The Analysis of Climate Dataset in Bandung Using Descriptive Statistical Method

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Abstract

Climate data is very interested to be investigated because it is one of the biggest influences of climate factors and several sectors in human life. Statistics acts as a tool for collecting, processing, and analyzing data. Previous research, the process was carried out in the questionnaire. This research aims to calculate the measurements available in the climate dataset using descriptive statistical methods that include concentration measures that measure around the data center and add the size of applications using Microsoft Excel and IBM SPSS 24 applications used for agricultural cultivation, one of which is palm sugar. This research conducted in government agencies, the Meteorological Agency, Climatology, and Geophysics in Bandung during August 2018. The results of applying descriptive statistical methods prove that the average value is 23,326 Celsius, the median value is 23,300 and mode is 23,3. This statistical analysis is correct, describing real data from weather data sets. The conclusion is descriptive statistics are a powerful method for calculating the evolution of different climates based on a specified period. This research has limitations, with data only in August 2018, there will only be a few conclusions. For advice from further research is to use more data so that conclusions and further information obtained.

Keywords: *Descriptive Statistical, Climate, Temperature, Bandung, IBM SPSS 24*

1. Introduction

Because of a large amount of data, when the climate factor analysis must be carried out by certain people period, descriptive statistics may be useful to a certain extent, to download valuable conclusions[1]. The global climate change due to natural and anthropogenic causes of occurrence at different times scientists, policymakers and especially among ordinary citizens who are informed, generally, for the most common means of communication, creating a common culture in relation to this aspect that reveals very interesting facts about what is meant and known for climate change and the consequences that knowledge can lead to mitigating or otherwise increase[2]. Climate change has already substantially reduced production in many parts of the world [3] an emerging Information System research topic which is experiencing a hype phenomenon similar to what had happened to other technologies[4] these and other extraordinary statistics as well as the body of evidence synthesized in the Intergovernmental Panel on Climate Change[5][6]. Specifically, climate services should provide an interpretation of key messages and clearly explain the confidence of the impacts projected by the climate service. Similarly, before making adaptation decisions based on climate service outputs, climate service users must seek out contextual information for a climate service by asking for confidence in the outputs, and requesting spatially and temporally relevant assessments of the outputs, with a particular concern for how well the climate service performs in relation to indicators of interest and the scale(s) of decision-making. [7] Local governments' limited mandate and capacity to adequately deal with increasing climate risk and impacts means that citizen engagement is becoming increasingly important for adapting to hazards such as floods and storms. Stronger collaborative approaches are urgently needed. At the same time, there is little research and hardly any empirical evidence on what inspires adaptation engagement in different citizen groups. [8] In response, governments and development agencies are encouraging the adoption of climate-smart agricultural technologies, including conservation agriculture, with the goal of bolstering productivity, enhancing resilience to weather shocks, and reducing negative externalities [9][10]. Climate change is no more a distant problem. We have been experiencing

changes in climatic variables, such as rising temperature, variable rainfall, frequent droughts, hurricane and typhoons.[11] The hypothesis formulated by observing the population tested in the sample. An adequate number of participants should calculate before the research[12].Frequency distribution of study approaches, dependent variable used in innovation studies[13]. A significant amount of data is needed to understand all these dimensions. Such knowledge is necessary to realize the vision of a smart city, which involves the use of data-driven approaches to improving the quality of life[14][15] to account for individual components associated with services that are consumed by human beings [16]. There was a clear trend in global temperatures from 1882 to 2013 with many short periods of time the temperature was stable or down. Of particular note, from March 1985 to December 2013 there was a sequence of average monthly temperatures that not broken above the 20th century average for each month which produced a total of 346 months[17].

In general terms, the climatic state may be understood conceptually as a joint statistical distribution of several variables describing the Earth system. For the atmosphere, these variables can be wind, temperature, specific humidity at various pressure levels as well as cloud cover, surface precipitation, and sea-level pressure[18][19]. Frequency distribution of publications by study category[20] a frequency distribution specifies the number of occurrences of the selected data based on specific categorization The number of occurrences may Also, be specified using a percentage value for each category[21]. The consequences can be dire if the analysis of scientific content is inadequate, such as wrong results with unwarranted assumptions and conclusions that lack vital support[22][23]. Nine (9) electronic databases selected for this review which is: 1) ACM Digital Library; 2) Emerald; 3) Gartner; 4) IEEE; 5) Science Direct; 6) Scopus; 7) Springer Link; 8) Web of Science; and 9) Google Scholar [24]. The attractiveness of big data can compress in one word, namely spatial prediction - the prediction of both the where and when[14][25]. In general, it can change very quickly due to weather conditions. The weather consists of air temperature towards the wind. Climate data is very interested in being investigated because it is one of the biggest influences of climate factors and several sectors in human life. Significantly, the descriptive analysis and text analysis technique of this review is advantageous to other researchers especially when they intend to embark on a new research topic[21].

