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Linear Regression Algorithm the Effect of Game Time on Students' Reading Interest

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Abstract

Education plays an important role in shaping an individual's character and abilities, with students' interest in reading as the main foundation for intellectual development and critical thinking skills. However, in today's digital age, there has been an alarming decline in students' interest in reading, who are more interested in spending their free time playing games than reading. The development of information technology and digital entertainment such as smartphones, tablets, and computers has changed students' habits in utilizing their free time. Playing games is the main choice, while reading interest is marginalized, which has a negative impact on students' literacy skills. The decline in reading interest has serious implications, especially in Indonesia, where the Human Development Index (HDI) in the field of education is still low compared to neighboring Malaysia. This low interest in reading is influenced by the lack of reading habits from an early age and unequal access to education. Good reading skills not only affect academic achievement but also the development of critical, analytical, and creative thinking skills. This study aims to understand the factors that affect students' interest in reading, especially the influence of game time. The Simple Linear Regression method was used to analyze the relationship between game play time and students' reading interest, which provided valuable insights for educators and parents in designing effective educational strategies. The study focused on SMP Negeri 7 Binjai and used a linear regression method to analyze data on students' reading and gaming habits. The results of the study show that excessive game playing time, an average of 9 to 10 hours per day, has an impact on increasing and decreasing students' interest in reading. This data was analyzed using the RapidMiner application, which showed a correlation between playing games and students' reading interest.

Keywords: *Reading Interests, Games, Regression, Literacy, Education*

1. Introduction

Education is an important factor in shaping a person's character and abilities. One of the main aspects of education is students' interest in reading, which is the foundation for intellectual development and critical thinking skills. However, in this digital era, we are witnessing a worrying phenomenon of declining students' interest in reading. Many students are more interested in spending their free time playing games than reading. The development of information technology and digital entertainment, such as smartphones, tablets, and computers, has affected students' habits in using their free time. Gaming activities have become the main choice for many students, while reading interests tend to be marginalized. As a result, we see a decline in reading interest among students, which has a negative impact on their literacy skills.

The decline in students' interest in reading has serious implications. Where students focus more on playing games than reading. According to research conducted by the United Nations Development Programme (UNDP), the Human Development Index (HDI) at the education level in Indonesia is still relatively low, at 14.6%. Much lower than Malaysia which has a percentage of up to 28%. The low interest in reading in Indonesia can be influenced by several factors. The first factor is the lack of reading habits that are instilled from an early age. Even though childhood is a golden age where in this phase children are experiencing very rapid growth so that parents can shape their children's characters. Second, uneven access to educational facilities and the lack of quality of educational facilities [1] Good reading skills not only affect academic achievement, but also play an important role in the development of critical, analytical, and creative thinking skills.

2. Literature Review

2.1. Mechine Learning

Machine learning is a part of artificial intelligence that is widely used to solve various problems. This article presents a review of problem solving from current research by classifying machine learning into three categories: supervised learning, unsupervised learning, and

reinforcement learning. The results of the review show that all three categories still have the potential to be used in some current cases and can be improved to reduce the computational burden and accelerate performance to obtain high levels of accuracy and precision. The purpose of this article review is expected to find gaps and be used as guidelines for future research. Machine Learning is the study of algorithms to learn how to perform certain tasks that are automatically performed by people. Here, learning refers to the ability to perform various existing activities or to correctly extrapolate new conclusions from various previously observed patterns [2].

2.2. Reading Interest

Reading interest includes continuous efforts to do reading activities, strong desires and interests, and the tendency to continuously feel pleasure without coercion, of one's own will, or without external encouragement. Reading interest leads to the acquisition of information, understanding, knowledge, skills, motivation, and facts presented through reading materials. The content read is very beneficial for the personal growth of the reader, family, and society as a whole [3] Interest is a high tendency or fondness from the heart or a great desire for something. Meanwhile, according to the Big Indonesian Dictionary, reading is defined as seeing and understanding the contents of something written by speaking or only in the heart. Meanwhile, reading interest is the driving force for children to be interested, pay attention, and enjoy reading activities so that they are willing to do these activities happily of their own accord [4].

