70.082575	
<b>25%</b>	46.430294	10.667069	37.000000	33.347122	110.709196	
<b>50%</b>	58.691038	16.357689	49.562398	42.404912	118.268178	
<b>75%</b>	72.877696	22.120395	63.000000	52.695888	125.467674	
<b>max</b>	129.834041	49.431864	125.742385	121.429566	163.071041	

In [9]: `import matplotlib.pyplot as plt`  
`%matplotlib inline`  
`df.plot()`

Out[9]: <Axes: >

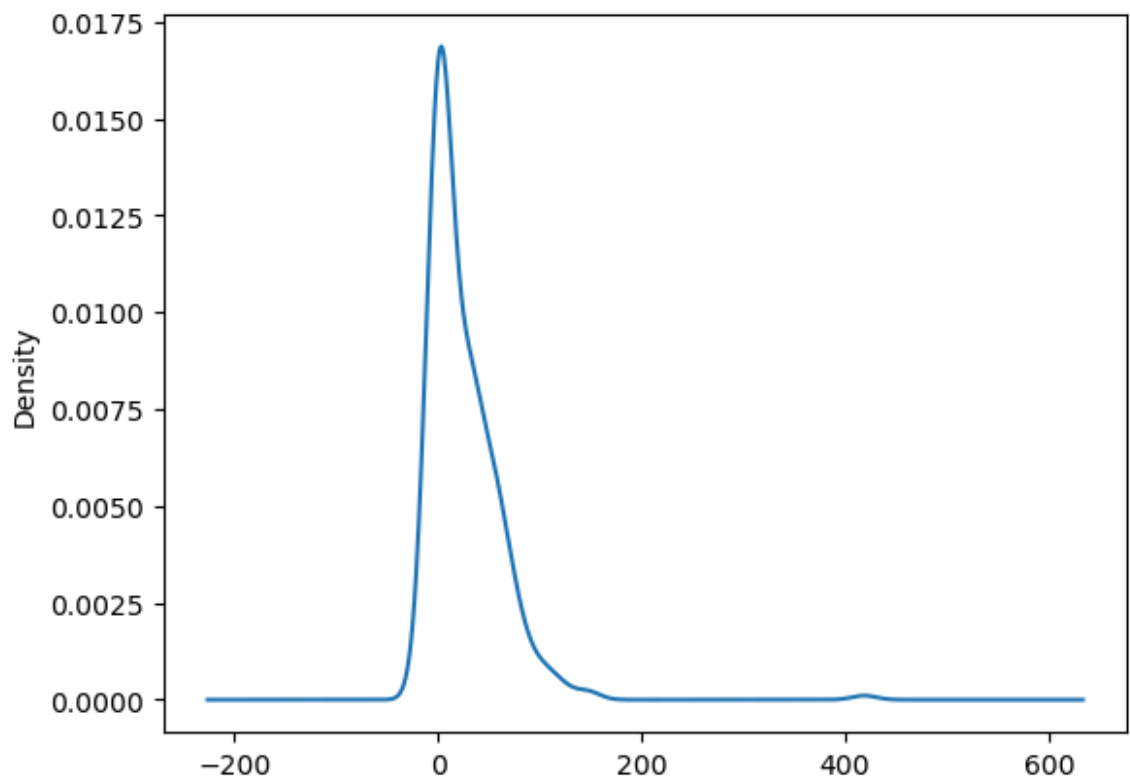


In [10]: `df.plot(kind='density', subplots=True, layout=(4,2), figsize=(12,12), sharex=False)`  
`plt.show()`