Climate can be a reject of the size of weather statistics for an extended period, and the weather states a change in the status of the atmosphere in a fast time. Two essential elements in the climate are temperature and rainfall. In Indonesia, there is the government body that handles climate and weather issues, namely BMKG (Meteorology, Climatology and Geophysics Agency) which spread in various provinces including BMKG Klas 1 Bandung. BMKG Klas 1 Bandung is a non-departmental government institution in Indonesia that has duties in the fields of meteorology, climatology, and geophysics around Bandung.

Weather data is fascinating to research because it is one of the most significant factors that affect climate and several sectors in human life. Analyzing weather cannot be separated from an understanding of the basic pattern of drought before the occurrence of weather changes due to global warming. See the problem at hand; the weather data analysis is carried out using descriptive statistical methods. This analysis also has a variety of considerations such as calculating the mean, median, mode, variance, standard deviation, range, minimum and maximum.

2. Related Works

Palm plants are plants that are very potent in overcoming Food shortages and adaptability, both on various agro-climate starting from lowlands up to 1,400 m above sea level (asl). Palm plants very suitable for sloping conditions with Agro-climate conditions vary from region to region mountains with high rainfall with sandy clay textured soil. The growth of this plant requires the temperature range of 20C to 25C[26] to account for individual components associated with services that are consumed by human beings [16]. Previous research on climate using descriptive statistical methods will complete the analysis. The purpose of previous research to emphasize the usefulness of descriptive statistical methods in analyzing datasets from a single parameter of climate data, temperature using a specific Statistical program [1] . Statistics remains highly relevant irrespective of the bigness of data. It provides the basis to make data speak while taking into account the

inherent uncertainties. Statistical analysis involves developing data collection procedures to handle different data sources further and to propose formal models for analysis and predictions. Some statistical methods are varying from sophisticated data requirement (e.g., dispersion models) to simple inference models (e.g., proximity-based models) for air quality prediction. Each of the methods has their specific data and computational requirements[14][27]. Descriptive analysis is the statistical data analysis techniques which always performed before conducting any statistical test of a more complicated model. Can be explained by describing and characterizing data[21]. We used descriptive statistics: we reported categorical variables as numbers with percentages and ordinal variables as medians with interquartile ranges[28]. In other research, presents two descriptive statistical methods: graphical and numerical charts and tables used to organizing and visualize collected data. Numeric values are calculated to summarize data. Number called parameter to describe population; data called statistics to characterize samples. The most useful numeric value for defining a set of observations is the size of location, dispersion, and symmetry. Generally, graphical methods are better for numerical methods for identifying patterns in data, although mathematical approaches are more precise and objective. Using both is wise. The following part, first, introduces the type of statistical data (quantitative or qualitative), and then, how to organize and visualize data collected using tables and graphs. Several types of statistical measurements (location, dispersion, and symmetry) are also discussed to provide summary data numerically[29].

Distribution of each frequency determines the number of occurrences of selected data based on specific categorization. Total events may also be identified using a percentage value for each category. A frequency distribution can illustrate by the table or graphical visualization such as line charts, pie charts, and bar charts. Meanwhile, central tendency describes the middle values of the selected data which usually represented using mode, mean and median values[21]. Frequency distribution of publications by research category[20] a frequency distribution specifies the number of occurrences of the selected data based on specific categorization, The number of circumstances may also, be determined using a percentage value for each category[21]. According to [30] is processed data showing different variables, measurement scales, and coding responses were given to the questions in the questionnaire by participants in the survey. This approach is adopted to obtain quantitative information in a form.

Previous research, the process was carried out in the questionnaire. This research shows that need to develop but can measure the size of the data and the size of the spread of data. Process In climate data using a combination of Microsoft Excel and IBM SPSS 24 and adding graphics to make it more transparent.