2.3. Game

Game comes from English which means game. Gaming is generally a recreational activity that aims to have fun, fill free time, or do light exercise. Games are usually played alone or together. Playing video games can be one way to entertain yourself. In addition, it provides a refreshing effect for a tired mind. If you feel bored after a day of activities at school, games can be a solution to relieve boredom and restore enthusiasm for other activities [5] A game is a game that is used to play. An item or something in general that aims to entertain or get pleasure, games can also be played using certain rules with the aim of getting victory or pleasure. Most students must have played games, either through consoles such as playstations, through computers, or through cognitive styles characterized by the ability to multitask while studying, short attention spans while studying, and exploratory learning approaches. They prefer to learn through experimentation rather than direct instruction, they move easily and quickly from one information or activity to another, if the information is no longer considered interesting to them [6].

2.4. Regresi Linier

Linear regression is a statistical method for modeling the relationship between a bound variable (bound, response, Y) and one or more independent variables (independent, predictor, X). If there is only one independent variable then it is called simple linear regression. If there is more than one independent variable, it is called multiple linear regression. The purpose of multiple linear regression analysis is to find out how several independent variables affect a dependent variable and to be able to predict the value of a dependent variable if the value of all independent variables is known [7].
Simple regression analysis is an approach method for modeling the relationship between one dependent variable and one independent variable. In a regression model, the independent variable describes its dependent variable. In a simple regression analysis, the relationship between the independent variable(X) will be followed by a change in the dependent variable(Y) on a fixed basis. While the relationship is non-linear, the change of variable X is not followed by the change of the variable Y proportionally [8].

A simple linear regression equation is mathematically expressed by:

1. Variable:
   X = (free variable / (predictor) : frequency of playing games
   Y = (bound variable / (response) : number of books read
2. Data

The data shows the frequency of playing games and the number of books read by each student, there are several important columns:
G = Variable assessment x (how often do you read)
A = Variable rating x (how often you play games
Y = number of books read
X^2 = square x
Y^2 = kuadrat y
XY = assessment between X and Y

2. Formula for calculating Linear Regression coefficients, constants and mape

a. Steps

Use the formula to calculate the regression coefficient (slope,b) and constant (intercept a).
Formula for Regression coefficient (b):

$$B = \frac{N(\Sigma XY) - (\Sigma X)(\Sigma Y)}{N(\Sigma X^2) - (\Sigma X)^2}$$

Where n is the amount of data (students)
Formula for intercept (a):

$$A = \frac{(\Sigma Y) - (\Sigma X)(\Sigma XY)}{N(\Sigma X^2) - (\Sigma X)^2}$$

Persamaan regresi linier : Y = a + bx
Information:

X : independent variable / index (t = 1, 2, ..., n) n is the number of periods
Y : Dependent variable / Nilain predicted the tth period
A : constant (value of Y if X = 0)B : regression coefficient (influence + or -) is the rate of change

MAPE Calculation Formula :

$$MAPE = \Sigma \left| \frac{Y - \hat{Y}}{N} \right| X\ 100\%$$

where =
1. Y is the actual value
2. $\hat{Y}$ is the predicted value
3. N is the amount of data

