questaotres

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1 Questão 3 - Prova 2 de Inteligência Artificial

1.1 Lucas Nóbrega e Nathália de Vasconcelos

2 1. Pré-processamento de dados

In [63]:
```
# Importando as bibliotecas
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import warnings
import matplotlib.cbook
warnings.filterwarnings("ignore",category=matplotlib.cbook.mplDeprecation)

# Importando os datasets
dataset_treino = pd.read_csv('base_treinamento.csv')
X = dataset_treino.iloc[:, :-2].values
y = dataset_treino.iloc[:, [5,6]].values


dataset_teste = pd.read_csv('base_teste.csv')
Xt = dataset_teste.iloc[:, :-2].values
yt = dataset_teste.iloc[:, [5,6]].values
```

In [2]:
```
dataset_treino.describe()
```

Out[2]:

	AP1	AP2	AP3	AP4	AP5	\
count	262.00000	262.000000	262.000000	262.000000	262.000000	
mean	-67.90458	-62.129771	-58.122137	-71.454198	-65.183206	
std	10.29165	8.530672	8.323924	9.232823	7.128596	
min	-90.00000	-81.000000	-75.000000	-86.000000	-84.000000	
25%	-75.75000	-68.000000	-65.000000	-78.000000	-69.000000	
50%	-69.00000	-63.000000	-58.000000	-74.000000	-65.000000	
75%	-61.00000	-57.000000	-53.000000	-66.250000	-60.000000	
max	-38.00000	-35.000000	-33.000000	-38.000000	-51.000000	

```
       Coordenada X  Coordenada Y
```

```
count    262.000000    262.000000
mean      12.026985     12.612634
std        5.079505      5.139619
min        1.390000      1.570000
25%        8.442500      9.412500
50%       12.400000     13.630000
75%       16.357500     16.710000
max       20.450000     19.630000
```

```
In [3]: dataset_teste.describe()
```

```
Out[3]:              AP1        AP2        AP3        AP4        AP5  Coordenada X  \
count  65.000000  65.000000  65.000000  65.000000  65.000000     65.000000
mean  -56.953846 -63.815385 -62.030769 -69.261538 -65.815385     12.094923
std     8.088245   7.717456   8.154694   9.361285  10.037262      5.005830
min   -71.000000 -82.000000 -76.000000 -82.000000 -86.000000      2.410000
25%   -63.000000 -69.000000 -67.000000 -76.000000 -74.000000      8.370000
50%   -58.000000 -64.000000 -62.000000 -73.000000 -68.000000     12.950000
75%   -52.000000 -58.000000 -58.000000 -64.000000 -59.000000     15.480000
max   -39.000000 -51.000000 -43.000000 -43.000000 -42.000000     20.460000

       Coordenada Y
count     65.000000
mean      12.153231
std        4.951980
min        2.110000
25%        9.090000
50%       12.580000
75%       17.490000
max       19.120000
```

2.0.1 Melhorando a visualização dos datasets...

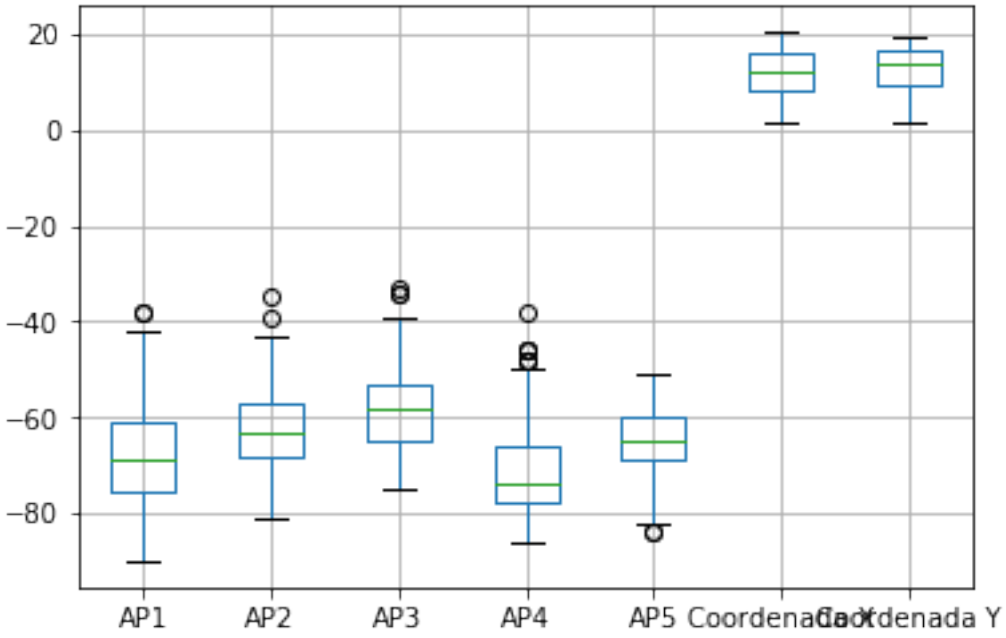
```
In [4]: print(pd.options.display.max_columns, pd.options.display.max_rows)
        pd.options.display.max_columns = 7
        pd.options.display.max_rows = 262
```

```
20 60
```

