Pl/sql design to determine the training data pattern on the Adaline neural network

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Abstract. Inventories of goods in business activities greatly affect the smooth running of business activities. The durian fruit sales business is also affected by inventory. Durian fruit sellers must be able to predict the needs of durian fruit customers so that sales business activities run stable. For sellers with low durian fruit sales, they will have no difficulty predicting demand for durian fruit. But for sellers of durian fruit in large quantities, it will take a long time and is prone to errors. An error in the prediction causes the sales business to lose. It takes high accuracy and fast time to make predictions. Adaline neural network has been proven to be able to solve prediction problems precisely. Adaline network performance is affected by training data. Durian fruit sales data is used as network training data to improve network performance. The focus of this research is the design of the pl/sql database to determine the training data input pattern in the android application to predict the number of durian fruit customer needs. Types of pl/sql used in this study are procedures and functions. Meanwhile, the method used to design pl/sql is an extreme method.

1. Introduction

Inventory of goods is an important component in the business of buying and selling goods. Inventory of goods has a big influence on the smooth running of the business of selling goods. This can be seen when the inventory is stable, sales of goods will run smoothly. On the other hand, if inventory is not stable, sales of goods will be hampered. When the business is running smoothly, the benefits are greater.

A businessman must be able to predict the needs of customers or buyers. This also applies to durian fruit sellers. Durian sellers must be able to estimate the number of durian fruit needs that customers need so that the business remains stable. When the business is running stable, it can be seen how much profit is obtained and not losing customers.

For sellers with low durian fruit sales, they will have no difficulty predicting demand for durian fruit. But for sellers of durian fruit in large quantities, it will take a long time and is prone to errors. Mistakes in predictions cause the sales business to lose money. Prediction of durian fruit needs can be done by looking at the sales of durian fruit that have occurred. The sales data forms a sales pattern that is used to predict future demand for durian fruit. Calculation of customer durian fruit needs can be done using the Adaline neural network. Adaline neural network has been proven to be able to solve prediction problems precisely. Adaline network performance is affected by training data. Durian fruit sales data is training data on the network.
The focus of this research is the design of the pl/sql database to determine the training data input pattern in the android application to predict the number of durian fruit customer needs. Types of pl/sql used in this study are procedures and functions. Meanwhile, the method used to design pl/sql is an extreme method.

2. Method

The design method pl/sql in this study uses the agile method. The type of agile method chosen in this study is the extreme programming method. Extreme Programming was introduced by Kent Beck in a project he handled. The process in extreme programming is similar to waterfall, which includes planning, design, coding, and testing [13][14].

2.1. Planning

This stage begins by studying the software business context required by the customer and recording the software's functionality in detail. At this stage the team members and the steps to realize the software desired by the customer are also determined.

2.2. Design

This design stage is an advanced stage of the planning stage. At this stage, the process of drawing the software scheme is carried out. At this stage it is also often called the stage of making software blueprints. At this stage there is still communication between the software maker and the customer.

2.3. Coding

The coding stage is one of the steps taken to implement the scheme that has been drawn from the ordered software.

2.4. Testing

It is at this testing stage that tests are carried out on the software ordered by the customer. All features and functionality of the software are tested at the testing stage. The results of the testing phase that determine whether or not an evaluation of the previous stages is carried out

3. Discussion

There are several studies that preceded this research. The research entitled "Developing a model-driven reengineering approach for migrating PL/SQL triggers to Java: A practical experience" [8] discusses converting pl/sql code to java code. The result of this research is that the researcher proposes software development involving a database using implement a model-driven re-engineering.

Another similar study is a study entitled "Prediction of software development faults in PL/SQL files using neural network models"[15], which examines the prediction of software development errors from pl/sql with sql metrics. The result of the research is that there are possibilities that the steps that have been taken in the study are useful in predicting errors in database access.

This research examines the design of pl/sql application database for prediction of customer durian fruit needs with the android platform. The application database is designed using MySql server 5.0. The
result of this research is a blueprint pl/sql which is used to determine the training data pattern of the proposed application.