2.6. Rapid Miner

Rapid miner applications use an object-oriented method in the Java hierarchy and can be used on almost all operating system platforms.Rapid miners are flexible to use and implement at different levels. Rapidminer implements a learning algorithm that is implemented to the entity sheet from the command line. Rapidminer includes tools for entity preprocessing, classification, grouping, regression, cooperation, and visuals. Rapid miners can process entities, integrate them into learning plans, and analyze the resulting classifiers as well as their performance, all without writing any code. The implementation of Rapid miner is to apply a learning method to a dataset and analyze the results to gain insights from the data, or implement a number of formulas and compare performance at will in the dataset to keep users focused on the dataset being used [9], [10]. Rapid Miner is an application that has received many awards, including in 2017, RapidMiner received an award from KDNuggets as the most popular general platform for data mining/data science. Rapid Miner was first developed in 2001 by Raft Klinkenberg, Ingo Mierswa, and Simon Fischer. The software can work on both standalone and network environments. RapidMiner can integrate with data mining, text mining, machine learning, predictive analytics, and business analytics. For data minning itself with many functions so that it is easier to implement [9].

Fig. 1: RapidMiner App Logo

3. Analysis and Design

3.1. Metode Penelitian

Research methodology is a science that studies how to make a correct scientific research. Activities that are carried out with strict rules and their goal is to build knowledge that ultimately gives birth to multidimensional science, can be defined in various ways, each of which is not a complete definition. In the way of thinking, with a scientific attitude as the main nature of science. Others emphasize the importance of the way of doing things, the scientific method, as the main nature of science. On the other hand, people consider the results of the application of these scientific methods, that is, a systematic and coherent collection of knowledge, as the main nature of science.

3.2. Supporting Data

The supporting data used by the research on the problem of reading interest in SMP Negeri 7 Binjai amounted to 400 students who filled out questionnaire data on the effect of game time on students' reading interest in SMP Negeri 7 Binjai.

3.3. Flowchat Penelitian Regresi Linier

The Linear Regression flowchat is the sequence of steps or flows in a process or algorithm. To describe the process flow of the Linear regression algorithm works from start to finish, it is used in programming as well as analysis. clearly explain how a process runs, so that it is easy to understand. Below is an image display of the flowchat system that will be created:

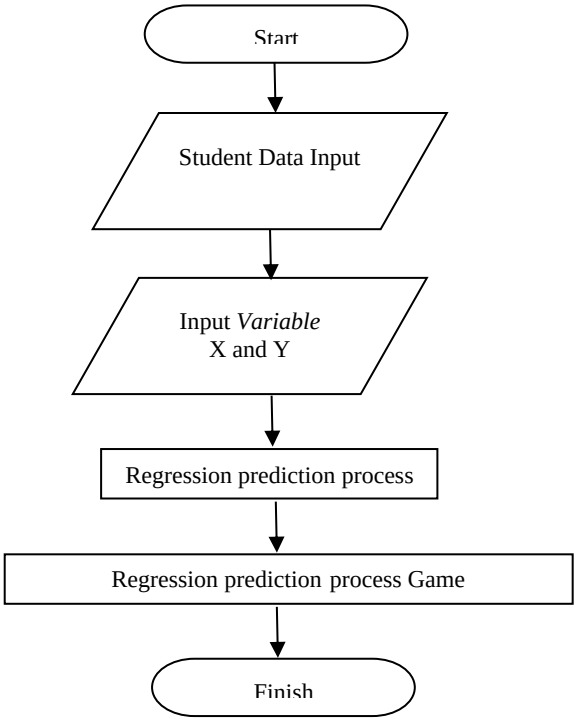

Fig. 2: Linear Regression Prediction Flowchart

3.4. System Database Design

The following is a dataset design to build a prediction system for the level of influence of game time on students' reading interest using the linear regression method, the database design is as follows:

1. Dataset table

Table 1: Dataset Table

No	Field Name
1	Free / Predictor
2	Not free / Response
3	X = g + h Description: G = How Often You Read A = How often do you play games
4	Y= Books Read

1. The effect of reading interest on students playing games at SMP N 7 Binjai
2. Variable = x= (bebas) predictor)
   Y= (non-free/ response)
   X = play the game
   Y = the book read