2.0.2 Visualizando os datasets em formato de boxplot...

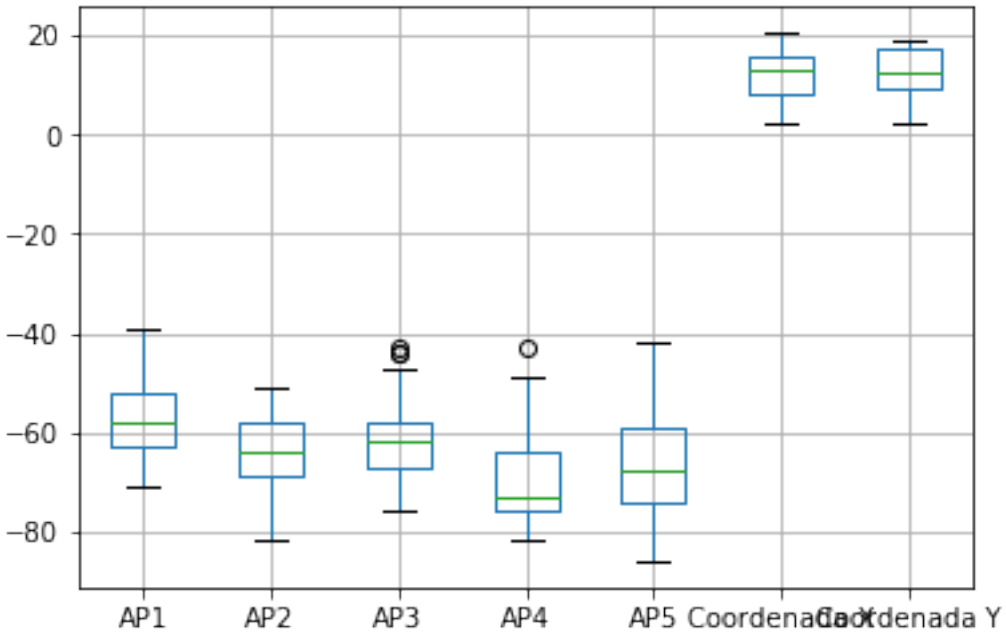
```
In [5]: dataset_treino.boxplot()
```

```
Out[5]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa294297fd0>
```



In [6]: dataset_teste.boxplot()

Out[6]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa2906a2470>



2.0.3 Checando se existe algum dado incompleto nos datasets...

```
In [7]: dataset_treino.isnull().values.any()
```

```
Out[7]: False
```

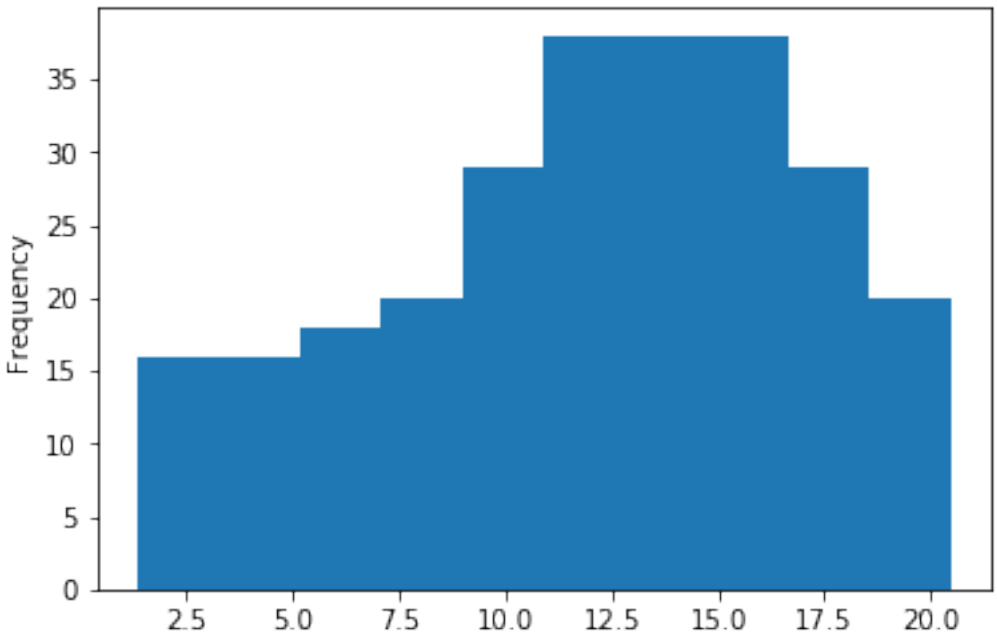
```
In [8]: dataset_teste.isnull().values.any()
```

```
Out[8]: False
```

