3

November 9, 2023

[1]:
```
import pandas as pd
import numpy as np
```

The targets were free electrons in the ionosphere. “Good” radar returns are those showing evidence of some type of structure in the ionosphere. “Bad” returns are those that do not

[2]:
```
file = 'ionosphere.data'
data = pd.read_csv(file, header=None)
print(data.shape)
```

```
(351, 35)
```

Considerando as informações de http://archive.ics.uci.edu/dataset/52/ionosphere, nossa base de dados possue duas classes: "good" e "bad".

[3]:
```
classe_b = data[data.iloc[:, -1] == 'b']
print(classe_b.shape)
classe_g = data[data.iloc[:, -1] == 'g']
print(classe_g.shape)
```

```
(126, 35)
(225, 35)
```

[4]:
```
data_classe_b = classe_b.iloc[:, :-1]
print(data_classe_b.shape)
cov_classe_b = np.cov(data_classe_b, rowvar=False)
print(cov_classe_b)
```

```
(126, 34)
[[ 0.21231746  0.          0.02615296 ... -0.03765241  0.01883534
   0.0165929 ]
 [ 0.          0.          0.          ...  0.          0.
   0.        ]
 [ 0.02615296  0.          0.43426932 ...  0.01533725  0.0625101
   0.02698674]
 ...
 [-0.03765241  0.          0.01533725 ...  0.44010465  0.0458018
   0.07988746]
 [ 0.01883534  0.          0.0625101  ...  0.0458018   0.33238603
  -0.05122951]
```

```
 [ 0.0165929   0.          0.02698674 ...  0.07988746 -0.05122951
   0.31987465]]
```

[5]:
```
data_classe_g = classe_g.iloc[:, :-1]
print(data_classe_g.shape)
cov_classe_g = np.cov(data_classe_g, rowvar=False)
print(cov_classe_g)
```

```
(225, 34)
[[ 0.          0.          0.         ...  0.          0.
   0.        ]
 [ 0.          0.          0.         ...  0.          0.
   0.        ]
 [ 0.          0.          0.04039954 ... -0.00482091  0.0170484
  -0.00271406]
 ...
 [ 0.          0.         -0.00482091 ...  0.16599451 -0.02706714
   0.14809712]
 [ 0.          0.          0.0170484  ... -0.02706714  0.21224406
  -0.0154278 ]
 [ 0.          0.         -0.00271406 ...  0.14809712 -0.0154278
   0.16280573]]
```