3.1. Database structure
In the research database there are 8 interrelated tables. The 8 tables designed are customer, sales, dtl_of_pattern, pattern, administrator, epoch, dtl_Epoch, and training. Figure 2 below is a table relationship image in the research database.

For a description of the table in the research database as follows:

- **customer**
  The customer table is a table used to store customer data for durian fruit. Because the application to be built is to meet sellers with more than 1 customer, then customer data information is collected in this table.

- **sales**
  table sales is a table used to store sales data from each customer. The sales data in this table will be processed to become training data for the Adaline Neural Network.

- **pattern**
  The training data used in the application is divided into network input patterns. And this table stores the training data input pattern data from the proposed system.

- **dtl_of_pattern**
  This table is used to store data from each application training data input pattern. The contents of this table are the result of the pl/sql automation process so that it becomes the input pattern for the neural network.

- **Administrator**
  administrator table is a table used to store administrator data. the application to be built is an online application so the contents of this table allow more than one data.

- **epoch**
  In order to improve its performance, the neural network adaline performs iterations that may be more than once. And this table is used to store learning process iteration data.

- **dtl_Epoch**

![Figure 2. application database structure](image-url)
The dtl_epoch table is a table used to store transaction data, the detailed epoch table, including the output of the calculation process for finding the ideal network weight.

- training table is a table used to store transaction data for adaline network training.

### 3.2. PL/sql of application database

There are 2 pl/sql used in this study, namely procedures and functions. The main reason the PL / SQL type used in the study is made different is the characteristics of the PL / SQL type selected in the study [8] [9]. The characteristic of the procedure is that it does not provide a return value, making it suitable for repeating the network training data input pattern. While the characteristic of functions is to provide a return value, the return value of this function is used for the process status to be displayed on the application screen. Procedures are used to generate input pattern data automatically and functions are used to automate input pattern triggers. The automation process for determining the input pattern is carried out during the process of adding data to the sales table.

#### 3.2.1. Training_data_patterns procedure

The training_data_patterns procedure is a procedure designed to create an Adaline network input pattern. In this procedure there is 1 input parameter. The value of this parameter is the selected customer id for which the training data pattern will be created. The algorithm of the training_data_patterns procedure is:

- Determine the initial value of each variable
- Delete record of the pattern table with a specific customer id.
- Calculate the amount of sales data of selected customers and store it in a variable (eg cRecord).
- Count the number of input patterns by dividing cRecord by 2 and storing it in a variable (eg cLoopIndex1).
- Calculate the top index for an input pattern by calculating cRecord modulus 2. If the result is 0, then the cLoopIndex1 + 1 variable. And if the result is odd, then the cLoopIndex1 + 2 variable. The result of the summation process is stored in a variable (for example i_top)
- During the first data index of customer sales data <cLoopIndex1, do:
  - Insert data into pattern table.
- During the data index the amount of data is 1 input pattern <i_top, do:
  - Insert data into dtl_of_pattern table.
- Finish

Figure 3 is a flowchart image of the training_data_patterns procedure algorithm.
3.2.2. Customer_sale function

customer_sale is a function that is made for updating the data in the sales table. The parameters in the customer_sale function have 9 input parameters. 7 parameters of the customer_sale function are used to fill the sales table column. And 1 parameter is used to identify the status of the process and the other one is used for storage of id in the update and delete process. Return value of the process status customer_sale function ("success", "fail"). The algorithm of customer_sale function is:

- Initiation of variables data,
- Find the data in the sales table.
- Check the value of the process parameters: if 't' and variable data = 0, then input the data into the sales table and run the training_data_patterns procedure. If 'e' and variable data = 1, then update the sales data table and run the training_data_patterns procedure. If 'h' then delete data table sales
- finish.

Figure 4 below is the flowchart customer_sale function.
3.3. Application interface
Pl / sql which is designed to be used in android-based and online applications. The pictures below are the interface of the android application for predicting the customer's need for the number of durian fruit.

Figure 4. customer_sale function

Figure 5. Home page of application

Figure 6. user register page
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