2.0.4 Analisando os histogramas

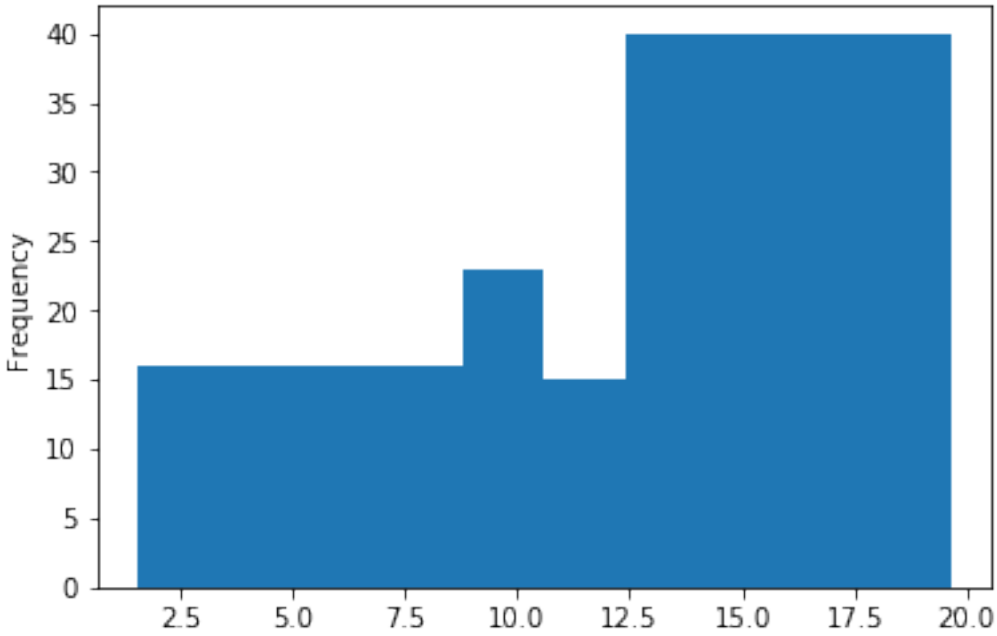
```
In [9]: dataset_treino['Coordenada X'].plot(kind='hist')
```

```
Out[9]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa290581748>
```



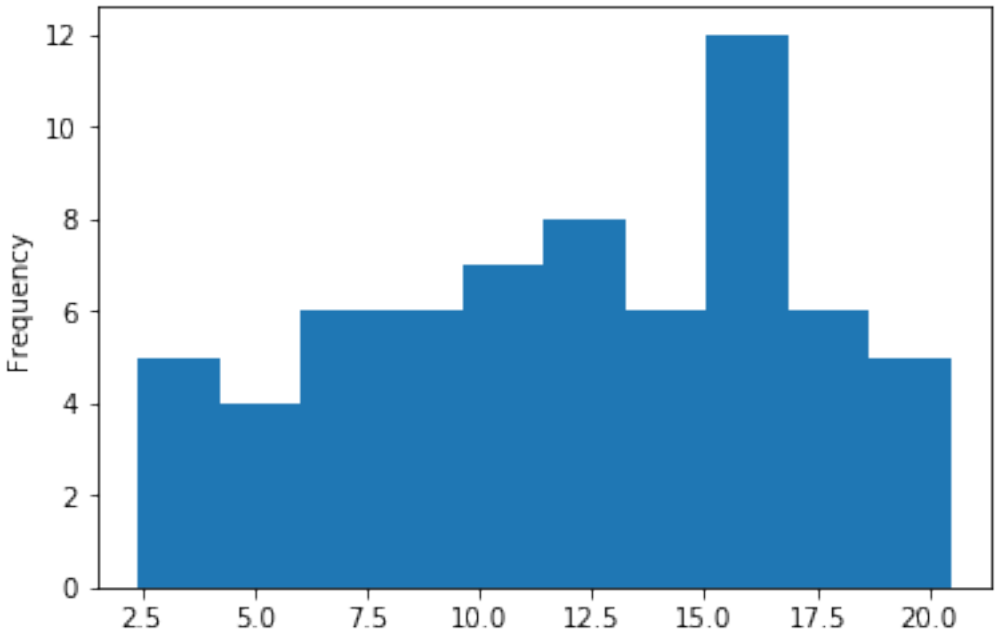

```
In [10]: dataset_treino['Coordenada Y'].plot(kind='hist')
```

```
Out[10]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa2905087f0>
```



