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Early Diagnosis Expert System Hepatitis Using Naive Bayes Method

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ABSTRACT

Public health activities for the control of viral hepatitis have increased during the last three decades. In 2010, there is growing public awareness about the public health burden of viral hepatitis. However, there are major gaps in the response and increased mortality. Five virus responsible for most cases of viral hepatitis are hepatitis A, B, C, D, and E. All hepatitis viruses can cause acute hepatitis. However, only HBV, HCV and HDV frequent cause of chronic hepatitis, which can cause progressive scarring of the liver and primary liver cancer. Of these, HBV and HCV causes 96% of deaths from hepatitis virus, So the need for special treatment for hepatitis, with the creation of an expert system for diagnosis of hepatitis using Naive Bayes method that aims to diagnose the onset of hepatitis disease is expected to help users who still lay on knowledge as well as related information from hepatitis. Based on test results using 10 samples of data to get the value of accuracy of 90%. Ketikakuratan 10% is due at the time of the calculation method that uses a Naive Bayes highest value for the results obtained and if the same value system will take the value of the list of the first order for the results to a user.

1. Introduction

Public health activities for the control of viral hepatitis have increased during the last three decades. In the 1990s, the World Health Assembly first recommended the inclusion of hepatitis B vaccine in Indonesia routine infant immunization schedules. Hepatitis B vaccines are given shortly after birth to prevent HBV infection occurs early in life. HBV infection acquired during childhood carries a greater risk of death at a later cirrhosis and hepatocellular carcinoma. Immunization against HBV increased from the early 2000s with support from the Global Alliance for Vaccines and Immunization (GAVI, now known as the Alliance of Vaccines), and the optimal procurement in Indonesia Region of the Americas through a revolving fund[1], [2],

From the 2000s, the iteration of the Global Burden Disease (GBD) project increases the real burden estimate of deaths from hepatitis virus. Then it became clear that cirrhosis and hepatocellular carcinoma accounts for most of the burden of viral hepatitis. Further developing preventive interventions, with blood safety initiative, health care injection safety, infection control, and harm reduction for people who inject drugs. However, drugs for treatment early viral hepatitis B and C have limited efficacy and poorly tolerated and expensive. Lack of treatment options means that little or no progress made in the management of people with chronic hepatitis infection[3],

In 2010, there is growing public awareness about the public health burden of viral hepatitis. However, there are major gaps in the response and increased mortality. In 2010, the World Health Assembly adopted the first resolution on viral hepatitis, leading to the establishment of the WHO Global Hepatitis Program in 2011. Research and development lead to revolutionary new treatments for HCV infection, which increase treatment outcomes. The second resolution in 2014 further underlines the public health importance of viral hepatitis and increasing the potential elimination of HBV and HCV.

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Five virus responsible for most cases of viral hepatitis is an infection of the liver due to viral infection. This is the hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus (HDV) and hepatitis E virus (HEV. All hepatitis viruses can cause acute hepatitis. However, only HBV, HCV and HDV often causes chronic hepatitis, which can lead to scarring of progressive liver (cirrhosis) and primary liver cancer (hepatocellular carcinoma). of these, HBV and HCV causes 96% of deaths from hepatitis virus and therefore become the main focus of this report (although for some deaths from HBV infection, HDV may also be a cofactor). In may 2016, the World Health Assembly adopted the Global Health Sector Strategy (GHSS) on viral hepatitis for 2016-2021 [1], [4].

194 WHO Member States are committed to eliminating hepatitis virus as a public health threat by 2030 (defined as a 65% reduction in mortality and a 90% reduction in the incidence compared to baseline 2015) The elimination can be achieved through adequate service coverage of prevention and treatment are synergistic intervention. It is against hepatitis B immunization, prevention of mother to child transmission of HBV, blood and injection safety, prevention of transmission of HBV and HCV infections among people who inject drugs by harm reduction services are comprehensive, and testing and treatment. WHO is also developing a monitoring and evaluation framework for GHSS the hepatitis virus [6-7].

Based on the relevant information to be dangerous viral hepatitis and its rapid spread, it would require specific response to hepatitis. One satuya to perform early diagnosis of the disease hepatitis [8].

This study was built based mobile android android studio by using the tools and programming language using Java and SQLite database used as a storage medium. It is expected that this expert system can help users who still lay on the knowledge and information related diseases nantiya hepatitis that can provide solutions to patients.

2. Research methods

Using the method of development experts. This is done so that the construction stage run according to procedure.

2.1. Naive Bayes Method

Naive Bayes is a method used in statistics to explore opportunities for a hypothesis, Bayes Optimal Classifier looking for opportunities of a class of each group of attributes that exist, and determine where the most optimal grade [9-11]. Naive Bayes has the form of the following formula:

$$P(m_i|N) = \frac{P\ (N|m_i)\ P(m_i)}{P(N)} \quad \text{.....(1)}$$

Information :
P (m | n) = probability of the hypothesis M based on conditions N
P (M) = probability of the hypothesis M
P (N | m) = probability of N by the condition M
P (N) = probability of N

On development, P (N) can be eliminated dikarenkan is fixed. So when compared with each category, this value can be eliminated because the attributes are not always related to it:

$$P(m_i|N) = \prod_{k=1}^{n} P(nk|m_i) \quad \text{.....(2)}$$

$$P(m|N) = P(N_1|m)\ x\ P(N_2|m)\ x\ \ldots P(N_n|m) x\ P(m)$$

When P (N) can be determined through calculation above, the class (label) of the sample data N is the class (label) which has a P (N | M) * P (N) maximum.

