CT60A4800 Fundamentals of smart systems – Assignment 3

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1. Datasets

The CSV datasets used for this assignment was obtained from the Finnish Meteorological Institute (Ilmatieteenlaitos), containing records of daily air temperature in December 2021 across 6 cities in Finland: Helsinki, Vaasa, Turku, Jyväskylä, Kuopio, and Rovaniemi. They can be divided into 2 groups: coastal (Helsinki, Vaasa, Turku) and inland (Jyväskylä, Kuopio, Rovaniemi).

2. Analysis

The datasets were analyzed using descriptive method, by visualizing values into line graphs. The original data was numbers recorded from observation stations and did not give much information on how geographical locations (coastal and inland) affected air temperature. By creating illustrations from these data, it would give us a clearer insight.

The data was analyzed using Python, with the pandas and matplotlib module.

Code:

```python
# Import libraries
import pandas as pd
import matplotlib.pyplot as plt

# Read csv
helsinki = pd.read_csv("Helsinki-Vantaa.csv", dayfirst=True, sep=",",
                       header=0, decimal=b".", index_col=0,
                       parse_dates=[[0, 1, 2, 3]], usecols=[0, 1, 2, 3, 5])
kuopio = pd.read_csv("Kuopio.csv", dayfirst=True, sep=",",
                     header=0, decimal=b".", index_col=0,
                     parse_dates=[[0, 1, 2, 3]], usecols=[0, 1, 2, 3, 5])
vaasa = pd.read_csv("Vaasa.csv", dayfirst=True, sep=",",
                    header=0, decimal=b".", index_col=0,
                    parse_dates=[[0, 1, 2, 3]], usecols=[0, 1, 2, 3, 5])
rovaniemi = pd.read_csv("Rovaniemi.csv", dayfirst=True, sep=",",
                        header=0, decimal=b".", index_col=0,
                        parse_dates=[[0, 1, 2, 3]], usecols=[0, 1, 2, 3, 5])
turku = pd.read_csv("Turku.csv", dayfirst=True, sep=",", header=0, decimal=b".",
                    index_col=0, parse_dates=[[0, 1, 2, 3]], usecols=[0, 1, 2, 3, 5])
jyvaskyla = pd.read_csv("Jyvaskyla.csv", dayfirst=True, sep=",", header=0, decimal=b".",
                        index_col=0, parse_dates=[[0, 1, 2, 3]], usecols=[0, 1, 2, 3, 5])
# Yearly plot
plt.figure()
plt.plot(helsinki, color='red', linestyle='-')
plt.plot(vaasa, color='blue', linestyle='-')
plt.plot(kuopio, color='green', linestyle='-')
plt.plot(rovaniemi, color='purple', linestyle='-')
plt.plot(turku, color='orange', linestyle='-')
plt.plot(jyvaskyla, color='yellow', linestyle='-')

# Calculate mean of all locations
mean = (helsinki + vaasa + kuopio + rovaniemi + turku + jyvaskyla) / 6
plt.plot(mean, color='black', linestyle=':')

plt.title("Air temperature in December 2021 at selected locations in Finland")
plt.ylabel("Temperature in [°C]")
plt.grid(True)
plt.legend(["Helsinki-Vantaa", "Vaasa", "Kuopio",
            "Rovaniemi", "Turku", "Jyvaskyla", "Mean"])
plt.show()
```
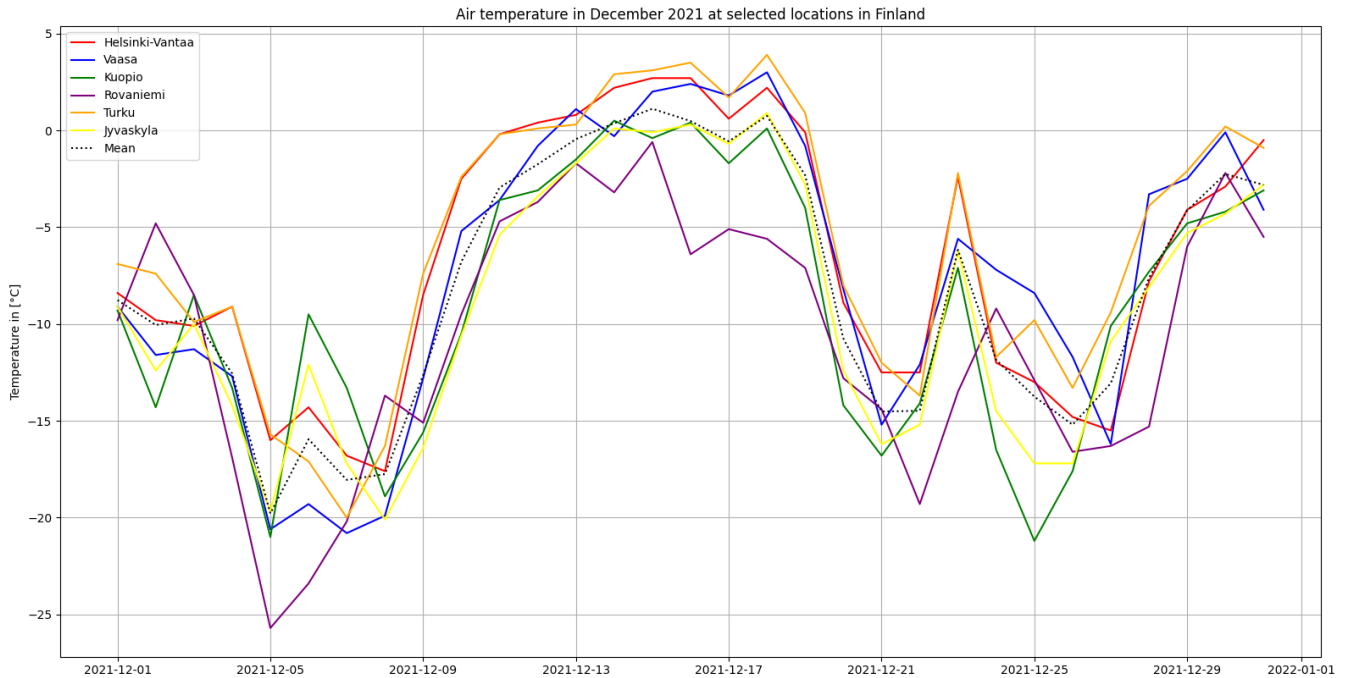
3. Results

Air temperature in December 2021 at selected locations in Finland

The results of the analysis were a line graph with data of the aforementioned cities over from 1.12.2021 to 31.12.2021.

From the line graph, we could see that the air temperature in December 2021 of coastal cities is generally higher than those located inland. This could be interpreted from the fact that the line graphs of coastal cities sit above the mean line, and those of inland cities are below. However, based on this research alone, it is not sufficient to say that in Finland, coastal cities are warmer than those inland in December.