Development of BasicStat: An R package as supporting tools for basic statistics learning

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Development of BasicStat: an R Package as Supporting Tools for Basic Statistics Learning

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Abstract. The aim of the study is to develop supporting materials for learning basic statistics (BasicStat: an R Package) that can be used by students in analyzing data classified as basic statistics. This type of study is development research or known as Research and Development (R & D). The results of this study are the R package in the form of BasicStat is very useful as a support for Basic Statistics lectures for students strengthened by the results of the questionnaire which results: (1) all respondents stated Happy (66.7%) and Very Happy (33.3%) with the existence of Package R as a support for lecture learning, which means that R package is very meaningful for students in lectures and (2) all respondents (100%) chose R software in statistical analysis because this software is free and open source when compared to other statistical software and 5.6% chose R software because it can be used across platforms (Windows and Macbooks).

INTRODUCTION

In conducting research, of course, data is needed to be processed and analyzed in order to draw a conclusion. The ability to process and analyze the data is certainly very much needed in research [1] like a student doing his thesis research. Therefore understanding the processing and analysis of this data is important.

In processing and analyzing data, there are several software that can be used. Some of them that are popular today are SPSS and Minitab. Both software are closed source based or require a license to use them. However, there is also some software that functions to process and analyze data based on open source or does not require a license to use it, including R software [2], [3]. So it is important to determine which statistical software will be used in conducting data analysis [4].

However, in the current situation, most students still do not know how to operate R software and of course this is related to student literacy in using software. In processing and analyzing data, they are only focused on manual calculations which of course are not always effective and efficient. Sometimes there are some errors in performing calculations caused by the large amount of data analyzed and the students' theoretical knowledge of statistics, especially the science of analyzing data. In addition, the lack of computer facilities and internet networks at schools and universities sometimes hinders the development of data analysis knowledge for students [5]. As a result, many students have difficulty in completing their final assignments at the tertiary level. Therefore, in this case, it is necessary to develop student competencies, especially in processing and analyzing data using R software. With the development of this R package, student center learning (SCL) learning can be effective [6][7].

METHODS

The type of this study is development research or known as Research and Development (R & D). The development of learning support materials in this study adapted the SDLC Waterfall model [8]. The implementation of this study was carried out at the Department of Mathematics Education, Universitas Negeri Makassar, Indonesia. The subjects of this study are students of the Department of Mathematics Education who programmed the Basic Statistics course. The choice of this course is because this course is a subject taught by researchers.

RESULTS AND DISCUSSION

Results

BasicStat R Package is a package for statistical software R. This R package is run on R using the R Commander package in the form of the Rcmdr Plugin.[9]. R Commander is a graphical interface package for R software. R Commander makes it easy for R users to perform data analysis because basically R software is text-based software in its analysis. With the existence of R Commander, users who were initially not very interested in R software became interested because it was presented in the form of a Graphical User Interface (GUI).

This package contains several tests of basic statistical methods:

- overall data description,
- data description per variable,
- data frequency distribution,
- missing data,
- histogram,
- stem and leaf,
- boxplot,
- scatterplot,
- bar graph,
- pie chart.

FIGURE 1. Information display when BasicStat is running in R software.

FIGURE 2. Displays the types of statistical analysis from BasicStat

```
Rcmdr> with(Data, stem.leaf(matematika, na.rm = TRUE))
1 | 2: represents 1.2
 leaf unit: 0.1
            n: 179
   6      80 | 000000
  17      81 | 0000000000
  26      82 | 000000000
  37      83 | 00000000000
  53      84 | 0000000000000000
  60      85 | 0000000
  72      86 | 000000000000
  78      87 | 000000
  89      88 | 0000000000
 (9)      89 | 000000000
  81      90 | 000000000
  72      91 | 00000
  67      92 | 000000000
  58      93 | 000000000
  49      94 | 000000
  43      95 | 00000000000
  32      96 | 0000000000
  22      97 | 0000000000000
   9      98 | 000000000
```

FIGURE 3. Statistical analysis output results from BasicStat

Users Responses

To see the responses from students regarding the R Package, the data collection process was carried out using a questionnaire or questionnaire. And 18 questionnaires have been collected from those who took the Computational Statistics course.