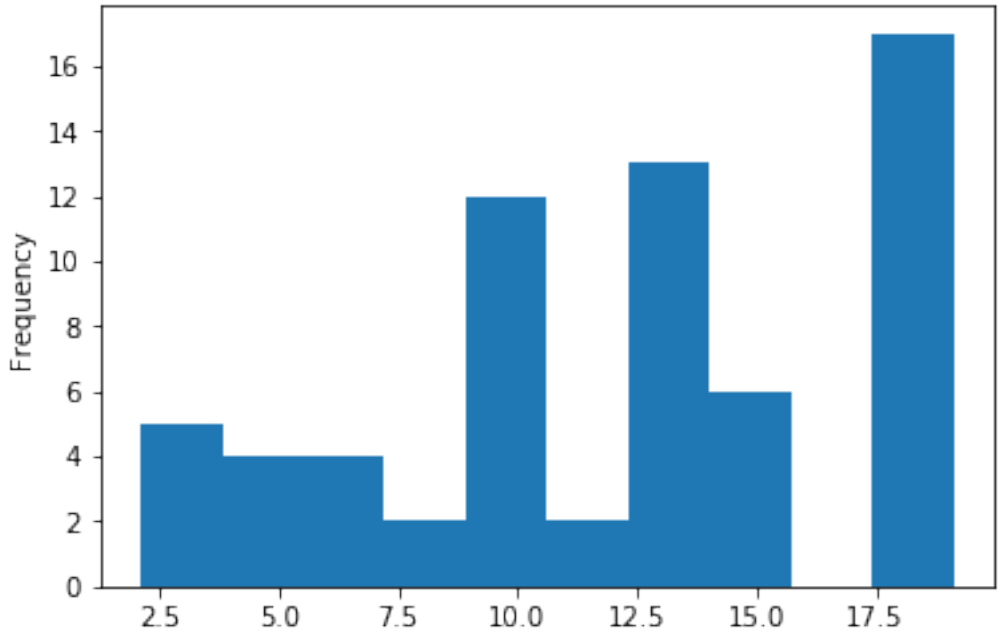

```
In [11]: dataset_teste['Coordenada X'].plot(kind='hist')
```

```
Out[11]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa290484390>
```



```
In [12]: dataset_teste['Coordenada Y'].plot(kind='hist')
```

```
Out[12]: <matplotlib.axes._subplots.AxesSubplot at 0x7fa290471978>
```



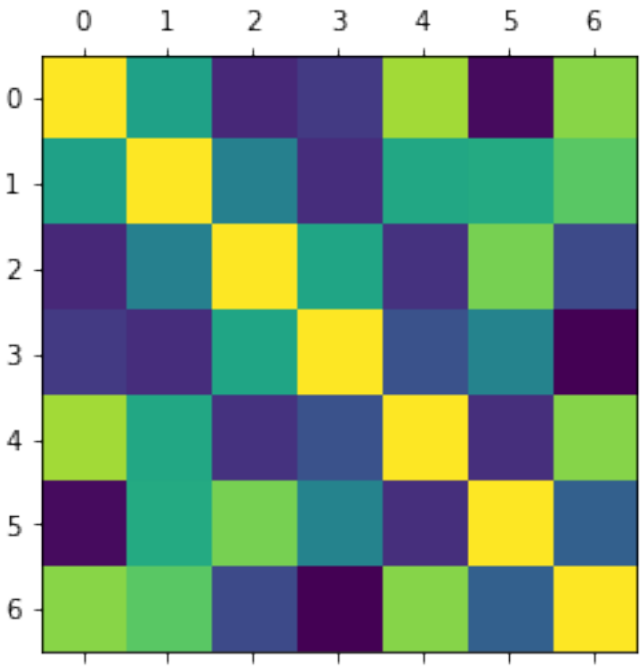
2.0.5 Preparando as variáveis para treino e teste dos algoritmos de aprendizado de máquina...

```
In [30]: X_train = X
         X_test = Xt
         y_train = y
         y_test = yt
```

