



# Expert System for Diagnosing Chicken Diseases using Bayes' Theorem

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## ABSTRACT (9 PT)

Chicken disease is a condition in which the organs of the chicken farm cannot function normally. To make a diagnosis of the disease requires further examination carried out by specialists (experts). An expert system is a system that uses human knowledge entered into a computer to solve problems that are usually solved by experts. The system created in solving the problem uses the Bayes theorem method where the inference process uses Forward Chaining. The application was developed using the Visual Basic 2010 programming language and MySQL database.

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## 1. INTRODUCTION

The development of technology from year to year is increasingly rapid with the widespread use of technology in all aspects of life (Febriani & Dewi, 2019) (Tekege, 2017). In the era of ever-increasing information development, technology plays an important role in the development of information for all parties and certainly cannot be separated from Information Technology (IT). One of the most important parts in the improvement of Information Technology is the computer. A system in Informatics Engineering that deals with information storage, the rules of reasoning that allow computers to make decisions like an expert in a particular field, are called Expert Systems. Another unique feature of the Expert System according to Hartati, Iswanti (Giarratano & Riley, 2005).

Chickens are animals from the poultry family that have wings, feathers, two legs, have a beak and reproduce by laying eggs (Abdurohman, 2014) (Sihotang, Riandari, Simanjourang, Simangunsong, & Hasugian, 2019). Examples of other poultry animals are, all types of birds, ducks, geese. Chicken is an animal that can be raised for its benefits. For example, the meat, eggs, feathers, and so on. The most widely bred chickens are broilers and laying hens. These two types of chickens have the most roles in human life. Just like humans, chickens also require treatment such as giving vaccines, healthy food, and adequate nutritional intake. This is intended so that chickens stay healthy and avoid various kinds of diseases. It can be seen whether or not a chicken is healthy from the behavior of the chicken, if there is an abnormal behavior change, then the chicken is attacked by the disease. One of the things that makes livestock susceptible to

disease is failure to give vaccines regularly. If cattle are sick, it is not easy to go to the nearest veterinarian. Therefore, researchers want to create an expert system that can help in solving problems to diagnose diseases in chickens.

Efforts to overcome these problems, namely by using an expert system with Bayes theorem. Bayes' theorem was put forward by an English presbyterian priest (1763) named Thomas Bayes. Bayes theorem is used to calculate the probability of an event occurring based on the effect obtained from the observations (Priyana, Satyareni, & Jannah, 2016) (Fadhillah, Ishak, & Ramadhan, 2021) (Nofriansyah, Gunawan, & Elfitriani, 2020). Bayesian probability is an interpretation of calculus that includes the concept of probability as the degree to which a statement is believed to be true. Bayesian theory can also be used as a decision-making tool to update the confidence level of information (Ellison, 1996) (Taroni, Biedermann, Bozza, Garbolino, & Aitken, 2014) (Watson, 1994).

Researchers who use expert systems diagnose diseases in poultry using the Bayes Theorem Web-Based Method Achmad Rido'i, Retno Wardhani, and Masruroh (2017), the opinion that there is a major problem that is experienced almost every year for poultry farmers. Disease in poultry is a serious problem that becomes an obstacle for farmers, such as poultry that have just been exposed to the virus or with mild symptoms, must be destroyed immediately because of the lack of knowledge about the types of diseases in poultry (Rido'i & Wardhani, 2017). From these problems, an application was made to diagnose the types of poultry diseases. The application is designed on a Web-based basis using the PHP programming language, as well as mysql and Xampp databases. The application that will be made uses the Bayes theorem method to calculate the possible symptoms of the disease in poultry (Muslim, Arnin, & Sushermanto, 2016) (Listiyono, 2008) (Rahman & Padilah, 2021).

The difference between this research and previous research is using the Bayes theorem method with the help of the Visual Basic 2010 programming language and the object is Chicken disease. Meanwhile, previous research implemented a Web-based system and discussed diseases of several types of Poultry. With the help of this system, he hopes to be able to identify chicken diseases through the symptoms entered and provide solutions like an expert. In addition, the information generated can be used as an alternative expert in consulting about chicken diseases

## **2. RESEARCH METHOD**

### **2.1 Data Collection**

In obtaining data, several methods have been used to obtain data that are in accordance with research needs. The methods referred to in this study are:

#### **a. Primary Data Collection Method**

Primary data is a source of research data obtained directly from the original source. The Primary Data consists of the following methods:

##### **1). Observation**

This observation was carried out at Mila Barus Ranch, Dusun I Lau Rakit, Kec. STM Downstream, Kab. Deli Serdang.

