**Idwimp: A R package for imputation of missing in weather stations data**

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**Summary**

Missing data at weather stations is a common problem in weather data analysis. Missing data can be due to a variety of reasons, such as measurement equipment failure, data transmission errors, or even a lack of personnel to perform the measurements. Missing data can be a problem for climate data analysis, as it can bias the results and reduce the accuracy of the conclusions.

IDW (Inverse Distance Weighting) is a spatial interpolation method that is commonly used to fill missing data in weather stations. The IDW method estimates the missing values based on the values available at nearby weather stations.

**Statement of need**

Filling in the missing data in weather stations is important because climate data is a valuable source of information for a wide range of applications, including agriculture, water management, renewable energy, public health, and urban planning, among others. . Climate data is also crucial for climate change research, as it provides information on long-term climate patterns and trends.

Lack of data at weather stations can have a significant impact on the accuracy of climate models and predictions, which can have important implications for decision-making. For example, the lack of data on the amount of precipitation in a region can lead to underestimation of the availability of water for irrigation, which can affect agricultural production. The lack of data on wind speed in a region can affect the planning of wind energy projects. Lack of data on extreme temperatures can affect planning for climate risk management.

In summary, filling in the missing data at weather stations is important for improving the accuracy and utility of climate data, which can have important implications for decision-making and planning in a variety of sectors and applications.

**Features & Functionality**

The IDW method assigns weights to each nearby weather station, based on the distance to the station where the missing data is required to be filled. Closer values receive more weight than farther values. The formula to calculate the interpolated value at the station where it is required to fill in the missing data is:

V = (ΣWi x Vi) / ΣWi

Where:

V: Interpolated value at the station where it is required to fill in the missing data

Wi: Weight assigned to the climatic station i, calculated based on the distance to the station where the missing data is required to be filled in.

Vi: Value at weather station I

The IDW is a simple method and easy to implement, but it can produce inaccurate results in areas where there are no nearby weather stations or where the distribution of weather stations is not uniform. You can also generate extreme values if the variability of the data is high.

It is important to note that the IDW is only one of many interpolation techniques available to fill in missing data at weather stations and that its use should be carefully evaluated based on the characteristics of the data and the objectives of the analysis.

**Target Audience**

The package is intended for researchers and people working with missing data from weather stations or with images created from remotely sensed satellite images.

**References**