2.0.6 Plotando os gráficos de correlação dos datasets...

```
In [14]: plt.matshow(dataset_treino.corr())
```

```
Out[14]: <matplotlib.image.AxesImage at 0x7fa29039c1d0>
```



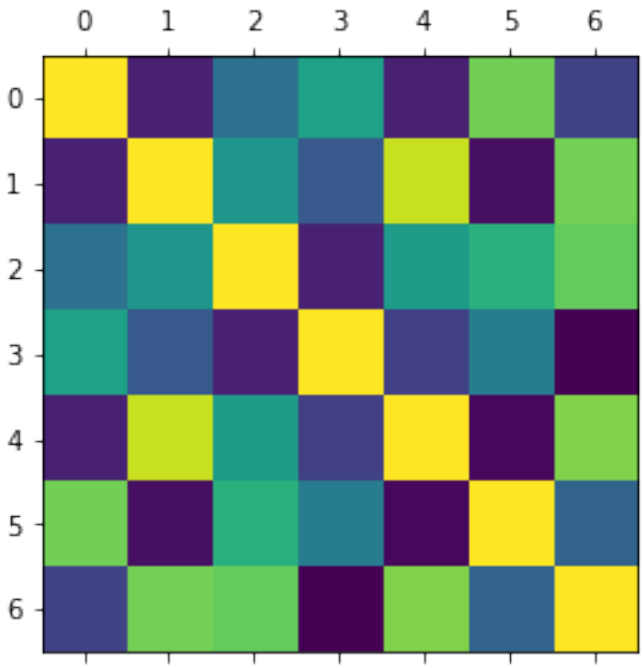

```
In [15]: print(dataset_treino.corr())
```

```
                    AP1       AP2       AP3       AP4       AP5  Coordenada X  \
AP1            1.000000  0.239991 -0.579181 -0.479896  0.749445     -0.732574
AP2            0.239991  1.000000 -0.009559 -0.552974  0.286467      0.307589
AP3           -0.579181 -0.009559  1.000000  0.262054 -0.519194      0.635752
AP4           -0.479896 -0.552974  0.262054  1.000000 -0.336926      0.011004
AP5            0.749445  0.286467 -0.519194 -0.336926  1.000000     -0.543906
Coordenada X -0.732574  0.307589  0.635752  0.011004 -0.543906      1.000000
Coordenada Y  0.683116  0.544512 -0.382358 -0.783691  0.676932     -0.236476

              Coordenada Y
AP1               0.683116
AP2               0.544512
AP3              -0.382358
AP4              -0.783691
AP5               0.676932
Coordenada X     -0.236476
Coordenada Y      1.000000
```

```
In [16]: plt.matshow(dataset_teste.corr())
```

```
Out[16]: <matplotlib.image.AxesImage at 0x7fa2902fcda0>
```




```
In [17]: print(dataset_teste.corr())
```

```
                    AP1       AP2       AP3       AP4       AP5  Coordenada X  \
AP1            1.000000 -0.624181 -0.116768  0.236859 -0.632930      0.618729
AP2           -0.624181  1.000000  0.151045 -0.290863  0.849767     -0.720831
AP3           -0.116768  0.151045  1.000000 -0.625816  0.189058      0.347374
AP4            0.236859 -0.290863 -0.625816  1.000000 -0.453619     -0.030745
AP5           -0.632930  0.849767  0.189058 -0.453619  1.000000     -0.753619
Coordenada X   0.618729 -0.720831  0.347374 -0.030745 -0.753619      1.000000
Coordenada Y  -0.446523  0.626146  0.578855 -0.791972  0.657350     -0.220059

              Coordenada Y
AP1               -0.446523
AP2                0.626146
AP3                0.578855
AP4               -0.791972
AP5                0.657350
Coordenada X      -0.220059
Coordenada Y       1.000000
```

