APPLICATION OF DATA MINING IN THE BEST CLASSIFICATION OF ANIMAL FEED TYPES

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The company's goal is to produce high quality aquaculture products such as feed, seeds, pet feed, probiotics to shrimp products and processed food for the domestic and export markets. The company is still experiencing difficulties in determining the appropriate composition for the manufacture of animal feed. So that the animal feed produced has poor quality. Therefore, we need a decision support system that can assist in the process of determining the composition in the manufacture of animal feed. Because Data Mining is a computer-based system capable of solving unstructured problems. To be able to assist in the process of determining the composition of the company's animal feed, the author uses the Multi Factor Evaluation Process method. The Multi Factor Evaluation Process method is a method that breaks up a complex, unstructured situation into its component parts, the Multi Factor Evaluation Process method is a specification of the problem, in which decision makers must evaluate each alternative with multiple specific criteria. From the results of the study, it can be concluded, among others: The company must provide supporting equipment to run the application of the MFEP Method in Determining the Composition of this Feed so that it runs as desired. To achieve the purpose of the application of the MFEP Method Application in Determining the Composition of Animal Feed that is designed, it is hoped that this research can continue so that the system can be based on Client-Server and Online.

Keywords: Data Mining, Animal Feed Types

1. INTRODUCTION

The livestock sector is one of the pillars of the Indonesian economy that still needs to be taken into account. Therefore, to produce superior livestock, good quality animal feed (ration) is needed. A ration that meets the nutrition of livestock can improve the quality and quantity of livestock yields. Therefore, it is recommended to meet the daily nutrition of livestock according to their needs (Syukron Hidayat and Imam Mukhlash, 2015: 43).The success of beef cattle business is determined by one of the biggest factors, namely feed. Feed is anything that can be eaten by livestock, either in the form of organic or inorganic materials, which can be partially or completely digested and does not interfere with livestock health (Djarijah, 2008).

The feed given to beef cattle must have the requirements as good feed. Good feed is feed that contains adequate quality and quantity of food substances, such as energy, protein, fat, minerals, and vitamins, all of which are needed in the right and balanced quantities so that they can produce quality and high quantity meat products (Haryanti, 2009).). Based on the problems that occur, the authors are interested in conducting an analysis of the determination of the composition of the manufacture of animal feed.

Research according to [6]. entitled Implementation of Data Mining on Airplane Ticket Sales Using the Apriori Algorithm. Explaining that Data Mining is a very useful technology to help companies find very important information from their data warehouse which has no known benefits. Robi Yanto, et al [5]. Implementation of Data Mining with the Apriori Algorithm Method in Determining Drug Purchase

Patterns. Explained that the process of determining drug purchase patterns can be done by applying Data Mining. With the appriori algorithm method. With this method, the determination of purchasing patterns can be done by looking at the results of the consumer's tendency to buy drugs based on a combination of 2 itemset. The new knowledge that can be obtained is based on the calculation of the Apriori algorithm and the system that is built can be arranged in close proximity to the layout of drugs to facilitate drug availability.

2.   METHOD

Data mining is a separation of the useful information model in database storage. Data mining alone is a sequence of processes that function to find additional information that is not yet in the database and models that intend to find data models that can turn into important information from the results of the separation and the introduction of useful or interesting models from the data contained in the database. Data mining is actually one of a series of knowledge search processes in databases known as Knowledge Discovery In Database (KDD). KDD deals with integration techniques and scientific discoveries. Interpretation and visualization of the resulting patterns from the KDD data set is the whole non-trival process to find and identify patterns in the data where the existing patterns will be valid, useful and understandable. A series of processes that have data cleaning and data integration (cleaning and integration) stages.

3. RESULTS AND DISCUSSION

The process of selecting the best alternative uses a weighting system, where the method is a quantitative method, referred to as the Multifactor Evaluation Process (MFEP) method. In multifactor decision making, decision makers subjectively and intuitively consider various factors that have an important influence on their choice of alternatives. For strategically influential decisions, it is preferable to use a quantitative approach such as the MFEP. In the MFEP, first of all, all the criteria that are important factors in making considerations are given an appropriate weighting. The same steps are also carried out for the alternatives to be selected, which can then be evaluated in relation to these considerations. Multifactor evaluation process is widely used for the following reasons:
1.   The concept is simple and easy to understand.
2.   The computation is efficient.
3.   Have the ability to measure relative performance and alternative decisions in a simple mathematical form.