3. Methodology

3.1. Descriptive Statistical

Statistics are used to analyze data by describing or describing data that has collected as it is without intending to make generally accepted conclusions or generalizations[31]. A major reason for calculating statistics and summarizing a set of data. A mass of numbers is not usually very informative so we need to find ways of abstracting the key information that allows us to present the data in a clear and comprehensible form. In this chapter, we will look at the example of a collection of data and considering the best way of describing and summarizing it. [32]

3.1.1. Mean

The mean is the average value of the data set. Means calculated by the sum of the value of the data then divided by the amount of data.[33]

$$\bar{x} = \frac{X_1 + X_2 + X_3 + ... + X_n}{n} \tag{1}$$

3.1.2. Median

The median is the middle value of the data set. [33]

$$\bar{x} = \frac{n+1}{2} \tag{2}$$

$$\bar{x} = \frac{1}{2}[\frac{n}{2} + \langle\frac{n}{2} + 1\rangle] \tag{3}$$

3.1.3. Mode

The mode is the variable value that has the highest frequency. please sort from sort the number from the smallest X_1 to X_n Modes can be found on data that has been sorted and which have not been sorted. [33]

3.1.4. Variance

Variance is a variant of data obtained from multiple standard deviations. [34]

$$\sigma^2 = \frac{\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2}{n(n-1)} \tag{4}$$

3.1.5. Standard Deviation

Standard deviation is the square root of variance. Like a mean, variance, and standard deviation are parameter of a population and are identified by Greek letters.[35] The variation in data distribution where the greater the distribution value means the data is more varied. [36]

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2}{n(n-1)}} \tag{5}$$

3.1.6. Range

Range is the number of numbers who have not been elected. [37]

$$R = Xmax - Xmin \tag{6}$$

3.1.7. Minimum

The minimum value is the lowest value obtained by each variable. [36]

3.1.8. Maximum

The maximum value is the highest value obtained by each variable. [36]

4. Experiment

Research data involved in the process using descriptive statistical methods in the Data of the Meteorology, Climatology and Geophysics Agency in August 2018 shown in Tables 1. Perform descriptive statistics on the evolution of climate parameters represented by Celsius temperature. The amount of data entered is 31 days of temperature data obtained in the city of Bandung.

Input from this data in the form of climate data consisting of 31 days, explains that every day in August the temperature of the air temperature may change due to several factors such as the angle of arrival of the sun and cloud factors can also affect changes in temperature.after getting the data, the data will be processed using Microsoft Excel and IBM SPSS 24. The output of this data is the concentration measure consisting of the mean, median and mode. While for the size of the distribution consists of variance, range, standard deviation, minimum and maximum.

Table 1. August Research Sample

Date	Day	Air Temperature
1	Wednesday	23.1
2	Thursday	21.9
3	Friday	21.9
4	Saturday	21.2
5	Sunday	21.2
6	Monday	21.7
7	Tuesday	22.8
8	Wednesday	22.3
9	Thursday	23.6
10	Friday	23.3
11	Saturday	23.3
12	Sunday	24.1
13	Monday	24.9
14	Tuesday	24.8
15	Wednesday	23.3
16	Thursday	23.5
17	Friday	23.3
18	Saturday	22.9
19	Sunday	22.5
20	Monday	23.1
21	Tuesday	24.9
22	Wednesday	25.0
23	Thursday	24.6
24	Friday	24.5
25	Saturday	23.8
26	Sunday	23.1
27	Monday	23.8
28	Tuesday	24.7
29	Wednesday	23.3
30	Thursday	23.1
31	Friday	23.6

4.1. Mean

The information that can be obtained from Tables 1 with the means equation 7 where the amount of data divides the bar from all calculations, see 8 for how to apply the calculations and 9 for the results of the calculation method. There are 31 data with numbers 723.1 / 31 so the result is 23.3.

$$\bar{x} = \frac{X_1 + X_2 + X_3 + ... + X_n}{n} \tag{7}$$

$$\bar{x} = \frac{23.1 + 21.9 + 21.9 + 21.2 + 21.2 + 22.8 + 22.3 + 23.6 + 23.3 + 23.3 + ... + 23.6}{31} \tag{8}$$

$$\bar{x} = \frac{723.1}{31} = 23.3 \tag{9}$$

So, the average temperature of August 2018 is 23.3 as calculated in table 1 Finding this mean is done to represent the value of the variables that have been examined whether large or small in number through the average count.

