



Tecnológico de Monterrey

Instituto Tecnológico y de Estudios Superiores de Monterrey

A2-Componentes Principales

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22 de Septiembre de 2023

In []: *#A00832272-Julian Lawrence Gil Soares*

```
from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

```
In [ ]: import pandas as pd
import numpy as np
from numpy.linalg import eig
import seaborn as sns
import matplotlib.pyplot as plt

df = pd.read_csv("/content/drive/MyDrive/Stats/paises_mundo.csv")

covariance = np.cov(df, rowvar=False)
correlation = np.corrcoef(df, rowvar=False)

wVa, vVa = eig(covariance)

wCa, vCa = eig(correlation)

# Total variance
total_variance_covariance = np.sum(wVa)
total_variance_correlation = np.sum(wCa)

# Proportion of variance
prop_var_explained_covariance = wVa / total_variance_covariance
prop_var_explained_correlation = wCa / total_variance_correlation

# Cumulative variance
cumulative_prop_var_explained_covariance = np.cumsum(prop_var_explained_covariance)
cumulative_prop_var_explained_correlation = np.cumsum(prop_var_explained_correlation)

print('Covariance:')
for i, prop in enumerate(prop_var_explained_covariance):
    print(f'Component {i + 1}: {prop:.4f}')

print('Cumulative covariance:')
for i, cum_prop in enumerate(cumulative_prop_var_explained_covariance):
    print(f'Components 1 to {i + 1}: {cum_prop:.4f}')

print('Correlation:')
for i, prop in enumerate(prop_var_explained_correlation):
    print(f'Component {i + 1}: {prop:.4f}')

print('Cumulative Correlation:')
for i, cum_prop in enumerate(cumulative_prop_var_explained_correlation):
    print(f'Components 1 to {i + 1}: {cum_prop:.4f}')

plt.figure(figsize=(10, 8))
sns.heatmap(covariance, annot=True, cmap='coolwarm', fmt=".2f", xticklabels=df.columns)
plt.title('Covariance Matrix')
plt.show()
```

```
plt.figure(figsize=(10, 8))  
sns.heatmap(correlation, annot=True, cmap='coolwarm', fmt=".2f", xticklabels=df.col  
plt.title('Correlation Matrix')  
plt.show()
```

Proportion of Variance Explained (Covariance):

Component 1: 0.9035

Component 2: 0.0965

Component 3: 0.0001

Component 4: 0.0000

Component 5: 0.0000

Component 6: 0.0000

Component 7: 0.0000

Component 8: 0.0000

Component 9: 0.0000

Component 10: 0.0000

Component 11: 0.0000

Cumulative Proportion of Variance Explained (Covariance):

Components 1 to 1: 0.9035

Components 1 to 2: 0.9999

Components 1 to 3: 1.0000

Components 1 to 4: 1.0000

Components 1 to 5: 1.0000

Components 1 to 6: 1.0000

Components 1 to 7: 1.0000

Components 1 to 8: 1.0000

Components 1 to 9: 1.0000

Components 1 to 10: 1.0000

Components 1 to 11: 1.0000

Proportion of Variance Explained (Correlation):

Component 1: 0.3664

Component 2: 0.1755

Component 3: 0.1246

Component 4: 0.0063

Component 5: 0.0133

Component 6: 0.0153

Component 7: 0.0297

Component 8: 0.0519

Component 9: 0.0786

Component 10: 0.0722

Component 11: 0.0663

Cumulative Proportion of Variance Explained (Correlation):

Components 1 to 1: 0.3664

Components 1 to 2: 0.5418

Components 1 to 3: 0.6664

Components 1 to 4: 0.6727

Components 1 to 5: 0.6860

Components 1 to 6: 0.7013

Components 1 to 7: 0.7310

Components 1 to 8: 0.7829

Components 1 to 9: 0.8615

Components 1 to 10: 0.9337

Components 1 to 11: 1.0000



