WeaCoDi: A Universal Diagram for Visual Representation of Weather Conditions

Abstract

WeaCoDi (from Weather Comfort Diagram, the short name is Weacodi, phonetic transcription: /wiːˈækədi/) is a universal method for visualizing weather forecasts, providing an intuitive representation of climatic conditions. Unlike traditional text-based, graphical, and tabular forecast formats, Weacodi employs a multi-layered diagram that allows users to easily perceive key meteorological parameters. The flexibility of this method enables adaptation to various requirements, displaying both general weather conditions and specialized data in the form of graphs overlaid on the base diagram.

Weacodi serves as an effective Human-Computer Interface, simplifying weather forecast perception and allowing users to quickly assess meteorological conditions without analyzing complex numerical data.

Introduction

Traditional methods of presenting weather forecasts (tables, icons, graphs, text) often require careful examination and analysis, making them less convenient for quick perception. Weacodi offers an alternative data representation method focused on visual perception.

A key feature of this method is the use of layered meteorological data representation, making the diagram intuitive and easy to interpret. Numerical values are either absent or optional, while displayed data remain relative and approximate.

This method provides flexible diagram customization for specific tasks, ensuring clarity without excessive information overload.

Theoretical Basis

Weacodi is based on the principles of human cognitive perception of weather conditions and multimodality. This allows for the use of various sensory channels for a more complete and intuitive understanding of the weather. The diagram is designed to be simple to read, not requiring specific units of measurement, which enables a quick, clear, and intuitive overview of weather conditions. The core idea lies in graphical stratification or the overlay of layered parameters.

Key principles:

- **Layered Data Representation:** Different meteorological data are presented as superimposed layers on a base diagram.
    - The background of the diagram indicates the time of day (day/night), with sunlight intensity representing natural illumination.
    - Cloud cover is shown as a layer over the sunlight intensity graph.
    - Precipitation (rain, snow) is visualized as an intensity graph.
    - Additional parameters such as temperature, relative wind speed, humidity, and comfort level are overlaid as graphs.
- **Relative Values:** All values on the diagram are relative and have arbitrary computed values. They are tailored for specific tasks to provide an approximate assessment of weather conditions without the need for complex numerical data analysis. For example, the comfort level is calculated using weather parameters based on a specific algorithm relevant to the current application context.
- **Visual Intuition:** The absence or optionality of numerical values makes the diagram intuitive and easy to interpret, allowing users to quickly assess conditions.

Alternative Representations

Unlike traditional methods of presenting weather forecasts, such as text-based, graphical, tabular formats, icons, or complex graphs, which often require careful examination and analysis, Weacodi offers an alternative, more visual data representation.

Traditional Methods	**WeaCoDi**
Require careful examination and analysis	Allows for quick assessment of atmospheric conditions
Use numerical data and text	Employs a multi-layered, intuitive diagram
Can be less convenient for quick perception	Focused on visual perception
Can lead to information overload	Ensures clarity without excessive information overload

Weacodi's flexibility enables adaptation to various requirements, displaying both general weather conditions and specialized data in the form of graphs overlaid on the base diagram. This makes Weacodi an effective Human-Computer Interface,

simplifying weather forecast perception.

Weacodi is particularly well-suited for environments with limited display real estate, such as mobile devices and gadgets. Its design prioritizes quick perception and clarity without information overload, making it an effective solution for presenting weather forecasts on smaller screens. By minimizing the need for complex numerical data analysis, Weacodi allows users to swiftly grasp meteorological conditions, a crucial advantage for mobile users who require immediate, concise information. This focused approach ensures that even with restricted screen space, the diagram remains highly readable and informative.