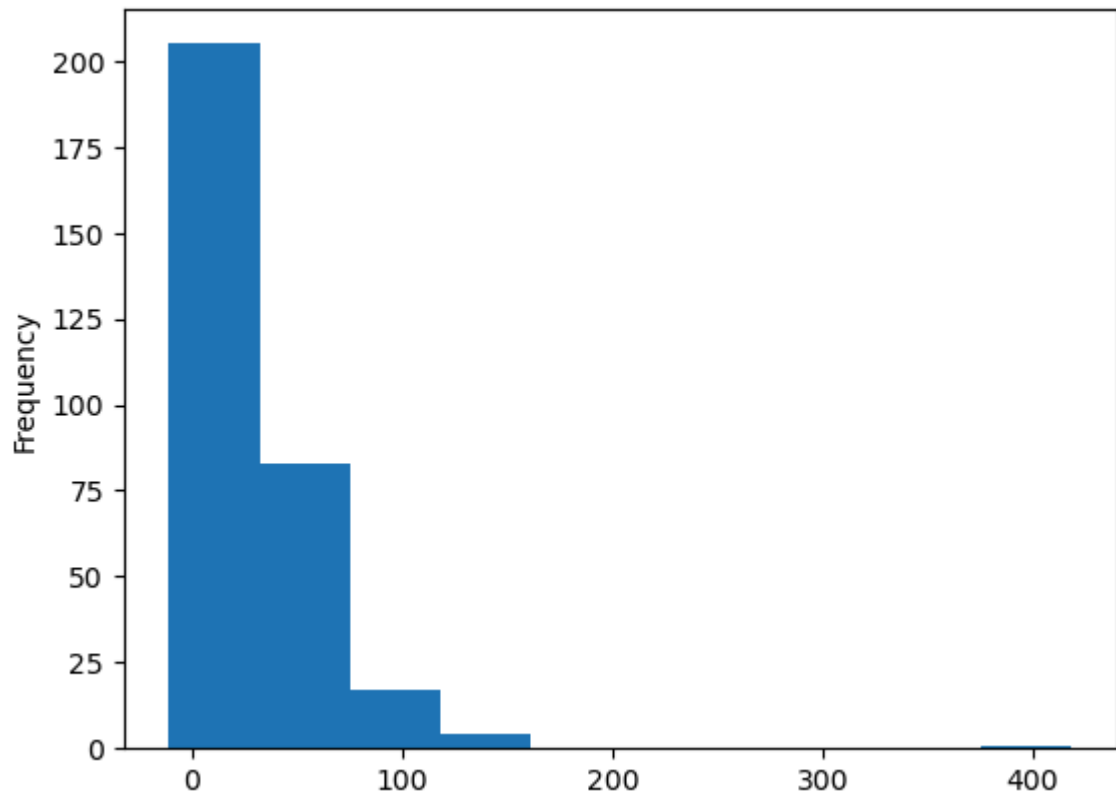
```
In [11]: df['degree_spondylolisthesis'].plot.density()
```

```
Out[11]: <Axes: ylabel='Density'>
```



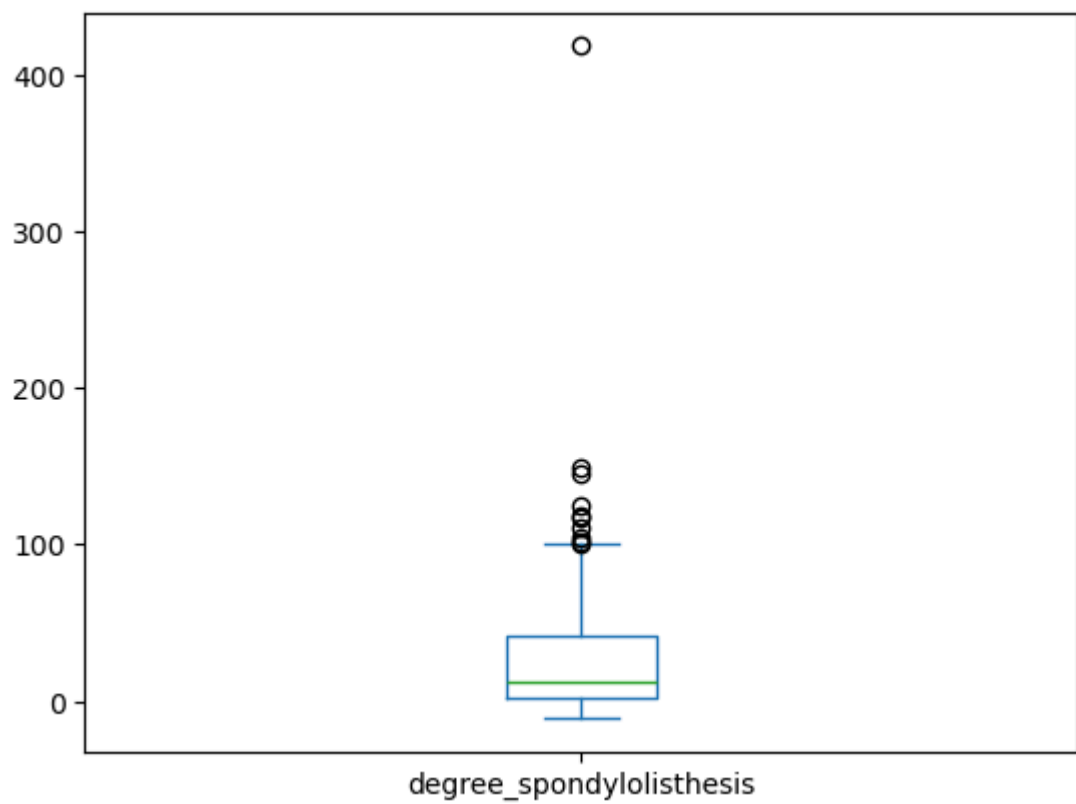
```
In [12]: df['degree_spondylolisthesis'].plot.hist()
```

```
Out[12]: <Axes: ylabel='Frequency'>
```



```
In [13]: df['degree_spondylolisthesis'].plot.box()
```

```
Out[13]: <Axes: >
```