##### **2). Interview**

The method of data collection is by conducting direct question and answer with the resource person, namely an expert drh. Anita Karolina Simamora in the field of Poultry farming.

#### **b. Secondary Data Collection**

Secondary data is a source of research data obtained through intermediary media or indirectly, in the form of: Books and Journals.

### **2.2 Data analysis**

Data analysis consists of three discussions, namely the place of research, analysis of system requirements and analysis of the system built.

#### **a. Research Place**

This research was conducted at Mila Barus Farm, Dusun I Lau Rakit, Kec. STM Downstream, Kab. Deli Serdang. The time of the research was carried out in the even semester period of the 2018/2019 Academic Year.

Mila Barus Farm was established in 2014 and has two cages and a large population of chickens. From interviews it was obtained that chickens can be harvested after the age of 30 days with good weight.

### 2.3 The Diagnostic Process With Bayes' Theorem

The need for chicken disease expert system software is obtained from the acquisition of knowledge. Knowledge acquisition is a process to collect data on a problem from an expert using Bayes' theorem.

## 3. RESULTS AND DISCUSSIONS

### 3.1 Implementation System

After the system is analyzed and designed in detail, it will go to the implementation stage. System implementation is the stage of putting the system into operation in order to provide input to system development.

After performing the system design stage and software implementation, the next action taken is the application of the software results.

The use of a computer for problem solving requires a good system, so as to enable the success of the computer in carrying out its duties, namely processing data into information. Implementation steps that process data into information. The implementation steps taken in completing the Expert System for Diagnosing Chicken Diseases Using the Bayes Theorem Method.

Expert System Diagnosing Chicken Disease Using Bayes Theorem Method, Providing hardware (Hardware) and software (Software). The software used to write programs into the computer Testing the system explains the results of system testing carried out on the Expert System for Diagnosing Chicken Diseases Using Bayes' Theorem Method.

### 3.2 Discussion

#### a. Main Menu Form

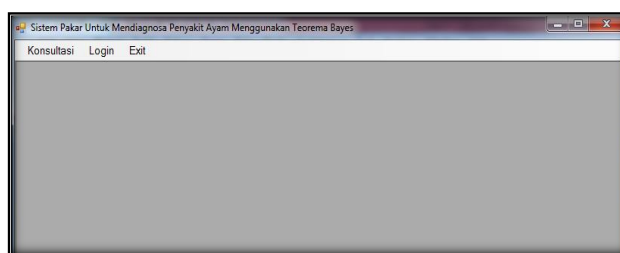


Figure 1. Main Menu Form

#### b. Login Form

The page where the system builder can login by entering the user name and password that has been created. or the program designer information page displays information about the program/system builder. The data displayed maker information and added information about how to use this Chicken Disease diagnosis expert system. The appearance is as follows.