2.0.7 Alterando a escala dos dados para que nenhum deles seja menos relevante do que o outro na fase de treinamento do aprendizado de máquina.

```
In [18]: from sklearn.preprocessing import StandardScaler
         sc_X = StandardScaler()
```

```
        X_train = sc_X.fit_transform(X_train)
        X_test = sc_X.transform(X_test)
```

```
/home/nath/anaconda3/lib/python3.6/site-packages/sklearn/utils/validation.py:475: DataConversio
  warnings.warn(msg, DataConversionWarning)
```

3 2. Regressão Linear Múltipla

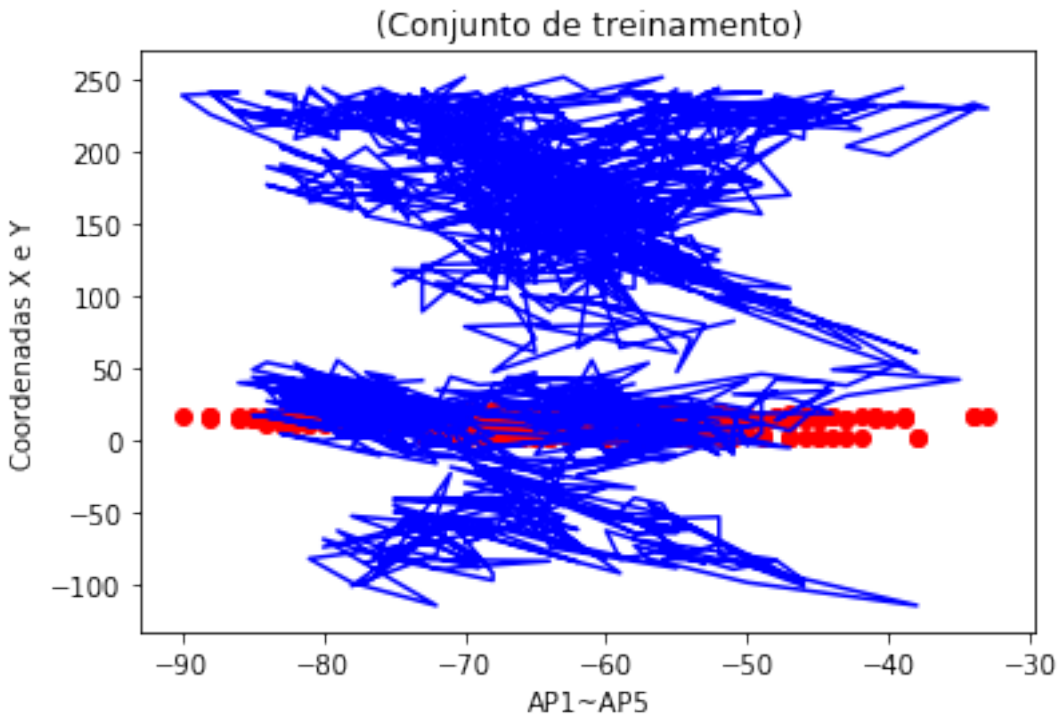
In [19]:
```
# Realizando o fitting da regressão linear múltipla para a base de treinamento
from sklearn.linear_model import LinearRegression
regressor = LinearRegression()
regressor.fit(X_train, y_train)
```

Out[19]:
```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=1, normalize=False)
```

In [20]:
```
# Prevendo os resultados da base de testes
y_pred = regressor.predict(X_test)
```

In [87]:
```
# Visualizando os resultados da base de treinamento

plt.scatter(X_train[:, 0:1], y_train[:, 0:1], color = 'red')
plt.scatter(X_train[:, 2:3], y_train[:, 0:1], color = 'red')
plt.scatter(X_train[:, [4]], y_train[:, 0:1], color = 'red')
plt.plot(X_train, regressor.predict(X_train), color = 'blue')
plt.title('(Conjunto de treinamento)')
plt.xlabel('AP1~AP5')
plt.ylabel('Coordenadas X e Y')
plt.show()
```



In [91]:
```
# Visualizando os resultados da base de testes

plt.scatter(X_test[:, 0:1], y_test[:, 0:1], color = 'red')
plt.scatter(X_test[:, 2:3], y_test[:, 0:1], color = 'red')
plt.scatter(X_test[:, [4]], y_test[:, 0:1], color = 'red')
plt.plot(X_test, regressor.predict(X_test), color = 'blue')
plt.title('(Conjunto de testes)')
plt.xlabel('AP1~AP5')
plt.ylabel('Coordenadas X e Y')
plt.show()
```