Methodology

Layered Data Representation

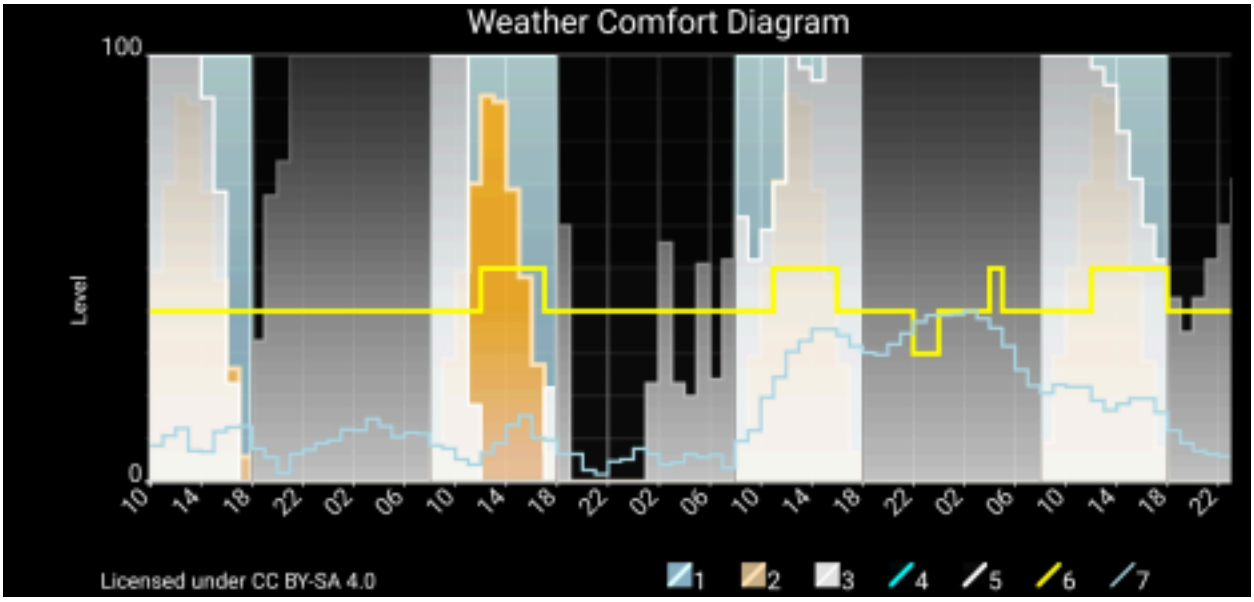
Weacodi is based on the principle of graphical stratification (layered parameter overlay), where:

- The background of the diagram indicates the time of day (day/night).
- Sunlight intensity represents natural illumination.
- Cloud cover is shown as a layer over the sunlight intensity graph.
- Precipitation is visualized as an intensity graph.
- Additional graphs (such as temperature, relative wind speed, humidity, comfort level, etc.) are overlaid on the base layers.

For example, in the diagram below:

- Cloud layers correspond to the actual percentage of cloud coverage.
- Sunlight intensity is a computed value based on an arbitrary algorithm that depends on the time of day.
- The yellow graph represents the comfort level, calculated using weather parameters based on a specific algorithm relevant to the current application context.

This approach allows users to quickly assess weather conditions without the need for complex numerical data analysis.