The company wants to determine the composition of animal feed. Here are 3 assessment processes with feed id p001, p002, p003, type of feed bengal grass, cattle, with the same criteria in the form of crude protein, crude fat, crude fiber, ash, TDN, energy, calcium, phosphorus, levels of water. There are 6 criteria factors that are used as a reference in making decisions:
1. F1 = Crude Protein
2. F2 = Crude Fat
3. F3 = Coarse Fiber
4. F4 = Ash
5. F5 = TDN
6. F6 = Energy
7. F7 = Calcium
8. F8 = Phosphorus
9. F9 = Moisture Content

In the application of MFEP, the first thing to do is to determine the factors that are considered important in determining the composition of animal feed. The next step is to compare these factors to get which factor is the most important, the second most important and so on. In this composition example, it is determined that the crude protein and crude fat factors are equally important, in order of the crude fiber, ash, fat content, energy, calcium, phosphorus, water content.

Table 1.Weight Value for Factor

Factor	Weight Value
Protein Crude	15
Crude Fat	15
Crude Fiber	10
Abu	10
TDN	10
Energy	10
Calcium	10
Fosfor	10
Kadar Air	10
Total	**100**

The next step is to give weighting to the factors used where the total weighting must be equal to 1 (Σpembobotan = 1).

1. $\text{Protein Kasar} = \dfrac{\text{Bobot Protein Kasar}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{15}{100} = 0.15$

2. $\text{Lemak Kasar} = \dfrac{\text{Bobot Lemak Kasar}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{15}{100} = 0.15$

3. $\text{Serat Kasar} = \dfrac{\text{Bobot Serat Kasar}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{10}{100} = 0.10$

4. $\text{Abu} = \dfrac{\text{Bobot Abu}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{10}{100} = 0.10$

5. $\text{TDN} = \dfrac{\text{Bobot TDN}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{10}{100} = 0.10$

6. $\text{Energi} = \dfrac{\text{Bobot Energi}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{10}{100} = 0.10$

7. $\text{Kalsium} = \dfrac{\text{Bobot Kalsium}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{10}{100} = 0.10$

8. $\text{Fosfor} = \dfrac{\text{Bobot Fosor}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{10}{100} = 0.10$

9. $\text{Kadar Air} = \dfrac{\text{Bobot Kadar Air}}{\text{Total Seluruh Bobot}}$
   $= \dfrac{10}{100} = 0.10$

Table 2. Normalization of Weights For Factor

Faktor	Nilai Bobot
Protein Crude	0.15
Crude Fat	0.15
Crude Fiber	0.10
Abu	0.10
TDN	0.10
Energy	0.10
Calcium	0.10
Fosfor	0.10

Kadar Air	0.10
Total	**1**

After normalizing the weighting, the composition is evaluated and given a weight value for each criterion as shown in table 3.

Table 3. Evaluation of Feed Composition Factors

Faktor	weight value P001	weight value P002	weight value P003	weight value P004	weight value P005
Protein Crude	32	34	30	34	35
Crude Fat	21	31	25	25	30
Crude Fiber	23	22	20	25	25
Abu	22	12	20	15	15
TDN	32	22	23	30	20
Energy	36	32	21	34	35
Calcium	21	21	15	20	20
Fosfor	31	36	13	25	30
Kadar Air	21	34	20	15	20

With the information above, the number or total evaluation values for alternatives or compositions are obtained. To get the total value of the composition evaluation by calculating as follows:

Calculation of the value of the evaluation weight:

Nbe = Nbf * Nef ....(1)

Information :

Nbe = Evaluation Weight Value

Nef = Factor Evaluation Value

Nbf = Factor Weight Value

Calculation of the total value of the evaluation:

Tne = Nbe1 + Nbe2 + Nbe3 + ...+ Nben .... (2)

Information :

Tne = Total evaluation score

Nbe = Evaluation weight value

Table 4. Evaluation for Feed Composition

ID Proses	Faktor	Bobot Faktor		Evaluasi Faktor	Bobot Evaluasi
	Protein Crude	0.15	*	32	4.8
	Crude Fat	0.15	*	21	3.15
	Crude Fiber	0.10	*	23	2.3
	Abu	0.10	*	22	2.2
P001	TDN	0.10	*	32	3.2
	Energy	0.10	*	36	3.6
	Calcium	0.10	*	21	2.1
	Fosfor	0.10	*	31	3.1
	Kadar Air	0.10	*	21	2.1
	Total	**1**			**26.55**