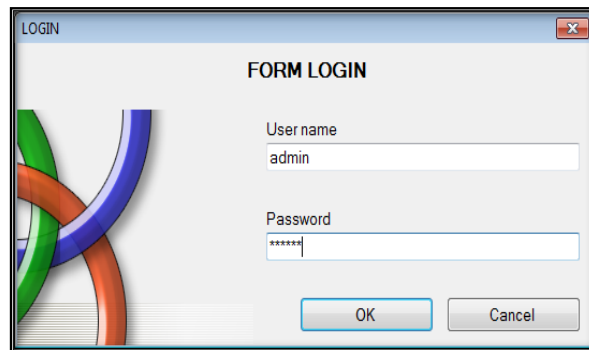


Figure 2. Login form

### c. Expert Menu Form

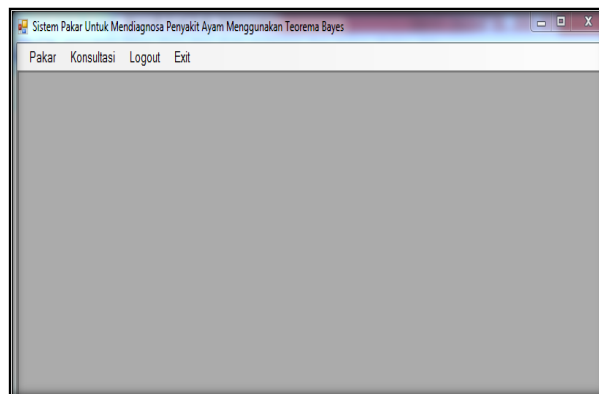


Figure 3. Expert Menu Form

### d. Expert Sub Menu Form

The Expert Sub Menu Form is where if the admin runs the application, in this form, the admin will manage the data needed in making the Expert System for Diagnosing Chicken Diseases Using Bayes' Theorem Method, where there are several menus and sub menus, for the expert menu consists of additional sub menus. symptoms, added disease, added rules, consultation data, user data. The following is the appearance of the Expert Sub Menu form:

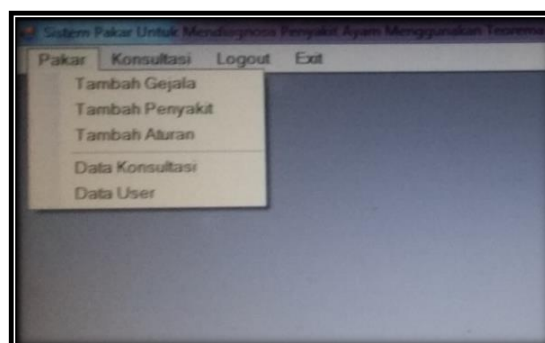


Figure 4. Expert Sub Menu Form

### e. Symptom Form

The Symptom form will appear if the user clicks on the expert menu and the sub menu adds Symptoms, Symptom data is used for where an admin of this application can manage Symptom data such as adding, saving, editing, deleting, canceling and exiting, Symptom data on Expert

Systems Diagnosing Chicken Diseases Using Bayes' Theorem method, here is the Add Symptom form.

Kode Gejala	Nama Gejala	Nilai
G01	Nafsu makan berkurang	0.4
G02	Lesu dan tidak aktif bergerak	0.3
G03	Gangguan pemapasan (sulit bernapas)	0.8
G04	Bulunya kotor disekitar anus	0.5
G05	Ayam menggerombol kedinginan	0.3
G06	Diare encer/diare berlendir, keputihan	0.8
G07	Jengger membengkak	0.6
G08	Bersin-bersin	0.2

Figure 5. Add Symptom Form

#### f. Disease Form

Disease form will appear if the user clicks on the expert menu and the add disease sub menu, disease data is used for where an admin of this application can manage disease data such as adding, editing, deleting and exiting disease data, disease data on the Expert System Diagnosing Chicken Diseases Using Bayes' Theorem method, here is the Add Disease form.

Kode Penyakit	Nama Penyakit	Nilai
F01	Newcastle Disease	0.4
F02	Infectious BD	0.3
F03	AJ	0.5
F04	Infectious Bronchitis	0.2
F05	Merek (MD)	0.3
F06	Cacar (Avian Pox)	0.4
F07	Bakuk Darah	0.3

Figure 6. Add Disease Form

#### g. Rule Form

The Rules Form will appear if the user clicks on the expert menu and the Rules sub menu, disease data is used for where an admin of this application can manage Rules data such as refreshing, saving, and exiting, the Rule data on the Expert System Diagnosing Chicken Disease Using the Bayes Theorem Method, as follows is the Rules form.

Figure 7. Rule Form

#### h. Patient Consultation Data Form

The Patient Consultation Data Form will appear if the user clicks on the expert menu and the Patient Consultation Data sub menu. Patient Consultation Data functions for where an admin of this application can manage Rule data such as printing, exiting and deleting patient data, Rules data on the Expert System for Diagnosing Chicken Diseases Using the Bayes Theorem Method, here is the Patient Consultation Data form.

No. Pasien	Nama Pasien	Alamat	No. Telepon	Tanggal
51	jimi	monica	12345	31 July 20
52	monicas	binjai	09876	31 July 20
53	desimatupang	balige	09854333	31 July 20
54	monica agriani simatupang	binjai	0812 7722 4690	02 August
55	simatupang	binjai	0812 7722 4690	02 August

kd_gejala	nama_gejala
G03	Gangguan pemapasan (sulit bernapas)
G13	Pembesaran tulang- tulang kaki
G20	Saluran tenggorokan tersumbat

Figure 8. Patient Consultation Data Form

#### i. User Data Form

The User Data form will appear if the user clicks on the expert menu and the User Data sub menu, functions for which an admin of this application can manage user data. such as adding, saving, editing, canceling, deleting, and exiting user data. In the Expert System for Diagnosing Chicken Diseases Using the Bayes Theorem Method, here is the Patient Consultation Data form.

