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Detection System Milkfish Formalin Android-Based Method Based on Image Eye Using Naive Bayes Classifier

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***Abstrack*-In this study was researcher trying to make an android-based application that can identify fish with formalin. The method used in researcher methods naïve Bayes classifier as a detector (detector) with the object input in the form of fish eye image. The steps in the study include the training and testing process. In the training process used to build the model naïve classifier and estimation parameters. While testing process, implement the results of the model and parameter estimation have been built to detect fish formalin or not formalin. The trial results demonstrate the ability-based applications using the naïve Bayes 98.3% for object dimensions 10x10 image.**

***Keywords*—Fish, Formalin, Features, Naive Bayes classifier**

I. INTRODUCTION

Fish as a food that is high in protein and contains essential amino acids required by the body, in addition to the biological value reached 90%.

The edible part is only about 70% of all the body parts found in fish, whereas 30% again as the head, tail, fins and entrails are generally discarded. Meat fish has delicate fibers unlike most terrestrial mammals. Fish meat has a fiber finer and shorter and has a binder so that the soft tissue when compared with other farm animals [1].

According to data from the UN Food and Agriculture Organization (FAO), the 2007 world fisheries production reached 143 million tons, consisting of 91 million tonnes of the catch (capture) and amounted to 51 million tons of farmed (capture). The supply of fishery products continues to grow from year to year, and two-by-three are still derived fromcatching. Currently, Indonesia is one of the important marine fish seed.[2](Tamsil Andi,2010).

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Consumption of fish is very good because it has the ability to improve vision. Fish can fight macular degeneration (the central part of the retina), glaucoma, and dry eye syndrome. A new study found that people who eat at least two servings of fish per week were less likely to experience age related macular degeneration (the leading cause of age-related blindness) than in people who do not eat fish at all. Researchers say omega-3 fatty acids may reduce the risk of inflammation and improve blood vessel function. There are several advantages to be gained if we take better advantage of the fish as a food source than other animal products. [3]

However, due to the frequent occurrence of cases of formalin fish often make the general public, especially the fishermen feel uneasy. As happened in January 2015 has made fishing in East Flores was struck. The reason, almost all the fish were seized by DKP NTT Province and POM in Fish Shelter (TPI) Oeba Kupang, referred to as fish containing formaldehyde. Worse, Sikka District Government also mentioned that all the fish were circulating in the district contain formaldehyde, particularly from East Flores. That's what makes the fishermen, especially in Adonara and Solor in East Flores, NTT, was very upset by the case. [4]

In Balikpapan, A total of 11 civil servants in Balikpapan were poisoned as a result of eating the meal pre-sahur while training positions in Haj Dormitory Batakan East Kalimantan Balikpapan early last Ramadan. Apparently, the results of laboratory examinations and Drug Administration Center for Food (BPOM) Samarinda are known, the civil servants of the fish consumed was positive for high levels of formaldehyde. In addition chilli sauce in a dish PNS was also positive for toxic bacteria. [5]

In connection with this, the researchers are trying to make an android-based application that can identify fish with formalin. With hope this study can help the community to choose the fish fresh without additives such as formaldehyde to make it safe for consumption.

II. NAIVE BAYES CLASSIFIER

A. Teorema Naive Bayes

Bayes Rule is a rule that is correct or revise a probability by utilizing additional information. That is, from initial probability (prior probability) that have not been repaired formulated based on information currently available, and then formed the next probability (posterior probability) [9]. When the feature is known ω_j class j, and x is the object features (pattern x), then the probability ω_if unknown can be formulated in equation :

B. Singularitas Naïve Bayes Against Gaussian Classifier

Naïve Bayes can be assumed into the special model p (x | θ), hereinafter naïve Bayes method to estimate population distribution parameter θ = (μ, Σ) to model Multivariate Normal distribution (Gaussian). One from the simplest approach to avoid a single value parameter covariance matrix is to use diagonal covariance matrix. Based on this it can be assumed that each feature is independent so that equation[7]:

$$p(x|\omega_j) = \prod_{l=1}^{d} N(x_1; \hat{\mu}_{jl}, \hat{\sigma}_{j,l}^2) \quad (3)$$

