Weather Factors Data (from Crate)

Start Date	2019-01-01 00:02:30
End Date	2023-07-01 00:55:00
N. of Entries	2 901 783

Weather Factors Data (from SMPC)

Start Date	2019-05-24 14:45
End Date	2023-06-30 11:45 PM
N. of Entries	143 267

Origin

This data is collected by *Monitar* (MonitarSense), the company responsible for the provision and maintenance of urban sensors scattered within Porto Municipality to monitor the meteorological factors' conditions. The data was retrieved from a Data Warehouse (*Crate DB*), storing the historical data resorting to an Orion broker API. The data is stored as a monthly *.csv* file, which is aggregated into a single Dataframe.

Additionally, the data concerning "SMPC" Sensor (maintained by "Serviço Municipal de Proteção Civil", namely, under supervision of "Regimento de Sapadores Bombeiros do Porto") is collected through *WeatherLink* platform (WeatherLink Home).

Both datasets (presented) are separate, although relative to the same factors, due to different origin sources and difference in measured parameters.

Transformations

No transformations applied.

Data Dictionary (from Crate)

Name	Description	Type	Default	Example
timestamp	Date & Time of measurement taken	object	null	2019-01-17 22:31:39
date_observed	Date of measurement	object	null	17/01/2019
time_observed	Time of measurement	object	null	22:31:39
entity_id	ID of measuring Sensor	object	null	urn:ngsi-ld:WeatherObserved:porto:weather:ubiwhere:5ad615bb3da2520542bc87fb
entity_type	Type of Sensor	object	WeatherObserved	WeatherObserved
latitude	Sensor Latitude Coordinate	float64	null	41.161724
longitude	Sensor Longitude Coordinate	float64	null	-8.603915
name	Sensors' name	object	null	Marques
barometricpressure	Barometric Pressure measured (HPa)	float64	null	NaN
precipitation	Precipitation measured (L/m^2)	float64	null	0.0
relativehumidity	Relative Humidity measured (between 0 – 1)	float64	null	0.84
solarradiation	Solar Radiation measured (W/m^2)	float64	null	0.2
temperature	Temperature measured (° Celsius)	float64	null	7.4
uv_index	UV Index measured **NOTE: this column has ~90% missing values; that's expected**	float64	null	NaN
uvindexmax	Max. UV Index measured	float64	null	NaN

winddirection	Wind Direction Angle measured (North = 0 Angle)	float64	null	97.0
windspeed	Wind Speed measured (m/s)	float64	null	0.166667

Data Dictionary (from WeatherLink)

Name	Description	Type	Default	Example
Date & Time	Date & Time of measurement taken	object	null	5/24/2019 14:45
Barometer - mm Hg	Atmospheric Pressure (mm Hg, millimetres of Mercury)	object	null	762.6
Temp - °C	Temperature (°C, degrees Celsius)	object	null	22
High Temp - °C	Highest Temperature measured (°C, degrees Celsius)	object	null	22
Low Temp - °C	Lowest Temperature measured (°C, degrees Celsius)	object	null	22
Hum - %	Humidity Level (percentage)	object	null	55
Dew Point - °C	Dew Point Temperature (°C, degrees Celsius)	object	null	13
Wet Bulb - °C	Wet Bulb Temperature (°C, degrees Celsius)	object	null	15
Wind Speed - km/h	Wind Speed (km/h, kilometres per hour)	object	null	6
Wind Direction	Wind Direction	object	null	NW
Wind Run - km	Wind Movement (km, kilometres)	object	null	1.6
High Wind Speed - km/h	Highest Wind Speed measured (km/h, kilometres per hour)	int64	null	18
High Wind Direction	Highest Wind Direction	object	null	NNW

Wind Chill - °C	Wind's Cooling Effect in °C, degrees Celsius	object	null	22
Heat Index - °C	Humidity's Warming Effect in °C, degrees Celsius	object	null	22
THW Index - °C	Temperature-Humidity-Wind Index in °C, degrees Celsius	object	null	22
THSW Index - °C	Temperature-Humidity-Solar-Wind Index in °C, degrees Celsius	object	null	28
Rain - mm	Precipitation in mm, millimetres	float64	null	0.0
Rain Rate - mm/h	Precipitation Rate (mm/h, millimetres per hour)	float64	null	0.0
Solar Rad - W/m^2	Solar Radiation (W/m^2, Watts per square meter)	object	null	850
Solar Energy - Ly	Solar Energy (Ly, Langley units)	object	null	18.28
High Solar Rad - W/m^2	Highest Solar Radiation measured (W/m^2, Watts per square meter)	object	null	909
ET - mm	Evapotranspiration in mm, millimetres	float64	null	0.0
UV Index	Ultraviolet Index	object	null	6
UV Dose - MEDs	Cumulative Ultraviolet Dose in Minimal Erythemal Doses (MED)	object	null	0.7
High UV Index	Highest Ultraviolet Index measured	object	null	6
Heating Degree Days	Measure of Energy demand for heating	object	null	0
Cooling Degree Days	Measure of Energy demand for cooling	object	null	0.041

Urban Sensor Characteristics

Main Characteristics of Weather Factors Sensor from MONITARSENSE Station	Description

Temperature	Resolution: 0.04 °C Measuring Range: -40 - +125 °C Accuracy: ± 0.3 °C
Relative Humidity	Resolution: 0.7 % Measuring Range: 0 – 100 % Accuracy: ± 2 %
Wind Direction	Resolution: 1 ° Measuring Range: 0 – 360 ° Accuracy: ± 3 °
Wind Speed	Resolution: 0.4 m/s Measuring Range: 0 – 89 m/s Accuracy: 0.5 m/s or ± 5 %
Precipitation	Resolution: 0.2 mm Measuring Range: 0 – 999.8 mm Accuracy: ± 0.2 mm or ± 4 %
Solar Radiation	Resolution: 1 W/m^2 Measuring Range: 0 – 1800 W/m^2 Accuracy: ± 5 %
UV Radiation	Resolution: 0.1 (Index) Measuring Range: 0 – 16 (Index) Accuracy: ± 5 %

Info

- Crate:
  - There are inconsistencies in the geographical coordinates (latitude and longitude) that should be accounted for.
  - Columns and/or Sensors may be empty.
  - Initial measurements are at random timestamps. At some point, they will be consistently within a 15-minutes frequency.
  - Some Sensors may not be labelled in "*name*" Column.
  - Column 'uv_index' in the Crate dataset has 90% missing values. A missing value might be a genuine missing value, or represent a value of 0, e.g. because of night time.
- WeatherLink:
  - There are multiple datetime formats in "*Date & Time*" Column.