	Username	Password	Nama Lengkap
▶	admin	c84258e9c39059a89ab77d846ddab909	administrator
	admin2	c84258e9c39059a89ab77d846ddab909	admin dua

Figure 9. User Form

#### j. User Biodata Form

The test form to determine this chicken disease can be done by the system user, where to try this application the user must first register his biodata including the user name, user address and telephone number, after the user has successfully entered the biodata the user can click the "start consultation" button, the function Filling in this biodata is so that users who try this application will be registered in the database or the application admin can see how many users have tried to use the Expert System to Diagnose Chicken Diseases Using the Bayes Theorem Method, here is the display of the user biodata filling form.

Figure 10. Biodata Form

#### k. Search Form

This search form will appear when the user has finished filling in the biodata on the previous registration form, in this form the user will be asked to enter any characteristics or symptoms experienced by the pet chicken from the user, here are the steps taken to trace the symptoms to the results.

**FORM KONSULTASI**

Pilih Gejala:

- Nafsu makan berkurang
- Lesu dan tidak aktif bergerak
- Gangguan pemapasan (sulit bernapas)
- Bulunya kotor disekitar anus
- Ayam menggerombol kedinginan
- Diare encer/diare berlendir, keputihan
- Jengger membesar
- Bersin-bersin
- Napas mencicit
- Keluar cairan dari hidung
- Mata berair
- Terdapat bengkak - bengkak pada bulu kulit paha
- Pembesaran tulang-tulang kaki
- Sayap menggantung
- Timbul bintik-bintik berwarna merah pada jengger
- Produksi telur menurun
- Berat ayam menurun
- Paruh dan bulu terlihat pecakan darah
- Suka menyendiri
- Sakuran tenggorokan tersumbat
- Muka bengkak
- Suara nyorok
- Kedinginan
- Sering menggelengkan kepala
- Demam

Hapus Ceklis    Lihat Hasil    Keluar

Figure 11. Consultation Form

### I. Bayes' Theorem Result Form

After the diagnosis results come out, the next step is to click print results, the following form will appear, where the function of this form is to print the diagnostic results on the chicken, along with the printout of the diagnostic results.

**FORM HASIL TEOREMA BAYES**

No Pasien : 110  
 Tanggal Diagnosa : 19-09-2018 12:00  
 Nama : Monica Simatupang  
 Alamat : Bagan Batu  
 Telepon : 085207817385

Gejala Yang Ditelesi:

Kode Gejala	Nama Gejala
G16	Produksi telur menurun
G17	Berat ayam menurun
G18	Paruh dan bulu terlihat pecakan darah

Nilai Diagnosa Penyakit: 100%  
 Penyakit: Cacar (Avian Pox)  
 Solusi: pemberian supportif

Cetak    Keluar

Figure 12. Result Form

### m. Report Form

**FORM LAPORAN**

1 of 1 Page Width Find Next

**Hasil Diagnosa Teorema Bayes**

No Pasien : 110  
 Tanggal Diagnosa : 19-09-2018 01:53  
 Nama Pasien : Monica Simatupang  
 Alamat : Bagan Batu  
 Telepon : 085207817385

Gejala Diagnosa

Kode Gejala	Nama Gejala
G16	Produksi telur menurun
G17	Berat ayam menurun
G18	Paruh dan bulu terlihat pecakan darah

Figure 13. Print Report Form

#### 4. CONCLUSION

Based on the analysis and system testing that has been done, it can be concluded that; using UML (Unified Modeling Language) can build a software to diagnose chicken disease.

The application of the Bayes theorem uses forward chaining. Where the implementation of the system is done through the collection of data or facts obtained from an expert. Starting from the premises or input information (if) first then to the conclusion or derived information (then).

This Bayes method can be implemented into a chicken disease determination system, with Visual Basic 2010 known as a programming language that is useful for creating applications that run on the Windows platform and MySQL as a database. This implementation is multi-user, so it can be used by anyone who needs it, be it farmers, the general public, institutions or individuals.

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