kr

December 23, 2024

1 №23

[26]:
```
import numpy as np
import pandas as pd
from scipy.cluster.hierarchy import dendrogram, linkage
import matplotlib.pyplot as plt
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LinearRegression, LogisticRegression
from sklearn.svm import SVR
from sklearn.ensemble import RandomForestRegressor
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn import metrics
from sklearn.metrics import mean_squared_error, r2_score
```

1.0.1 1

. .

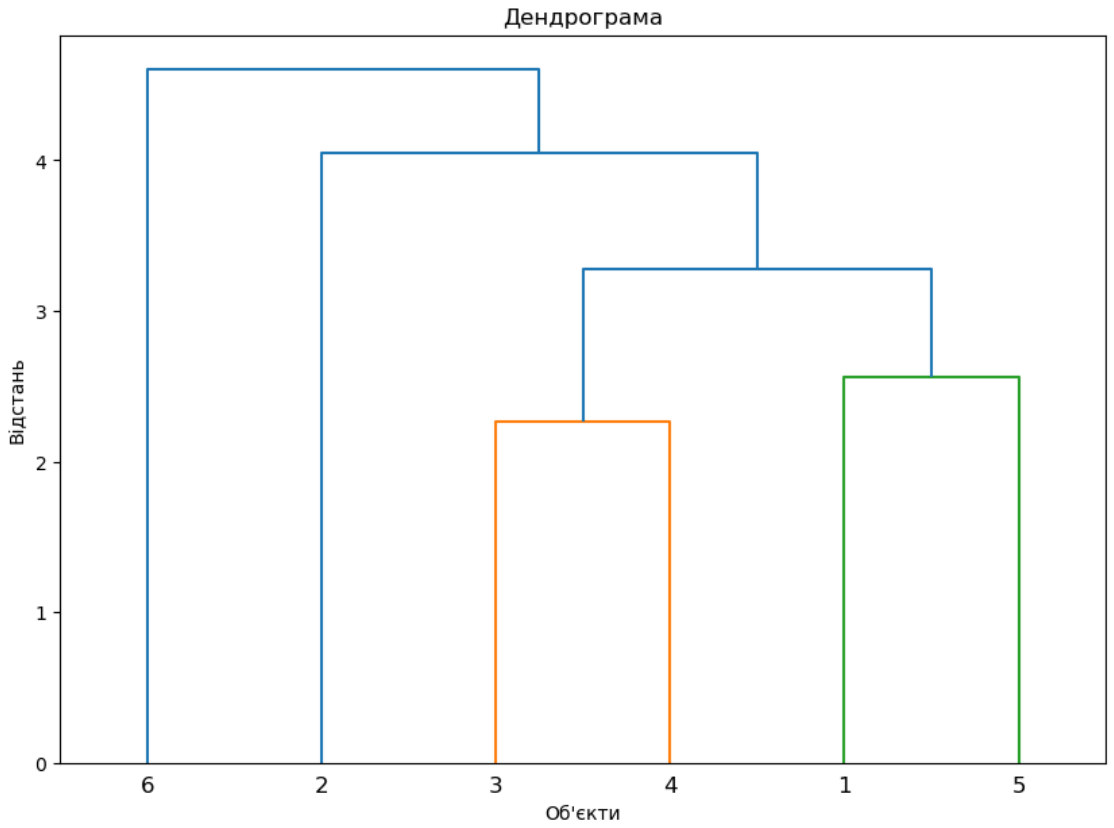
[27]:
```
data = np.array([
    [0, 869000, 3, 67.4, 2008],
    [3, 950000, 3, 72, 1960],
    [3, 563905, 4, 77.78, 2022],
    [4, 670000, 3, 65.1, 2013],
    [1, 442700, 3, 58.25, 2020],
    [4, 496369, 2, 41.57, 2020]
])
```

[28]:
```
scaler = StandardScaler()
data_scaled = scaler.fit_transform(data)

linkage_matrix = linkage(data_scaled, method='ward', metric='euclidean')

plt.figure(figsize=(10, 7))
dendrogram(linkage_matrix, labels=np.arange(1, len(data)+1))
plt.title("      ")
```

```
plt.xlabel(" '   ")
plt.ylabel("    ")
plt.show()
```



1.0.2 2

. R^2

[46]:
```
data = pd.DataFrame([[869, 3, 67, 2008],
                     [950, 3, 72, 1960],
                     [564, 4, 77, 2022],
                     [670, 3, 65, 2013],
                     [443, 3, 58, 2020]],
                     columns=["Y", "X1", "X2", "X3"])
data
```

[46]:

	Y	X1	X2	X3
0	869	3	67	2008
1	950	3	72	1960
2	564	4	77	2022
3	670	3	65	2013

```
4  443   3  58  2020
```

[47]:
```
X = data[["X1", "X2", "X3"]]
y = data["Y"]
```

[48]:
```
regressor = LinearRegression()
regressor.fit(X, y)
```

[48]:
```
LinearRegression()
```

[51]:
```
y_pred = regressor.predict(X)

mse = mean_squared_error(y, y_pred)
r2 = r2_score(y, y_pred)

coefficients = regressor.coef_
intercept = regressor.intercept_
print("          : Y = {:.2f} + {:.2f}*X1 + {:.2f}*X2 + {:.2f}*X3".
  ↪format(intercept, coefficients[0], coefficients[1], coefficients[2]))
print("Mean Squared Error (MSE):", mse)
print("R^2:", r2)
```

```
          : Y = -3602.19 + -724.90*X1 + 44.97*X2 + 1.78*X3
Mean Squared Error (MSE): 1430.6690050494801
R^2: 0.9594717759420961
```