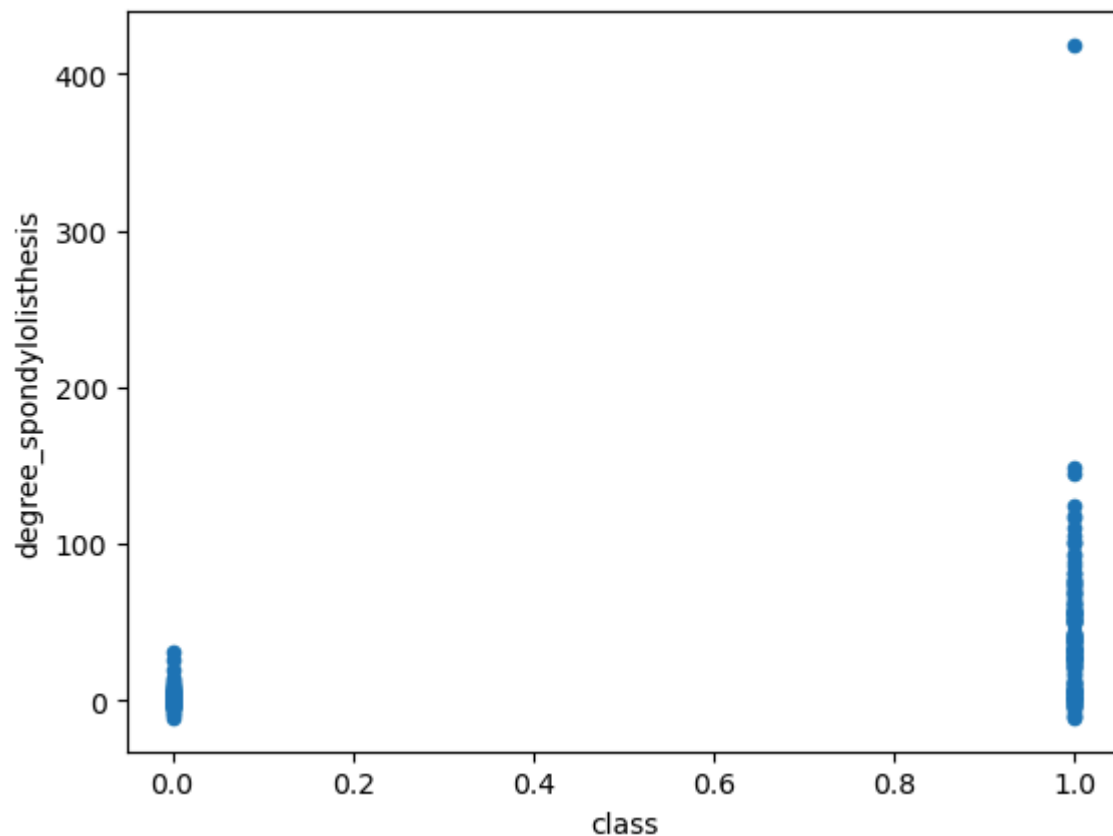
```
In [14]: df['class'].value_counts()
```

```
Out[14]: class
b'Abnormal'    210
b'Normal'      100
Name: count, dtype: int64
```

```
In [15]: class_mapper = {b'Abnormal':1,b'Normal':0}
df['class']=df['class'].replace(class_mapper)
```

