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- In this homework, we used Python to calculate distance (Manhattan) matrices for 4 different attributes in a dataset, and then calculated a combined matrix of all 4 of those. It allows us to see how similar or different objects are from one another.

Co2_Emissions_MetricTons Distance Matrix

```
C02_Difference
✓ 0.0s
[[0.0, 0.59, 0.4, 0.29, 0.16, 0.71, 0.03, 0.24, 0.25, 0.42],
 [0.59, 0.0, 0.2, 0.88, 0.44, 0.12, 0.57, 0.35, 0.34, 0.17],
 [0.4, 0.2, 0.0, 0.69, 0.24, 0.31, 0.37, 0.15, 0.14, 0.03],
 [0.29, 0.88, 0.69, 0.0, 0.44, 1.0, 0.31, 0.53, 0.54, 0.71],
 [0.16, 0.44, 0.24, 0.44, 0.0, 0.56, 0.13, 0.09, 0.1, 0.27],
 [0.71, 0.12, 0.31, 1.0, 0.56, 0.0, 0.69, 0.47, 0.46, 0.29],
 [0.03, 0.57, 0.37, 0.31, 0.13, 0.69, 0.0, 0.22, 0.23, 0.4],
 [0.24, 0.35, 0.15, 0.53, 0.09, 0.47, 0.22, 0.0, 0.01, 0.18],
 [0.25, 0.34, 0.14, 0.54, 0.1, 0.46, 0.23, 0.01, 0.0, 0.17],
 [0.42, 0.17, 0.03, 0.71, 0.27, 0.29, 0.4, 0.18, 0.17, 0.0]]
```

Energy_Consumption_TWh Distance Matrix

```
EnergyConsumption_Difference
✓ 0.0s
[[0.0, 1.0, 0.2, 0.95, 0.99, 0.48, 0.38, 0.22, 0.85, 0.13],
 [1.0, 0.0, 0.8, 0.05, 0.01, 0.52, 0.62, 0.78, 0.15, 0.87],
 [0.2, 0.8, 0.0, 0.75, 0.79, 0.28, 0.19, 0.03, 0.66, 0.07],
 [0.95, 0.05, 0.75, 0.0, 0.04, 0.47, 0.56, 0.72, 0.09, 0.82],
 [0.99, 0.01, 0.79, 0.04, 0.0, 0.51, 0.61, 0.77, 0.14, 0.86],
 [0.48, 0.52, 0.28, 0.47, 0.51, 0.0, 0.09, 0.25, 0.38, 0.35],
 [0.38, 0.62, 0.19, 0.56, 0.61, 0.09, 0.0, 0.16, 0.47, 0.26],
 [0.22, 0.78, 0.03, 0.72, 0.77, 0.25, 0.16, 0.0, 0.63, 0.1],
 [0.85, 0.15, 0.66, 0.09, 0.14, 0.38, 0.47, 0.63, 0.0, 0.73],
 [0.13, 0.87, 0.07, 0.82, 0.86, 0.35, 0.26, 0.1, 0.73, 0.0]]
```

Region Distance Matrix

```
region_difference
✓ 0.0s
[[0, 1, 1, 1, 1, 1, 1, 1, 1, 0],
 [1, 0, 1, 0, 1, 1, 0, 0, 1, 1],
 [1, 1, 0, 1, 1, 1, 1, 1, 1, 1],
 [1, 0, 1, 0, 1, 1, 0, 0, 1, 1],
 [1, 1, 1, 1, 0, 1, 1, 1, 1, 1],
 [1, 1, 1, 1, 1, 0, 1, 1, 1, 1],
 [1, 0, 1, 0, 1, 1, 0, 0, 1, 1],
 [1, 0, 1, 0, 1, 1, 0, 0, 1, 1],
 [1, 1, 1, 1, 1, 1, 1, 1, 0, 1],
 [0, 1, 1, 1, 1, 1, 1, 1, 1, 0]]
```

Country Distance Matrix

```
country_difference
✓ 0.0s
[[0, 1, 1, 1, 1, 1, 0, 1, 1, 1],
 [1, 0, 1, 1, 1, 1, 1, 1, 1, 0],
 [1, 1, 0, 1, 1, 1, 1, 1, 0, 1],
 [1, 1, 1, 0, 1, 1, 1, 0, 1, 1],
 [1, 1, 1, 1, 0, 1, 1, 1, 1, 1],
 [1, 1, 1, 1, 1, 0, 1, 1, 1, 1],
 [0, 1, 1, 1, 1, 1, 0, 1, 1, 1],
 [1, 1, 1, 0, 1, 1, 1, 0, 1, 1],
 [1, 1, 0, 1, 1, 1, 1, 1, 0, 1],
 [1, 0, 1, 1, 1, 1, 1, 1, 1, 0]]
```

Final Distance Matrix

```
distance_final
✓ 0.0s
[[0.0, 0.9, 0.65, 0.81, 0.79, 0.8, 0.35, 0.61, 0.78, 0.39],
 [0.9, 0.0, 0.75, 0.48, 0.61, 0.66, 0.55, 0.53, 0.62, 0.51],
 [0.65, 0.75, 0.0, 0.86, 0.76, 0.65, 0.64, 0.54, 0.45, 0.53],
 [0.81, 0.48, 0.86, 0.0, 0.62, 0.87, 0.47, 0.31, 0.66, 0.88],
 [0.79, 0.61, 0.76, 0.62, 0.0, 0.77, 0.69, 0.71, 0.56, 0.78],
 [0.8, 0.66, 0.65, 0.87, 0.77, 0.0, 0.69, 0.68, 0.71, 0.66],
 [0.35, 0.55, 0.64, 0.47, 0.69, 0.69, 0.0, 0.34, 0.68, 0.67],
 [0.61, 0.53, 0.54, 0.31, 0.71, 0.68, 0.34, 0.0, 0.66, 0.57],
 [0.78, 0.62, 0.45, 0.66, 0.56, 0.71, 0.68, 0.66, 0.0, 0.72],
 [0.39, 0.51, 0.53, 0.88, 0.78, 0.66, 0.67, 0.57, 0.72, 0.0]]
```