The following is a manual calculation table to find the value of x

Table 2: X^2, Y^2 and XY calculation table

	Data	X		Data results from g + j	The result of the letter variable from the book that the student reads is converted into a number	The result of multiplying the value x times 2	The result of multiplying the value x times y
No	**Student Name**	**G**	**J**	**X**	**Y**	**X2**	**XY**
1.	Muhammad Al-Haqqi	40	60	100	25	10000	2500
2.	Agina Br smbiring	60	60	120	25	14400	3000
3.	Jems Wilsen Ginting	60	40	100	40	10000	4000
4.	Daffin paradise Simanjuntak	60	60	120	25	14400	3000
5.	Louis feldro bangun	60	60	120	25	14400	3000
6.	Haga Mesato Mendrofa	60	60	120	35	14400	4200
7.	Johanes purba	60	60	120	40	14400	4800
8.	Marcellino Imanuel Marpaung	60	60	120	35	14400	4200
9.	Kesya aginta ginting	60	60	120	25	14400	3000
10.	ira Syafira nurdina	40	60	100	25	10000	2500
11.	syifana umara br sembiring	60	60	120	25	14400	3000
12.	Ziyya Adinda	60	40	100	40	10000	4000
13.	Daniel ibrena Sitepu	60	60	120	25	14400	3000

Table. 3: Assessment of the X variable table

G (How often do you read?)	**Value**
Sometimes	60
Often	40
J (How often do you play games?)	**Value**
Sometimes	60
Often	40

Table. 4: Assessment of variable Y

Books read	**Value**
Novel	25
Lesson	40
Funny	35

Based on letters and converted into numbers to be able to enter the achievement of regression calculations where the results of the assessment I asked the principal to do calculations on linear regression.

G = How often do you read
J = How often do you play games?
Y= Books read

3.6. Linear Regression Calculation Koeficent Regression (b)

- Calculate regression coefficienti (b) :
  B = 13 (44200) – (1480) (390) /13 (169600) – 2190400)
  B = 574600 - 577200 / 2204800 – 2190400.00
  B = - 2600 /14400.00 = -0,18055555556

3.7. Calculate regression coefficienti(a)

A = (390) (169600) – (1480) (4420) /13(169600) – (2190400)
A = 66144000 – 64416000 / 220800 - 2190400
A = 728000 / 14400.00 = 50,55555556

3.8. Calculation Steps

Error Rate Calculation on the Effect of Game Playing Time on Reading Interest

Table. 5: Calculation of MAPE Error rate

No	**Student Name**	**Result of the number of variables x (g + j)**	**The number of book variables that are read from letters is converted into numbers**	**Prediction data (Ŷ)**	**Data Difference (Y – Ŷ)**	**Mape Error (%)**
1	Muhammad al- haqqi	100	25	32.500	-7,500	0,23
2	Agina sembiring	120	25	28.889	-3,889	0,13
3	Jems wilsen	100	40	32.500	-7,500	0,23
4	Daffin paradise	120	25	28.889	-3,889	0,13
5	Louis feldro bangun	120	25	28.889	-3,889	0,13
6	Haga mesato	120	35	28.889	6,111	0,21
7	Johanes purba	120	40	28.889	11,111	0,38
8	Marcellino imanuel marpaung	120	35	428.889	6,111	
9	Kesya ginting	120	25	28.889	-3,889	0,21
10	Ira syafina nurdina	100	25	32.500	-7,500	0,13
11	Syifana umara br sembiring	120	25	28.889	-3,889	0,13
12	Ziyya adinda	100	40	32.500	-7,500	0,23
13	Daniel ibrena sitepu	120	25	28.889	-3,889	0,13
				361140,889		250%

MAPE = 250 X 100 % / 13 = 20%
Based on the test results, the prediction error rate on the effect of game playing time at SMP N 7 Binjai School is 20% or 80% accuracy
RMSE = 493,961,419,753 / 13 = 6.164

From the results of the calculation according to the formula, the result of the magnitude of error was 6.164%. So, the accuracy level of the prediction data value is 93.964%. The prediction results using a simple linear regression method are said to be very accurate and good for predicting a value that is not known with a high level of accuracy using RMSE.