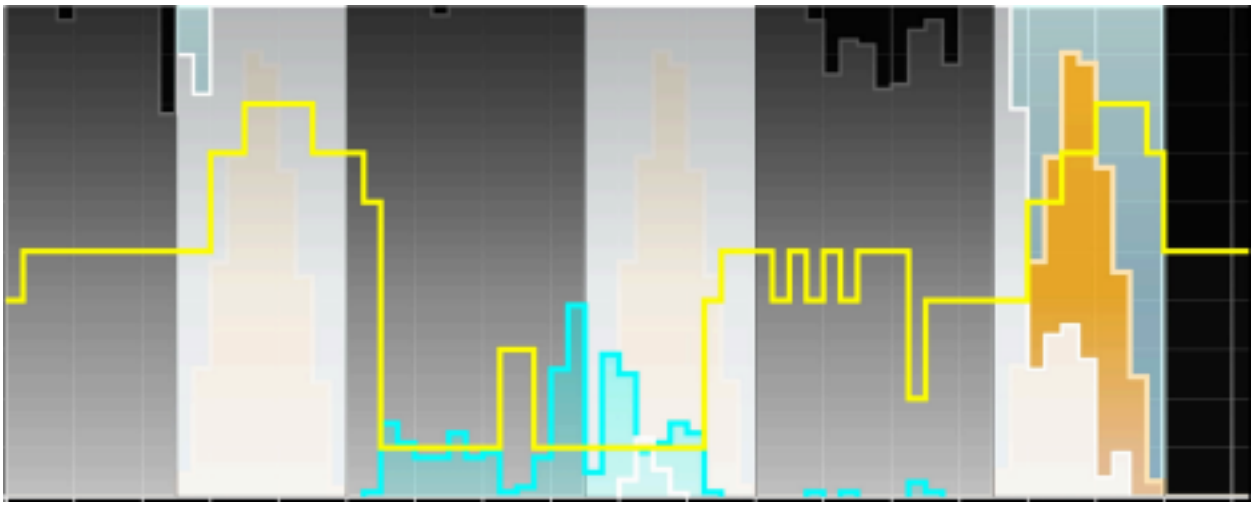
Example (Figure 1). Classic Weacodi look with wind graph.

This example is taken from a mobile application. It includes:

- The Y-axis represents relative values converted into percentage units.
- The X-axis is a time scale.

On the diagram:

- The black background represents nighttime.
- 1 - Daytime.
- 2 - Sunlight intensity.
- 3 - Total cloud cover.
- 4 - Rain.
- 5 - Snow.
- 6 - Comfort level (scaled from 1 to 10).
- 7 - Relative wind intensity (in this example, the maximum wind value on the diagram corresponds to 40 km/h).



Example Diagram (Figure 2). Weacodi basic layers.

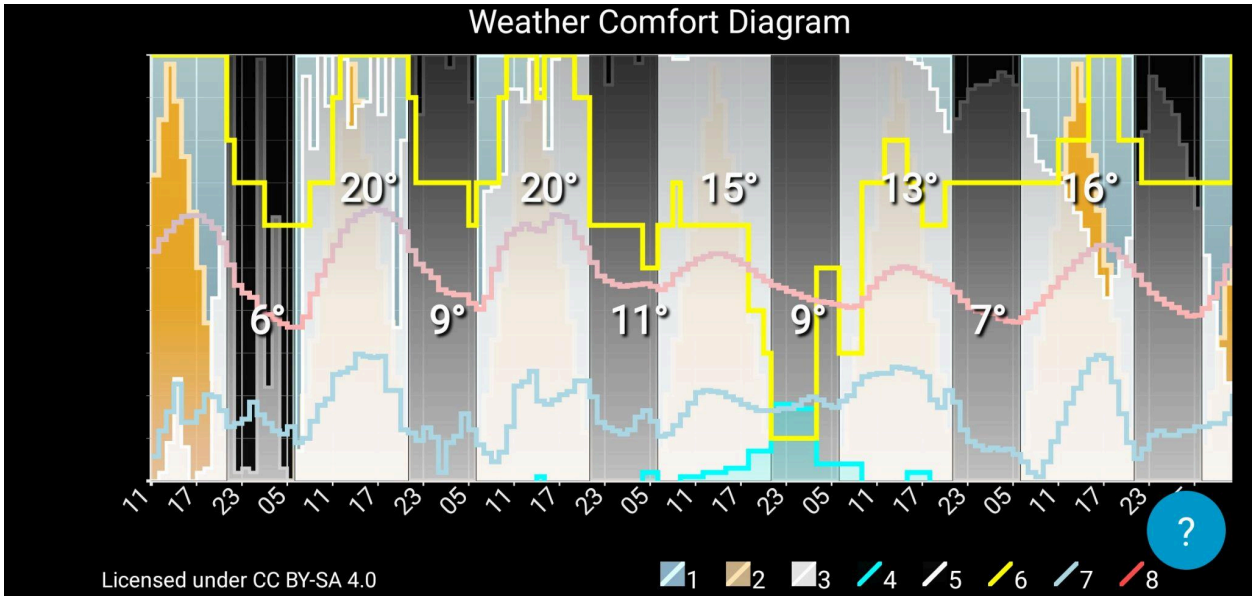
The provided example (Figure 2) illustrates a weather forecast for the next three days.