Where μ _jl a component to-l from μ _j (component to-l based on the mean of sample data from class ω_j), σ _ (j, l) ^ 2 is the diagonal elements all l from Σ_j (component to-l based variants of data samples from class ω_j) and N (x, μ, σ ^ 2) is the probability density function from the distribution model Univariate Normal (Gaussian) with mean μ and variance σ ^ 2. The theorem can direpsentasikan into the discriminant function, so by using conditional probability x against ω_j if g_i> g_j, for all i ≠ j obtained discriminant function [7] as follows:

$$g_j(x) = log\left(p(\omega_j)\right) - \sum_{l=1}^{d} log(\hat{\sigma}_{j,l}) - \frac{1}{2}\sum_{l=1}^{d} \frac{(x_l - \hat{\mu}_{jl})^2}{\hat{\sigma}_{j,l}^2} \quad (4)$$

With

$$p(\omega_j) = n_j / \sum_{i=1}^{c} n_i$$

Based on the equation 4, the rules for classifying the *pattern x* is:

$$\hat{C} = \arg max\left(g_j(x)\right), j = 1, \dots, C \quad (5)$$

Where $\hat{C}$ is the chosen class id[10].

III. RESEARCH METHODS

A. Framework System

At this stage, the design of the system began to be formed to determine how the system will resolve the problems to be studied in this research object and to give you an idea of what should be done and how the application identifiers formaldehyde content in fish work. Design system to be built is shown in figure 1.

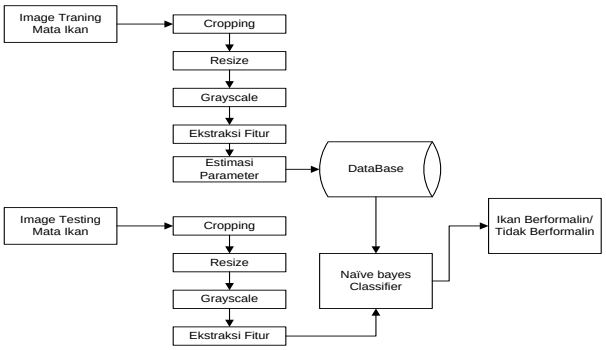

Fig 1 Design system

The system includes training and testing parts where the second part of the second pass through the same process, namely preprocessing and feature extraction to get the object that represents the characteristics [12]. Later in the training process, we will estimate the parameters of the distribution of object features. The results of this process will be stored for use in the testing process is based on a discriminant function.

Data Collection Instrument

Data collection instruments used in the study specifically designed to adjust the camera's ability to be used to take the image of a fish eye.

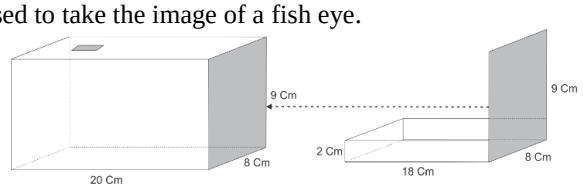

Fig 2 Design data retrieval tool

The tool is rectangular light-tight, at the top there is a place for a permanent camera so that when shooting the camera is not shifted. This tool also has a height of 9 cm between the camera lens to the object to be photographed in order to focus the camera to work optimally.

Model Feature

1) Grayscale: Grayscale image used to represent the features of light intensity on beef meatballs. This process will change the value of the matrix of each *R, G and B* into *Gray* value, so it can be written as[13]:

$$Gray = (R \times 0.299) + (G \times 0.587) + (B \times 0.114) \quad (6)$$

2) Estimasi Parameter: Object features assumed to follow Univariate Normal distribution (Gaussian) with the model parameters from the *mean* and *variance*. So we get the parameters of the distribution *mean* as follows:

$$\hat{\mu} = \frac{1}{2}\sum_{i=1}^{n} x_i \quad (7)$$

And the results of parameter estimation variance is[11]:

$$\hat{\sigma}^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \hat{\mu})^2 \quad (8)$$

IV. EMPIRICAL ANALYSIS

B. Descripsion Data

The data used in this study are primary data obtained from the purchase of fish by researcher. The total amount of data that will be used in a study of 240 images fish include fresh fish of data 120 and 120 of the fish with formalin. This study also used secondary data obtained from a survey conducted by taking samples of fish randomly in three markets in the city of Malang, the Market Gadang, Merjosari Market, and Market Belimbing.

Software Implementation

Application identifiers content of borax in beef meatballs based on Android has several features to facilitate the users (user) in using the application. Here are some important features contained in the application.

First Page: In this section the user will receive instructions to select the type of image data retrieval

1) beef balls that will be tested. Furthermore, users can open one side by shifting the homepage form. *Interface* home page and the homepage is shown in Figure 3.