4. Analysis and Planning

4.1. Discussion

The research was conducted at SMP N 7 Binjai where I went to the school to meet the resource person for me to ask for permission to conduct research on the effect of playing games on students' reading interest.The student data that will be predicted is data obtained from SMP N 7 Binjai School The process carried out for the calculation of student data prediction plays games utilizing the application of data

mining using the Linear Regression method. The general of Data Mining itself is the process of searching for hidden patterns (hidden patern) in the form of knowledge (knowledge) that is not previously known from a set of data. Meanwhile, linear regression is a statistical method used to model the relationship between one or more independent variables (predictors) and dependent variables (responses). The main goal of linear regression is to find the best line that can predict the value of a dependent variable based on the value of an independent variable.The data discussed in the previous chapter, after analyzing and designing the system, the final stage of the research is the discussion and testing of the system. The data that will be predicted is the data of junior high school students n 7 binjai where the data amounts to 387 students from the questionnaire form With the system that is built, a knowledge can be generated about how many numbers or the number of levels students playing games at SMP N 7 Binjai are from the variable number of students whose game time is very high which results in a decrease in the student's interest in reading in a more effective and efficient way.

4.2. Implementation

Implementation is the implementation stage as well as testing for the new system and is the stage where the application will be operated in actual conditions. The implementation at this stage is the final stage process of applying the Linear Regression method, in the system predicting data according to the design that has been carried out. Implementation is carried out on the RapidMiner application by applying the Linear Regression method, to the program so that the system can carry out the data prediction process by utilizing according to the prediction stages. From the results of the design that has been carried out, the process has successfully applied the linear regression method to predict the level of playing games for SMP N 7 Binjai students.

a Select the file or input data file to be processed by the RapidMiner application on the read exel operators. Then the data to be processed is with the data with the name of the Ramadan thesis file in a folder called Said Thesis. Next, select the sheet that will be processed on the system, the selected data is on a sheet named overall data that will be tested in RappIdMiner, the following is the display in the data retrieval process on RapidMiner:

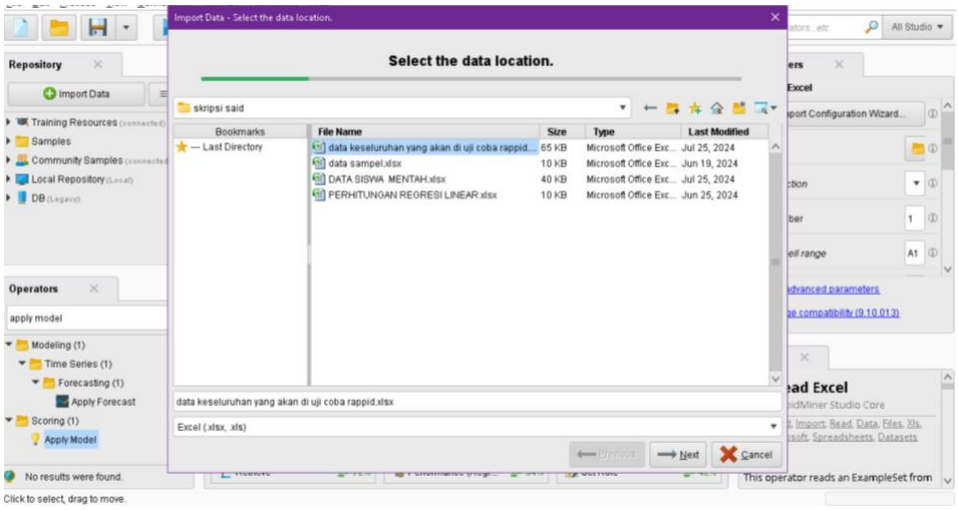

Fig. 3 Data retrieval process on RappIdMiner

4.2.1. Process design design on RapidMiner

The following is a view of the design of the Prediction process on RapidMiner in the form of Read Exel, Linear Regression and Apply Model, then click run:

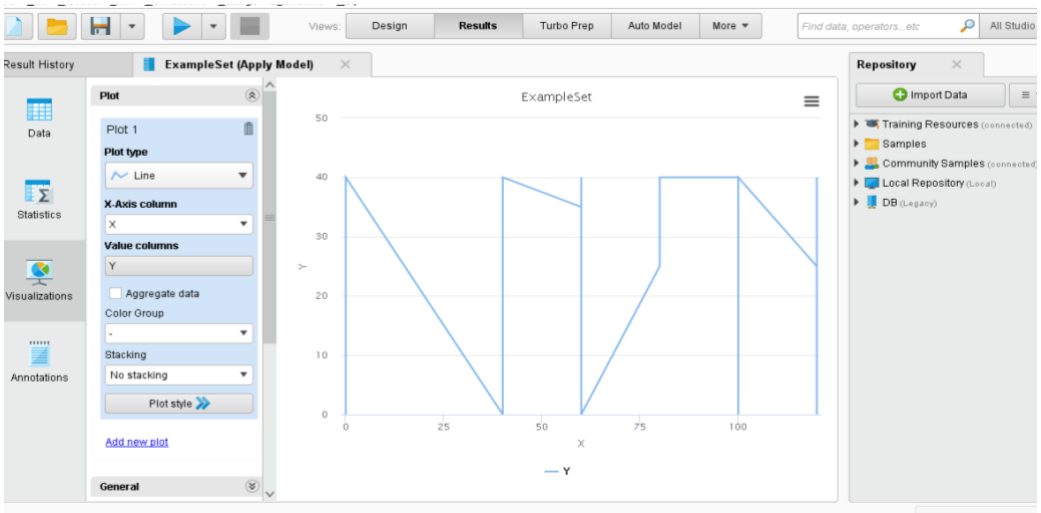

Fig. 4: Game time prediction graph for SMPN 7 Binjai students

The results of the system test are the output data of the process results that have been carried out in the test against the input data provided in the test that has been carried out using RapidMiner. The data description of the results of the prediction of student game time using the linear regression method is as follows:

4.2.2 Prediction Results of overall student data playing the game

Table. 6: Results of Game Time for SMPN 7 BINJAI Students

No		No		No	
1	17.911949635605076	129	35.82759086073563	257	23.88383004398193
2	35.82759086073563	130	32.84165065654721	258	35.82759086073563
3	32.84165065654721	131	35.82759086073563	259	32.84165065654721
4	35.82759086073563	132	26.869770248170354	260	17.911949635605076
5	32.84165065654721	133	35.82759086073563	261	35.82759086073563
6	35.82759086073563	134	35.82759086073563	262	35.82759086073563
7	23.88383004398193	135	35.82759086073563	263	35.82759086073563
8	32.84165065654721	136	35.82759086073563	264	32.84165065654721
9	32.84165065654721	137	35.82759086073563	265	32.84165065654721
10	32.84165065654721	138	35.82759086073563	266	26.869770248170354
11	35.82759086073563	139	32.84165065654721	267	32.84165065654721
12	35.82759086073563	140	32.84165065654721	268	35.82759086073563

5. Conclusion

After the author has elaborated on the discussion in the previous chapters, then as a conclusion to writing this thesis, the author draws conclusions about the effect of playing games on students' reading interest, the conclusions are as follows:

The prediction of data on the influence of game time on students' reading interest was carried out using a linear regression method with the variables used, namely: where X = Variables G and J (G = how often do you read?, J = how often do you play games?), and Variable Y is a book that is read by the system design by applying the multiple linear regression method carried out on the RapidMiner application. The RapidMiner application has an increase and decrease in reading interest in junior high school 7 students due to the effect of excessive gaming where the average player plays games per student is 9 to 10 hours.

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