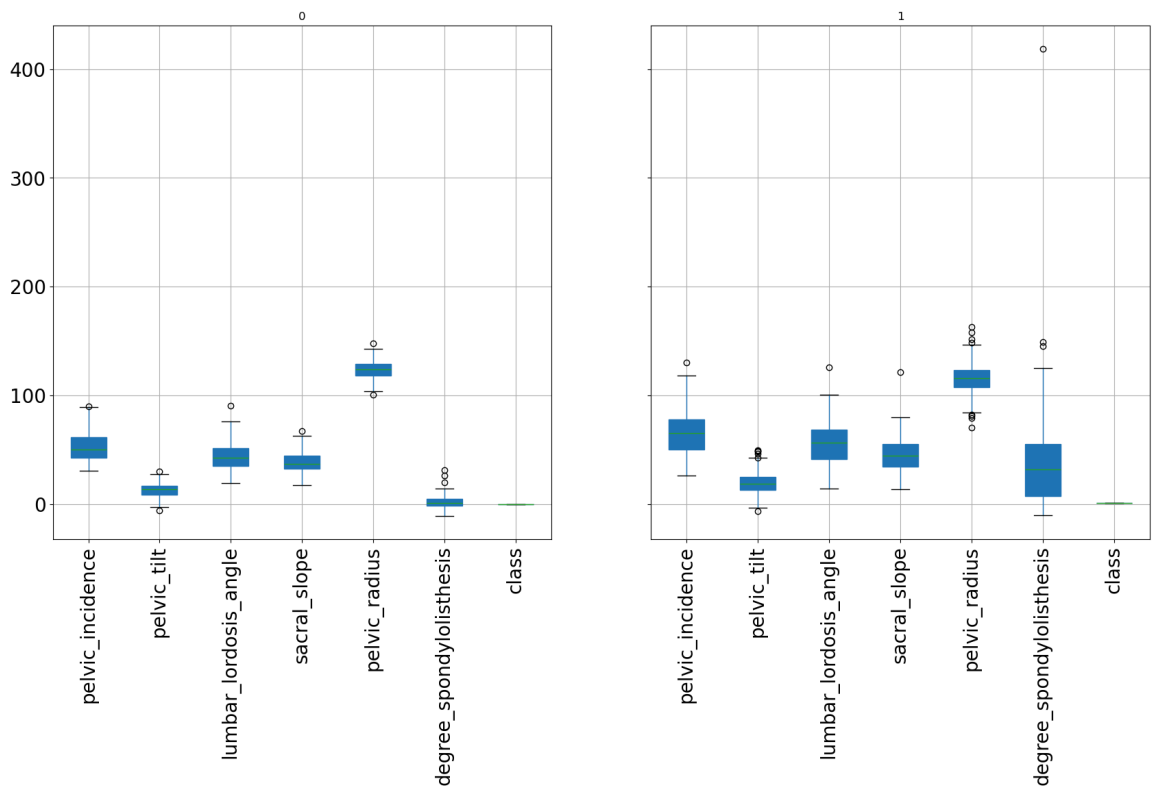
```
In [18]: df.plot.scatter(y='degree_spondylolisthesis',x='class')
```

```
Out[18]: <Axes: xlabel='class', ylabel='degree_spondylolisthesis'>
```



```
In [19]: df.groupby('class').boxplot(fontsize=20,rot=90,figsize=(20,10),patch_artist=True)
```

