SIMULATION OF NEW STUDENT PREDICTION AMOUNT USING THE MONTECARLO METHOD

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ABSTRACT

With this prediction simulation system the number of new students is expected predict the number of new students entering each of the coming years. Implement the method Monte Carlo and also apply this prediction simulation application while simultaneously testing the level of accuracy and the efficiency of the data generated using this method. Data collection is carried out by means of directly observing objects by sampling data that already existed in 2015 - 2019 to be able to predict the following year. The results of testing this method are of how many number of new students each year and the level of accuracy will be seen. It can be concluded that the use of the Monte Carlo Method in this study is as a method that can be provides information on the maximum profit generated through a number experiment random. The more experiments carried out, the better the results.

INTRODUCTION

Admission of new students is annual routine activities carried out at school and university. RA Al Fariq is favorite private school in Buntu Pane who will carry out the reception prospective new students. Acceptance system new student is still very manual in terms of estimate or predict how many students who will be accepted are also not yet can be sure how many results. To meet the needs above can be done with modeling and simulation, by taking sample of new student admission data in years beforehand so that it can be predicted for the year going forward One of them by using the montecarlo method. The process of MC simulation was divided in three different steps.

Monte Carlo simulation becomes more popular in project management, more creative studies.[1] Monte Carlo method The Basics of Monte Simulation Carlo is a probable element experiment by using a random sample. Simulation Monte Carlo in determining the value of options can be calculated using matlab software, visual basic and PHP. [2]

In this case the Monte Carlo method too nicknamed self-learning monte carlo (SLMC) where an efficient algorithm was first learned from training data generated in the simulation and then used to speed up the simulationin fact.

The Monte Carlo method is a approximation very general and useful for estimating expectations arising from stochastic simulations. However, the price can be expensive computationally, especially if the costs of producing stochastic samples the individual is very high, as in the case of PDEstochastic. Multilevel Monte Carlo is newly developed approach that greatly reduces computing costs by doing most simulations with low accuracy at a low cost, with a little simulation of that done with high accuracy and high cost.[3]

In the Monte Carlo method with an algorithm Metropolis modeling process begins with subsidize the initial model parameters. From the results simulation is obtained that the pattern similarity to the time series.[4]

Analysis in the whole process requires measurement of uncertainty and a combination of probabilities of uncertainties individual. This quantitative analysis sometimes requires a computer program. One of the technique used for risk analysis in a manner quantitative and modeling techniques are MonteCarlo Modeling and Simulation. [5]

METHOD

This research methodology contains an overview or steps to be implemented in doing research. This needs to be established so that research can be done with structured. The steps to be taken must cover everything from studying the problem to with the existence of a system that can be produced so that the problem can be resolved. After the process using the done, then the next step determine the Monte Carlo Simulation by five steps are there.

1. Define or determine distribution probability for the variables urgent.
2. Compute the cumulative distribution for each variable in firts step
3. Set an interval of random numbers (random numbers) for each interval.
4. The form of random numbers (Generating Random Numbers) Using the mixed congruent method) The formula for Generate Random Number :
   a. Mixed Congruent Method
   b. Multiplicative Method
5. Simulate from a series of experiments by connecting random numbers with random number intervals.

RESULT AND DISCUSSION

In this predicting the number of new students at RA Al Fariq using the Montecarlo method. This mechanism aims to see if the results of the tests that have been done in accordance with the expected goals.

Mechanism testing to compare those results obtained in the calculation process with use Montecarlo simulation model for predict the number of new sis in RA Al Fariq by using the system which has been designed. After testing is complete, the test results will appear on the form simulation whether the montecarlo method can meet expectations in realizing the number of new student admissions was reached in accordance with the expectations of the parties school later as material decision-making. This testing mechanism can be done in the following ways:

1. Test the case in a way collect the necessary data in software testing
2. Determine the expected results, namely results peruse the previous data that is on RA Al Fariq School is associated with new student admission for three years the last by doing the calculation process Manually.
3. Running the Draft has been designed to score - random value against probability - possibilities to be obtained admission of new students who will done in the new school year
4. See the comparison test results with expected results. If there is a difference result, it will be corrected accordingly with the errors found.

For the Montecarlo Simulation Calculation Stages the data used is the previous years' ago. Can be seen in the following table and image :

Table 1. Table New Student of The Years

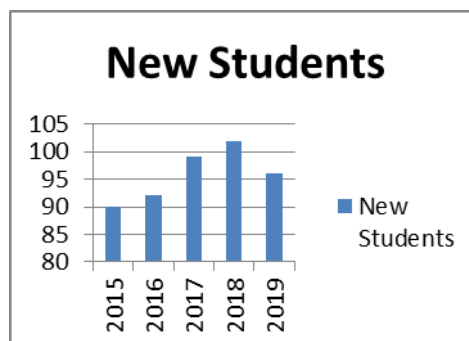| Number	Years	New Student of The Years
1	2015	90
2	2016	92
3	2017	99
4	2018	102
5	2019	94
Total		479

image 1. Diagram Of New Student

The following is a calculation for the probability distribution of new student admissions in the past five years.