P002	Protein Crude	0.15	*	34	5.1
	Crude Fat	0.15	*	31	4.65
	Crude Fiber	0.10	*	22	2.2
	Abu	0.10	*	12	1.2
	TDN	0.10	*	22	2.2
	Energy	0.10	*	32	3.2
	Calcium	0.10	*	21	2.1
	Fosfor	0.10	*	36	3.6
	Kadar Air	0.10	*	34	3.4
Total		**1**			**27.65**
P003	Protein Crude	0.15	*	30	4.5
	Crude Fat	0.15	*	25	3.75
	Crude Fiber	0.10	*	20	2.0
	Abu	0.10	*	20	2.0
	TDN	0.10	*	23	2.3
	Energy	0.10	*	21	2.1
	Calcium	0.10	*	15	1.5
	Fosfor	0.10	*	13	1.3
	Kadar Air	0.10	*	20	2.0
Total		**1**			**21.45**
P004	Protein Crude	0.15	*	34	5.1
	Crude Fat	0.15	*	25	3.75
	Crude Fiber	0.10	*	25	2.5
	Abu	0.10	*	15	1.5
	TDN	0.10	*	30	3.0
	Energy	0.10	*	34	3.4
	Calcium	0.10	*	20	2.0
	Fosfor	0.10	*	25	2.5
	Kadar Air	0.10	*	15	1.5
Total		**1**			**25.25**
P005	Protein Crude	0.15	*	35	5.25
	Crude Fat	0.15	*	30	4.5
	Crude Fiber	0.10	*	25	2.5
	Abu	0.10	*	15	1.5
	TDN	0.10	*	20	2.0
	Energy	0.10	*	35	3.5
	Calcium	0.10	*	20	2.0
	Fosfor	0.10	*	30	3.0
	Kadar Air	0.10	*	20	2.0
Total		**1**			**26.25**

The calculation step is for each factor weight multiplied by the factor evaluation, as below:

P001 = (0.15 * 32) + (0.15 * 21) + (0.10 * 23) + (0.10 * 22) + (0.10 * 32) +
(0.10 * 36) + (0.10 * 21) + (0.10 * 31) + (0.10 * 21)

$$= 4.8 + 3.15 + 2.3 + 2.2 + 3.2 + 3.6 + 2.1 + 3.1 + 2.1$$
$$= 26.55$$

P002 $= (0.15 * 34) + (0.15 * 31) + (0.10 * 22) + (0.10 * 12) + (0.10 * 22) +$
$(0.10 * 32) + (0.10 * 21) + (0.10 * 36) + (0.10 * 34)$
$= 5.1 + 4.65 + 2.2 + 1.2 + 2.2 + 3.2 + 2.1 + 3.6 + 2.4$
$= 27.65$

P003 $= (0.15 * 30) + (0.15 * 25) + (0.10 * 20) + (0.10 * 20) + (0.10 * 23) +$
$(0.10 * 21) + (0.10 * 15) + (0.10 * 13) + (0.10 * 20)$
$= 4.5 + 3.75 + 2.0 + 2.0 + 2.3 + 2.1 + 1.5 + 1.3 + 2.0$
$= 21.45$

P004 $= (0.15 * 34) + (0.15 * 25) + (0.10 * 25) + (0.10 * 15) + (0.10 * 30) +$
$(0.10 * 34) + (0.10 * 20) + (0.10 * 25) + (0.10 * 15)$
$= 5.1 + 3.75 + 2.5 + 1.5 + 3.0 + 3.4 + 2.0 + 2.5 + 1.5$
$= 25.25$

P005 $= (0.15 * 35) + (0.15 * 30) + (0.10 * 25) + (0.10 * 15) + (0.10 * 20) +$
$(0.10 * 35) + (0.10 * 20) + (0.10 * 30) + (0.10 * 20)$
$= 5.25 + 4.5 + 2.5 + 1.5 + 2.0 + 3.5 + 2.0 + 3.0 + 2.0$
$= 26.25$

The final result of calculating the value of feed composition with code P001 is 26.55, P002, 27.65, P003, 21.45, P004, 5.25, P005, 26.25. Based on the results of the calculation with the type of bengal grass feed with the same criteria, but different composition values, the result is the process code P002 with a final value of 27.65. is the highest value of the other process code.

4. CONCLUSIONS

Overall data mining processing designed using the Multi Factor Evaluation Process method accelerates the composition data processing, composition data search and report generation process to produce animal feed composition decisions, The decision support system that has been designed supports services for companies in determining the composition of animal feed, so that the data obtained is more accurate, efficient and effective, The MFEP method is a suitable method to be applied in decision making by sharing alternatives, especially determining the composition of animal feed quickly and accurately. The level of accuracy of the test results using the MFEP method is 100%.

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