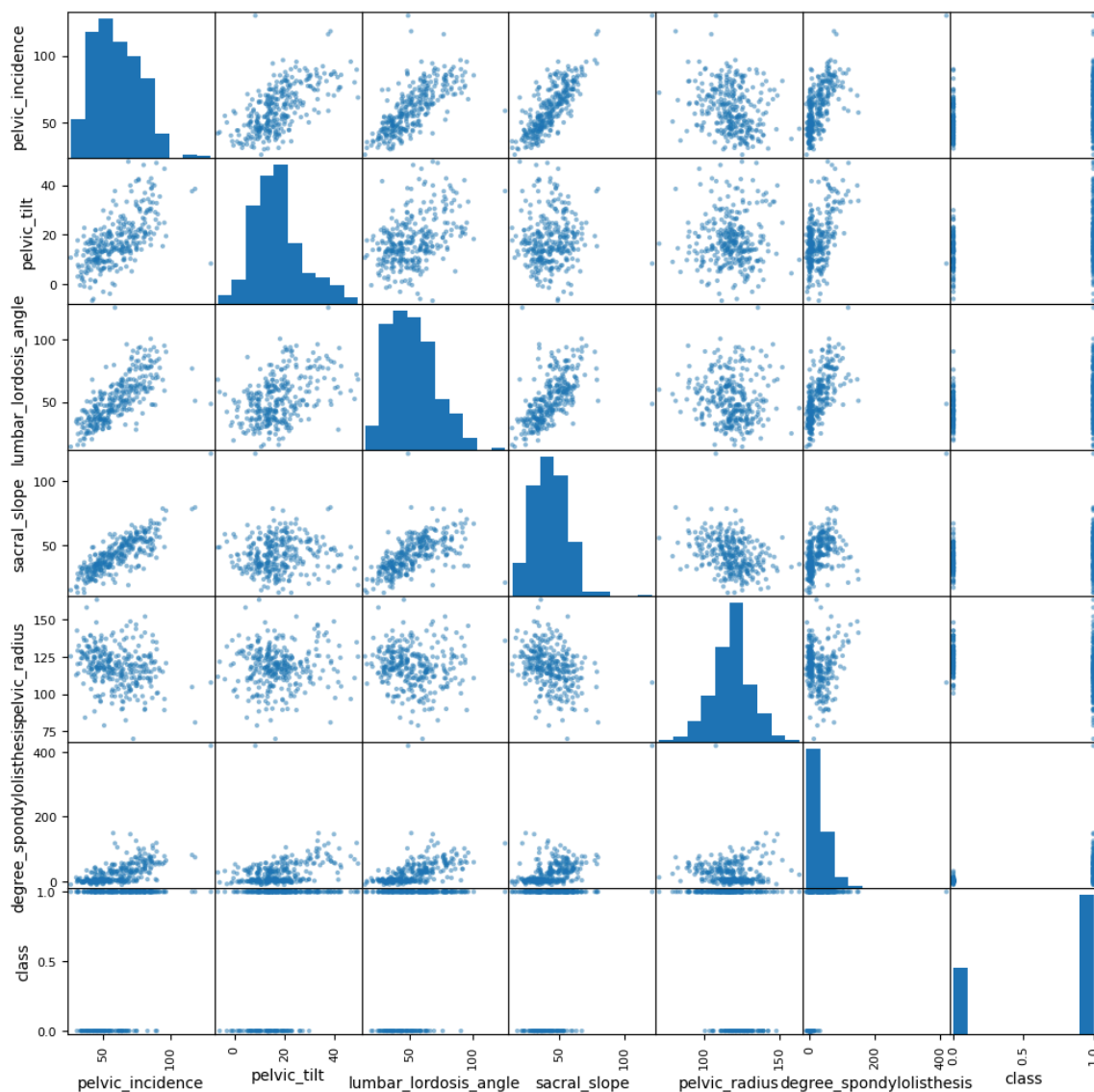
```
Out[19]: 0      Axes(0.1,0.15;0.363636x0.75)
1      Axes(0.536364,0.15;0.363636x0.75)
dtype: object
```