1. For the first we can make Creating a Probability Distribution from Variable. In the process of completing the first stage, this is done by sharing each data annually with the amount of data available. Can be seen in the table below:

Table 2. Table Probabilty

Number	Years	New Student of The Years	Probability
1	2015	90	0,188
2	2016	92	0,192
3	2017	99	0,206
4	2018	102	0,213
5	2019	94	0,201

2. Calculating the Probability Distribution Cumulative distribution variable probability. Conversion from an ordinary probability distribution be a cumulative distribution, that is, by means of add up every possible number with the previous amount. Here is a calculation of distribution calculations for the cumulative likelihood of student admission new. We can be seen in the table below :

Table 3. Table Probabilty

Number	Years	New Student of The Years	Probability	Cumulative Probability
1	2015	90	0.188	0.188
2	2016	92	0.192	0.380
3	2017	99	0.206	0.586
4	2018	102	0.213	0.799
5	2019	94	0.201	1.000

3. Make Interval of each variable, The determination of the value of this interval is a calculation last before entering numeration random (Generating Random Number). Could seen in the table 4.

Table 4. Table Interval Random Number

Number	Years	New Student of The Years	Probability	Cumulative Probability	Interval Random Number
1	2015	90	0.188	0.188	001-188
2	2016	92	0.192	0.80	189-380
3	2017	99	0.206	0.586	381-586
4	2018	102	0.213	0.799	587-799
5	2019	94	0.201	1.000	800-1000

4. To create random numbers we can use Microsoft Excel software by using the Randbetween command, for example for random numbers from 1- 1000, we write the command: = randbetween (1.1000) and it is repeated a number of lines required. In this random number generation stage, the researcher used Excel microsof to speed up the calculation process of this study. Any values taken in this calculation can be seen in the following image below.
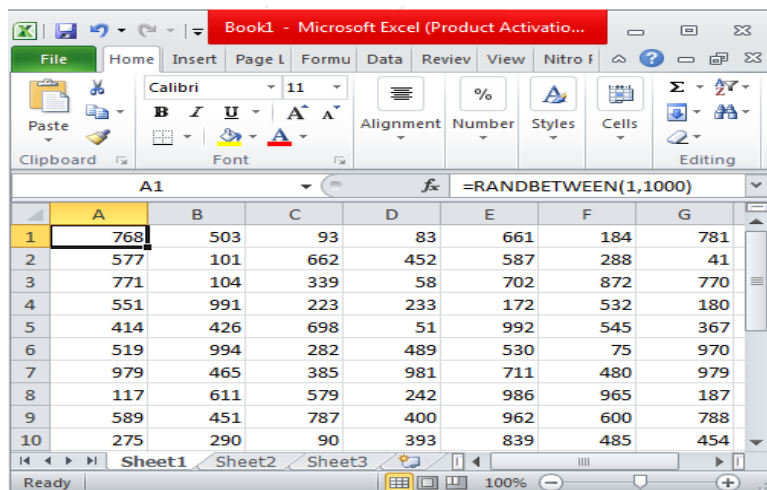

image 2. Random Number Generator

5. Create a simulation of a series of experiments We can simulate an experiment by taking random numbers From the picture above, for example, we will make a simulation for 1 year, for the 2020 school year. We take Column A1 inimage 2. The method of determining the demand is determined by a random number. For example if the random number is 768 the number lies in the 587-799 interval means 102 new students. So that for the 2020 RA AlFariq will have new student 102 people, the table can be see above :

Table 5. Table New Student of The Years

Number	Years	New Student of The Years
1	2015	90
2	2016	92
3	2017	99
4	2018	102
5	2019	94
6	2020	102

CONCLUSION

After simulation and number prediction new student RA Alfariq Buntu Pane using the Monte Carlo method then it can Conclusions are drawn, based on the results of prediction simulation New students use the Monte Carlo method which has been done, the value is obtained predictions for the next five years are obtained average values for predictions per five years, every year and average grade every class The application of the Monte Carlo method is an algorithm using numbers random, then every random number that is used will display the results remains the same is the result of prediction. Implementation in equalizing results manual calculation and from the system must done in order to know is there or not difference in results. The level of accuracy of manual calculation resultswith a simulation application for predictionusing the Monte Carlo method is very fittingand 100% accuracy.

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