4.2. Median

Information can be obtained from Tables 1 and using with the median equation if the total odd data 10 In addition, if the total event data is12. However, the data taken is 31, including the

odd number, the method of calculation and the results can be seen in 11. It can be observed that the median result of the calculation method can be ascertained that the median value is 23.3.

$$\bar{x} = \frac{n+1}{2} \tag{10}$$

$$\bar{x} = \frac{31+1}{2} = 16, X16 = 23.3. \tag{11}$$

$$\bar{x} = \frac{1}{2}[\frac{n}{2} + \langle \frac{n}{2} + 1 \rangle] \tag{12}$$

The median value in August 2018 is 23.3 as calculated in Figure 5.2. Calculating this median is useful for determining many data so that the middle value can be searched.

4.3. Mode

To calculate the mode look at table 1, please sort from the number from the smallest X_1 to X_n. Starting from 21.2, 21.2, 21.7, 21.9, 21.9, 22.3, 22.5, 22.8, 22.9, 23.1, 23.1, 23.1, 23.1, 23.3, 23.3, 23.3, 23.3, 23.3, 23.5, 23.6, 23.6, 23.8, 23.8, 24.1, 24.5, 24.6, 24.7, 24.8, 24.9, 24.9, 25. There are 31 data. Look for the middle number which is between the numbers 15 and 16. the result is 23.3. The mode is used to find out which values often come out so that the value can be a reference in research.

4.4. Variance

Looking from the calculation calculated in equation 13, it can produce a value of 1.140 because the variance is always non-negative in this case indicating that the variation of data in this dataset is tiny. This variance described as a measure of the distance value from the average.

$$\sigma^2 = \frac{\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2}{n(n-1)} \tag{13}$$

$$\sigma^2 = \frac{31 \times 16901.09 - 522873.61}{31 \times 30} \tag{14}$$

$$\sigma^2 = \frac{523933.81 - 522873.61}{930} \tag{15}$$

$$\sigma^2 = \frac{1060.2}{930} = 1.140 \tag{16}$$

4.5. Standard Deviation

In equation 11 and 12, the deviation value is 1.06. These used to search for population data which is very difficult to do. Therefore, it is necessary to use a data sample that can represent the entire population so that it is easier to carry out this research.

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2}{n(n-1)}} \tag{17}$$

$$\sigma = \sqrt{1.140} = 1.06 \tag{18}$$

4.6. Range

In equation 13 and 14, can explain that the value of the range is 3.8. This value may obtain because of the difference between the data and the most considerable value with the data with the smallest value. The range used for discussion in the frequency distribution list.

$$R = Xmax - Xmin \tag{19}$$

$$R = 25.0 - 21.2 = 3.8 \tag{20}$$

4.7. Minimum

In table 1, the lowest or minimum value is 21.2. Minimum has usually used data sample. These used to determine the smallest data value compared to all other data in the dataset.

4.8. Maximum

In table 1, the highest or maximum value is 25. Maximum usually uses a data sample. These used to determine the largest data value compared to all other data in the dataset. For the

Statistics

Air Temperature

N	Valid	31
	Missing	0
Mean		23.326
Median		23.300
Mode		23.3
Std. Deviation		1.0677
Variance		1.140
Range		3.8
Minimum		21.2
Maximum		25.0
Sum		723.1

Figure 1. The Result

results of the spss application can be seen in figure 1.

5. Result and Discussion

Conduct a descriptive statistical method for the evolution of climate parameters represented by temperature, in August 2018. In the implementation, various ways can do. Involve a series of steps, with Microsoft Excel and IBM SPSS 24 programs for the Windows version. Thus, in this research, the application of tools descriptive statistics emphasize the good and satisfying data homogeneity so that it can calculate the value of the concentration size and the size of the distribution of climate data.

6. Conclusion and Future Work

6.1. Conclusion

In this case, August, at descriptive statistics options using for calculate mean, median, mode, and some will select, while for August. Whereas for the spread size such as standard deviation, variance, range, minimum and maximum. For the results of the calculate are the Mean value is 23,3. The Median value is 23,3. Moreover, Mode value is 23,3. Standard Deviation value is 1.07. Variance value is 1.14. Range is 3.8. The value Minimum from 31 data is 21.2 and the value maximum is 25.0. Thus, in this research, the application of tools descriptive statistics emphasize the good and satisfying data homogeneity so that it can calculate the value of the centering size and the size of the spread of climate data.

6.2. Future Work

1. More data is used so that the information produced is more about the climate.

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