Weather Factors Data (from Crate)

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| --- | --- |
| **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](https://sense.monitar.pt/)), 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](https://www.weatherlink.com/)).

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/m²) | float64 | null | 0.0 |
| relativehumidity | Relative Humidity measured (between 0 – 1) | float64 | null | 0.84 |
| solarradiation | Solar Radiation measured (W/m²) | 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/m², 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/m², 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/m²  Measuring Range: 0 – 1800 W/m²  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.