- Tomorrow will be a good day, although there will be no sunshine as cloud cover will reach 100% for most of the day.
- The following night, light rain is expected, which will continue throughout the night and intensify in the morning.
- The next day will bring a mix of rain and snow, resulting in unfavorable weather conditions.
- However, after that, a beautiful sunny day will follow, providing excellent conditions for training and other outdoor activities.

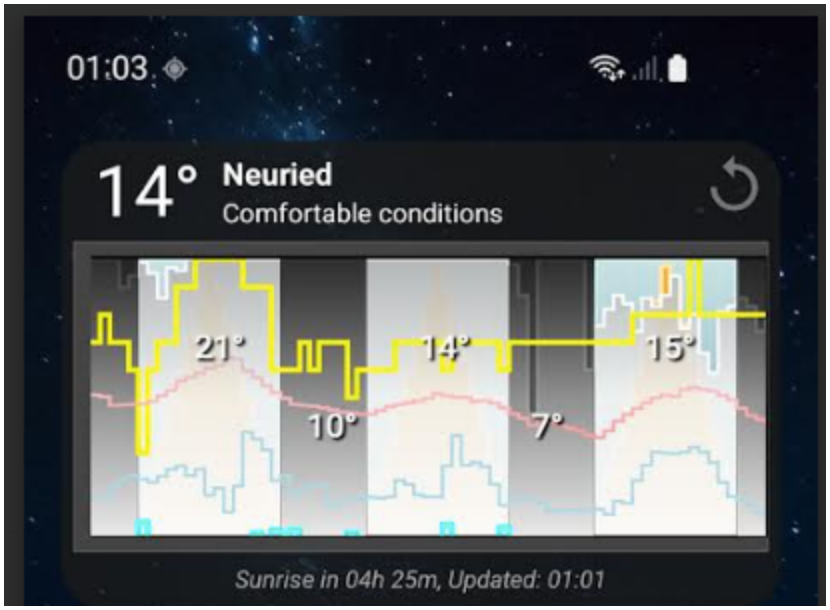
In this example, numerical values on both axes are intentionally omitted to demonstrate that the diagram remains readable without them.

While the core elements listed above form the fundamental basis of Weacodi and are mandatory for its functionality, the system offers the flexibility to integrate **optional numerical values and additional graphs**. These supplementary elements, such as maximum and minimum temperatures, detailed temperature graphs, or wind speed graphs, can be seamlessly added to the diagram. They serve to **complement the information** presented by the core visual elements without hindering readability. Instead, they provide a deeper level of detail for users who require more precise data, enhancing the overall informative value of the diagram. Figures 3 and 4 provide examples of such diagrams, showcasing the integration of numerical values and

additional graphs.



Example Diagram (Figure 3). Weacodi with numbers and graphs.



Example Diagram (Figure 4). Weacodi widget.

Applications and Prospects

Weacodi is suitable for use in various fields, particularly:

- On mobile devices and gadgets with limited screen space.
- In web applications, where quick weather condition assessments are required without reading numerical or textual data.
- As an effective Human-Computer Interface, simplifying the perception of weather forecasts.

The flexibility of customization makes Weacodi a universal tool adaptable to different requirements.

Conclusion

Weacodi introduces a new approach to weather visualization, optimized for human perception.
Layered data representation makes the diagram intuitive and easy to interpret.
Thanks to its flexibility and customization capabilities, this method can be used for both everyday weather forecasting and specialized applications.

Last Updated: May 22, 2025