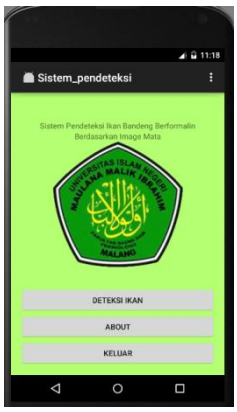

Fig 3 UI first form

*2) Indentification Form:*In this section users can identify the fish eye image data that has been selected by pressing detection. Furthermore, users can view the information to see the calculation results of the identification. *Interface* identification form following description is shown in Figure 4 and Figure 5

Fig 4 Indentification form Fig 5 Result form

Results Training

The results of the training process will show the effect of changing the dimensions of the image of the training data, the percentage of errors, and accuracy generated by the system. Of the 120 data in the training for each class, obtained different results. For each variation of the dimensions of the image of a fish-eye image training data, are presented in Table I of the training process which has been carried out based on the image size.

Table 1. Eye image data accuracy training

Size (baris x kolom)	Error	Akurasi
1x1	22.5	77.5
2x2	40	60
3x3	0.83	99.17
4x4	0.83	99.17
5x5	0.83	99.17
6x6	0.83	99.17
7x7	0.83	99.17
8x8	0.83	99.17
9x9	0.83	99.17
10x10	0	100

According to Table I shows that the dimensions of the image of the most optimal training data show for the data contained on the size of 10 x 10 with an error rate of 0% and an accuracy of 100%

Testing Results

Testing is done by comparing the results of a fish-eye image 120 based on the process memformalinkan fish and also based on the test results of formaldehyde test kits for fish obtained from the field survey. Next will be compared to then count the errors and the level of accuracy obtained. Results of identification systems based on variations shown in Table II below.

Table 2. Eye image data accuracy testing

Uraian	Error	Akurasi
Mengandung formalin	0%	100%
Tidak mengandung formalin	3.33%	96.67%
Rata rata		98.35%

Analysis of Systems Work

The process of testing conducted using data previously taken without the use of tools. As for data collection in the field survey conducted laboratory tests in advance using reagent or formalin to determine the formaldehyde content contained in the fish. Overall the results obtained from testing results obtained accuracy of 98.35% for the testing of data without the use of tools. By this method can distinguish naïve Bayes classifier formalin fish and the fish was fresh through the eye image to make use android.

As for the shortcomings of the system, among other methods of naïve Bayes classifier is a system that can only function as a tool. Therefore, in the decision-making is still affected by the factors supporting or other policies. In addition ouput application in identifying the fish has not completely identical to real data and the survey data that has been tested using a test kit reagents or formalin. This is because the data retrieval process image still has some shortcomings such as the presence of some data that is not the focus, the eye's surface are different from each other, the influence of the intensity of light and weather conditions for collecting data without the use of tools as well as the differences in materials and processing methods as well as treatment for the data obtained from the results of the field survey.

V. CONCLUSION

Based on the results of research and discussion on the implementation of the methods naïve Bayes classifier to identify formaldehyde content in fish can be concluded that the results obtained in the training data is obtained the best accuracy rate is 100% with a resize of 10x10. The results of trials testing the data.

eye image fish fresh fish obtained accuracy rate of 100%, while for data retrieval fish containing formalin acquired 96.67% accuracy rate. Data obtained through traditional market survey results taken from Merjosari Market, Market Belimbing, and Market Gadang. Less than optimal levels of accuracy due to several factors such as the surface of the fish eyes are different from each other, the influence of light intensity, weather conditions.

REFERENCES

[1] Irawan, A,1995, *Pengawetan Ikan dan Hasil Perikanan. Cara Mengolah dan Mengawetkan secara Tradisional dan Mogdern*, CV.Aneka, Solo.

[2] Tamsil Andi, 2010, *Pembenihan Ikan Laut Ekonomis secara Buatan*, Lily Publisher, Makassar.

[3] Afrianto Eddy dan Liviawaty Evi,1989,*Pengawetan dan Pengolahan Ikan,Kanisius*, Yogyakarta.

[4] Suara.com/news/2015/05/14/093611/gara-gara-kasus-ikan-berformalin-nelayan-pun-ikut-terseret. Access in 05 September 2015

[5] Okezone.com/read/2008/09/15/1/146100/santap-ikan-berformalin-11-pns-keracunan.Access in 05 Septetmber 2015

[6] I. B. Santoso, "Membangun Gaussian Classifier dalam Mengenali Objek dalam Bentuk Image," *Matics*, vol. 1, pp. 1–5, 2014.

[7] A. R. Webb and K. D. Copsey, *Statistical Pattern Recognition*, 3rd ed., Mathematics and Data Analysis Consultancy Malvern, United Kingdom: John Wiley & Sons Ltd., 2011