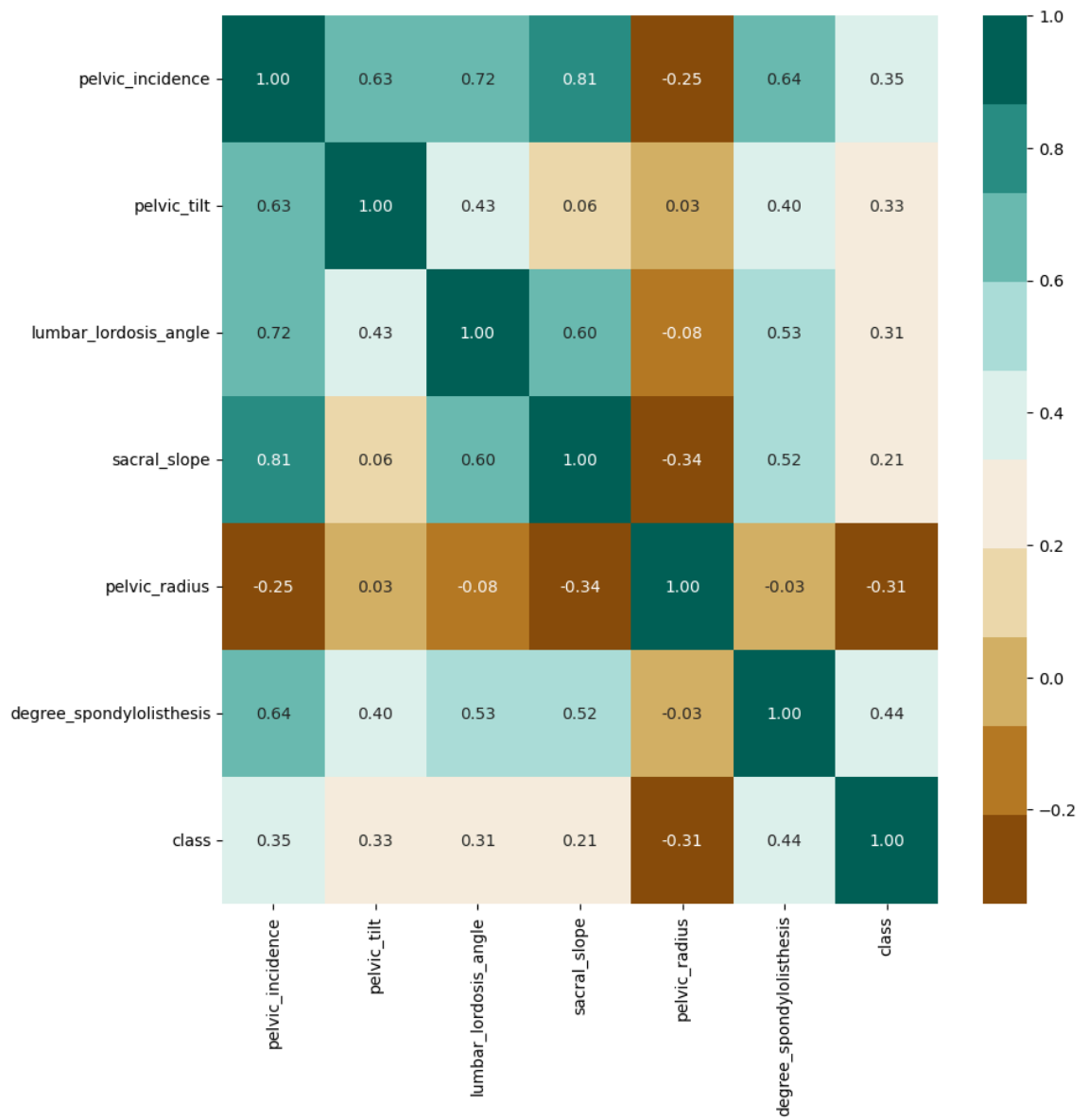
```
In [16]: corr_matrix = df.corr()
corr_matrix["class"].sort_values(ascending=False)
```

```
Out[16]: class                1.000000
degree_spondylolisthesis    0.443687
pelvic_incidence            0.353336
pelvic_tilt                 0.326063
lumbar_lordosis_angle       0.312484
sacral_slope                0.210602
pelvic_radius              -0.309857
Name: class, dtype: float64
```

```
In [17]: pd.plotting.scatter_matrix(df,figsize=(12,12))
plt.show()
```



```
In [20]: import seaborn as sns
# Plot figsize
fig, ax = plt.subplots(figsize=(10, 10))
# Generate Color Map
# colormap = sns.diverging_palette(220, 10, as_cmap=True)
colormap = sns.color_palette("BrBG", 10)
# Generate Heat Map, allow annotations and place floats in map
sns.heatmap(corr_matrix, cmap=colormap, annot=True, fmt=".2f")
#ax.set_yticklabels(column_names);
plt.show()
```



In [ ]: