Weather in Slovakia (2018—2024)
Semestral Project Report
PV251 Visualization
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Motivation

The desire to do visualization of weather data stemmed from interest to explore weather or climate changes in a data-driven way. The curiosity was also supported by quite readily available data covering just the right amount of information and rigour for such a small project.

Data Sources and Data Processing

The data for this project originated from the Slovak Hydrometeorological Institute's INSPIRE & OpenData project, which provides meteorological data via CSV files and SensorThings API. The following key details describe the data sources:

- **Project Wiki**: The project's description and objectives are available on the SHMU-INSPIRE-OpenData GitHub Wiki.
- **Forum Thread**: Additional insights about the data were found in a Slovensko.Digital forum thread.
- **Data URL**: The data was fetched programmatically from http://meteo.shmu.sk/customer/home/opendata/

The raw data was preprocessed using Python libraries (Pandas and NumPy). Records with blatantly incorrect values (e.g., negative relative humidity, extreme precipitation values) were dropped. The dataset was divided into multiple CSV files, each corresponding to a single weather parameter. Columns in each file represented individual weather stations.

Explanation of Design Choices

The project was designed mainly to:

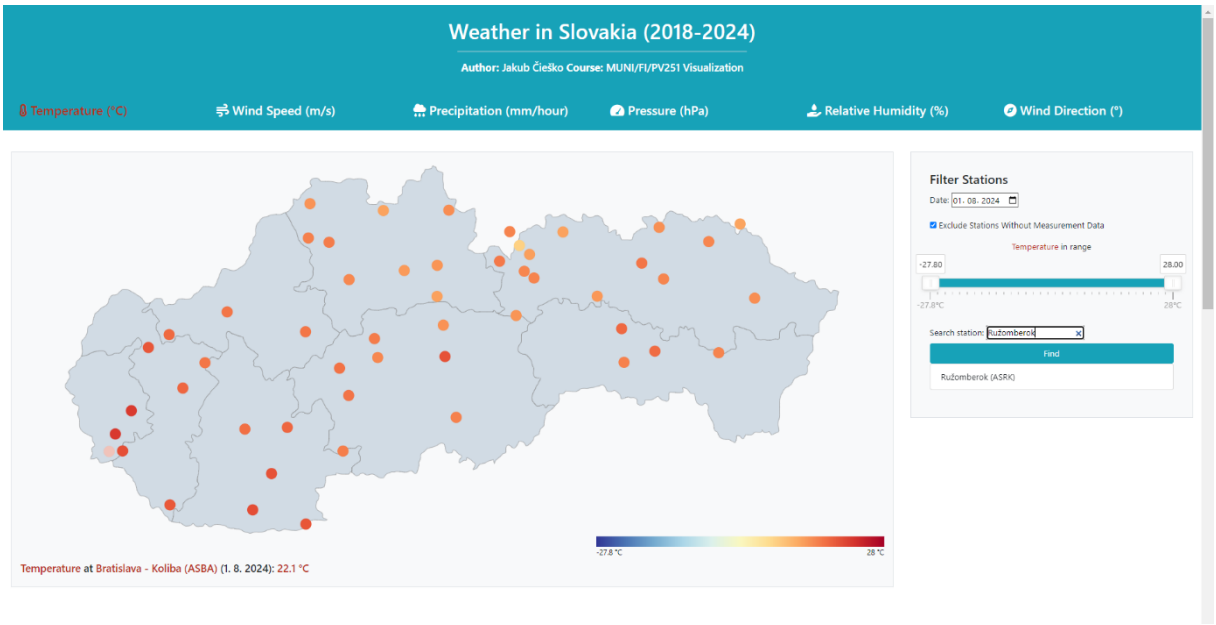
- Present seasonal trends and anomalies.
- Highlight geographical distributions of weather parameters.
- Show interdependencies among variables like precipitation, humidity, and temperature.
- Enable users to compare weather stations and variables of choice.
- Provide well-interactive charts with zooming and cursor features.

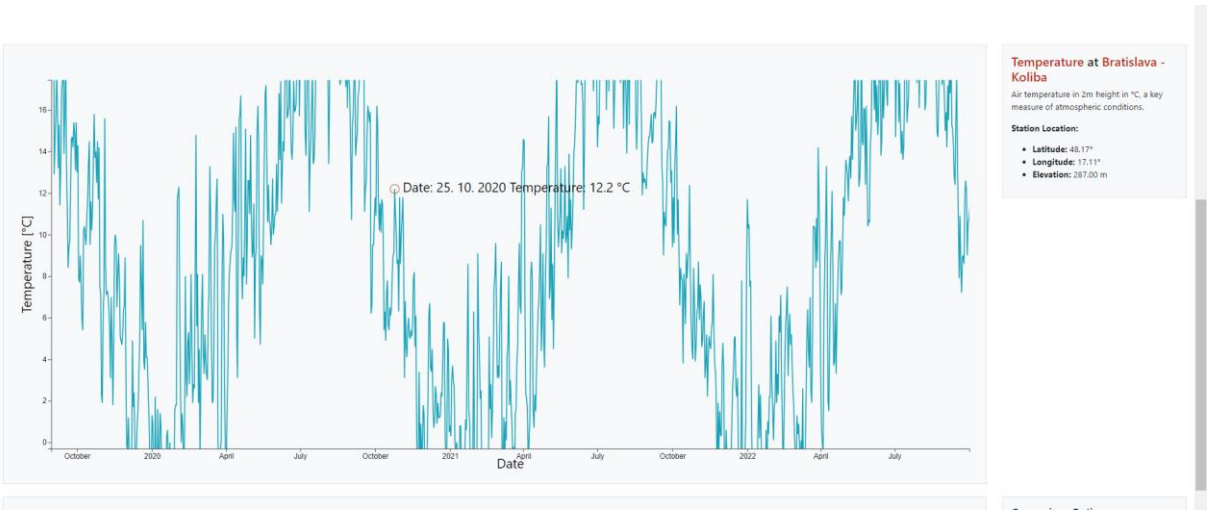
Observations in Visualization

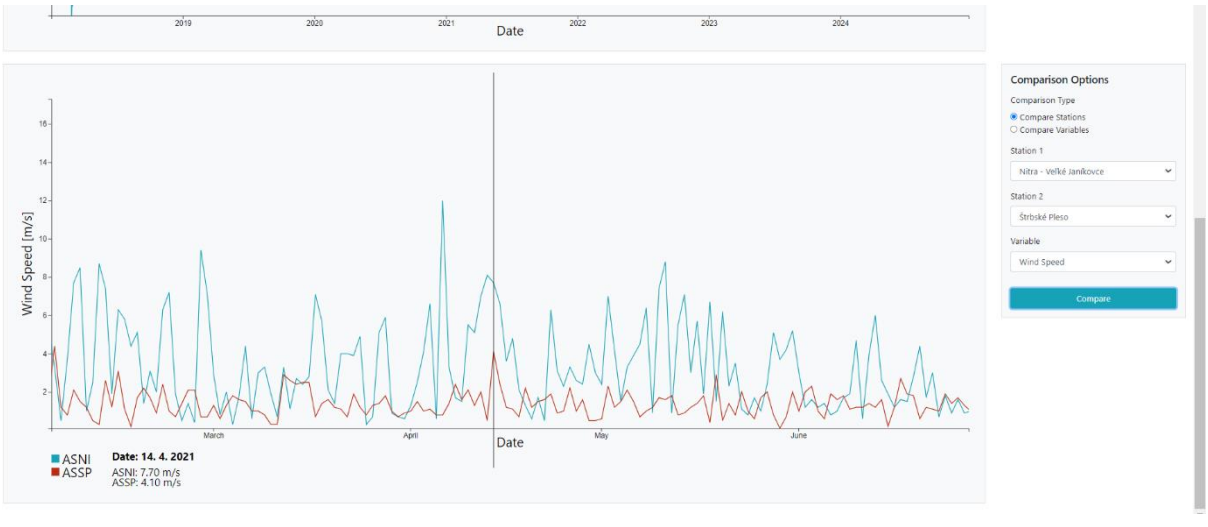
- **Overall Trends**: Weather data suggests an overall increase in temperatures and a decrease in precipitation levels over the years. While these trends seem apparent from the charts, they would need statistical validation for confirmation.

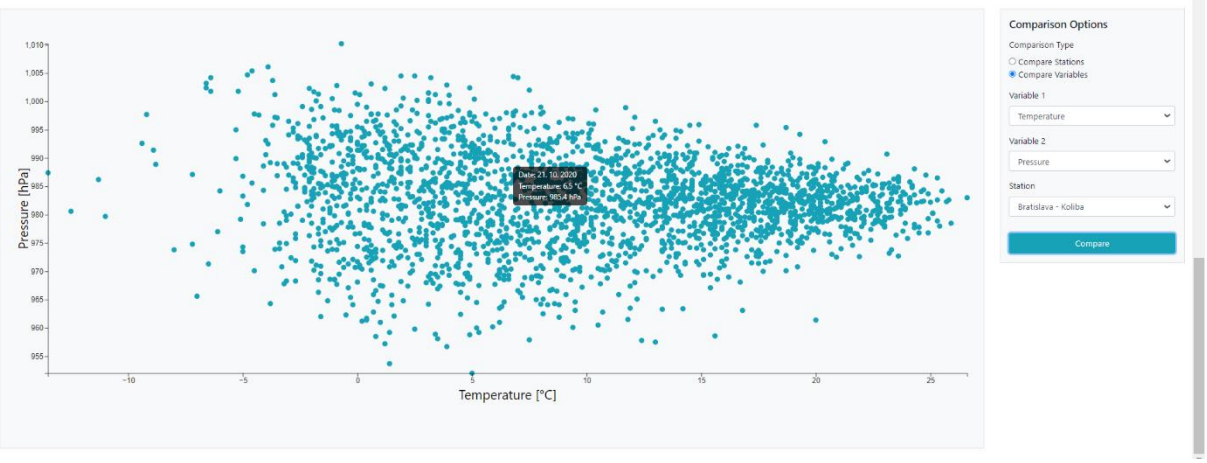
- **Temperature Trends**: Gradual warming trends were evident over the years, indicating potential climate change effects.

Screenshots









Used Technologies

- **D3.js**: For dynamic and interactive chart generation.
- **Bootstrap**: To ensure responsive design for web-based visualizations.
- **Pandas/Numpy**: For efficient data manipulation.
- **noUISlider**: For slider features (https://refreshless.com/nouislider/)

Lessons Learned

D3.js offers incredible flexibility, but its low-level nature makes even simple visualizations require significant effort. The trade-off between flexibility and ease of use was a key realization. Translating ideas into code can be more challenging than anticipated, and some concepts seem better in theory than in practical implementation.