1. Did you know about Packages in R before?

From this question, it is known that there are around 27.8% of students who do not know about Package in R.
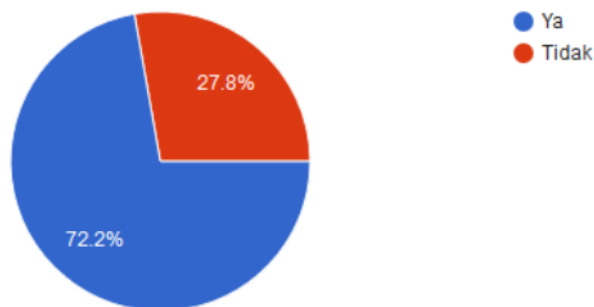
● Ya
● Tidak

27.8%

72.2%

FIGURE 4. Question 1: did you know about Packages in R before (in Indonesia).

2. Have you been helped in Basic Statistics using Package R (BasicStat) as a lecture support material?
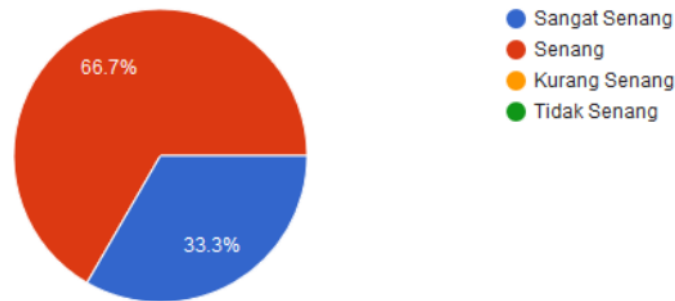
FIGURE 5. Question 2: have you been helped in Basic Statistics using Package R (BasicStat) as a lecture support material (in Indonesia).

From the results of the questionnaire analysis, it was found that all respondents were Happy (66.7%) and Very Happy (33.3%) with the Package R as a support for lecture learning. Which means that Package R is very meaningful for students in their lectures.

3.   What is your reason for choosing R Software?

All respondents (100%) chose R software in statistical analysis because this software is free and open source when compared to other statistical software and 5.6% chose R software because it can be used across platforms (Windows and Macbooks).
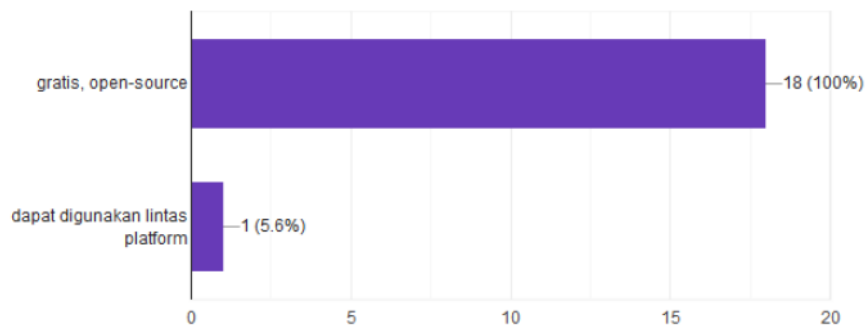
FIGURE 6. Question 2: what is your reason for choosing R Software (in Indonesia).

Here are some responses from students regarding the use of the R Package in learning:

- Very helpful in learning.
- Using R is very helpful in inputting data and can also help in determining the mean, median, and mode and can make it easier to manage data.
- R is one of the software that helps in statistics lectures. The software setup is quite easy. This is also reinforced by [10] that R Commander is to provide a simple-to-use and easy-to-install GUI for R.

CONCLUSION

Based on the results of research data analysis, it can be concluded that the R Package in the form of BasicStat is very useful as a support for Basic Statistics lectures for students because it helps in learning and is easy to use and can be used across platforms (Windows, Linux, and Macbooks).

ACKNOWLEDGMENTS

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