3. Results and Discussion

Based on the process of filling the questionnaire and the answers will get the results in the form of presentations value that indicates the patient's condition at the time.

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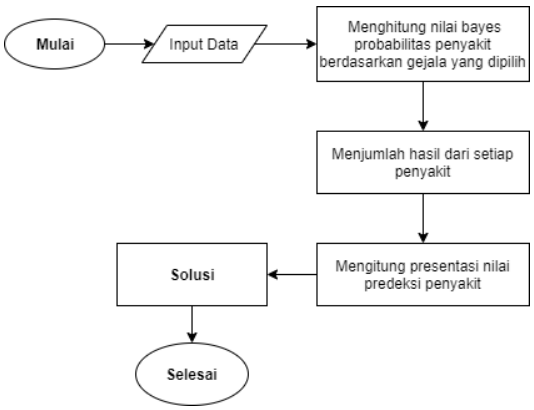

Fig 1. Flow Chart System

3.1. Data Disease

Disease data obtained from the literature and by experts.

Table 1.
The list of diseases

Code	Disease name
P01	hepatitis A
P02	hepatitis B
P03	hepatitis C

3.2. Table Decision Expert

Table expert decision made to connect diseases with table table table caption symptoms can be seen in the table.

Table 3.
Expert decision

Code	Symptoms name	P01	P02	P03
Z01	Fatigue	1	1	1
Z02	Fever	1	1	1
Z03	Stomach ache	1	1	0
Z04	Nausea	1	1	1
Z05	Gag	1	1	1
Z06	Loss of Appetite	1	1	0
Z07	Joint pain	0	1	1
Z08	Itchy	1	0	0
Z09	Dark colored urine	1	1	0
Z10	Muscle ache	1	0	1
Z11	Your skin Mengguning	1	1	1
Z12	Yellowing Eyes section	1	1	1
Z13	Diarrhea	1	0	0
Z14	MudahBerdarah	0	0	1
Z15	easy Bruising	0	0	1
Z16	Spider angiomas	0	0	1
Z17	Swelling in the legs	0	0	1

3.3. System implementation

In this study, the authors use the Java programming language with the help of tools based on Android and Android studio using SQLite database as a storage medium. Following the implementation is done:

a. Main page

In the section of this page, the user can see some features in applications such as yard diagnosis expert system, the list of diseases, a history of aid and the application page.

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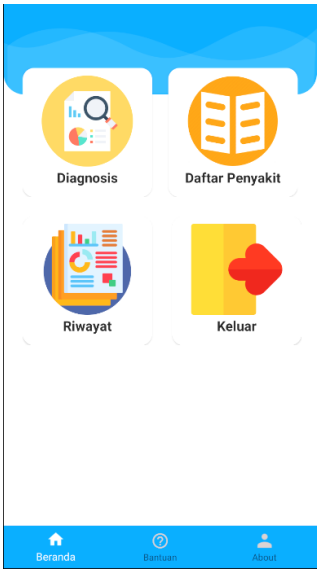

Fig 1. Home

b. Diagnosis Page

On the diagnostics page is a page for the user to input the perceived symptoms the patient (user) and calculate diagnosis by symptom was entered.

Fig 2. Diagnosis Page

c. Results page

In the diagnostic results page, users can see the results of diagnostics in the form of a probability value illness at the time.

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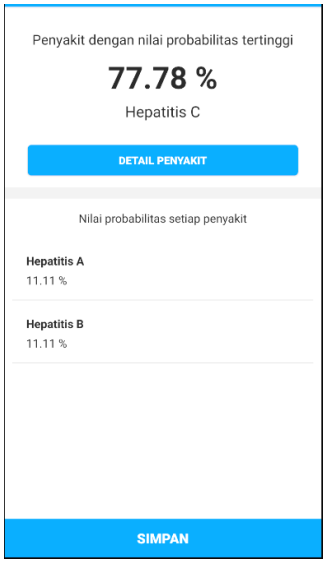

Fig 3. Results Page

d. Results Details page

On the detail page of this result include some detailed information regarding the diagnosis, cause, prevention and symptoms of any disease from the user.

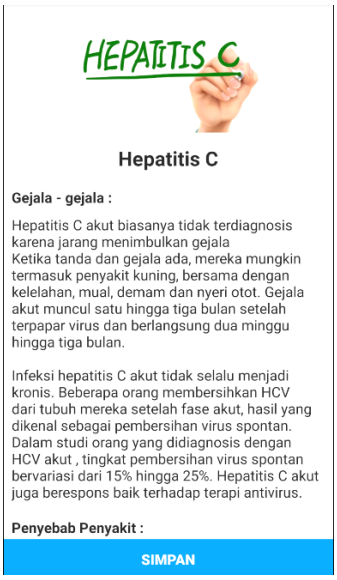

Fig 4. Detail Page Results

3.4. Testing Accuracy

Testing accuracy using 10 sample data obtained from reference hepatitis as a reference at the time of testing. Testing is done by comparing the results obtained from the calculation of the results of the reference system.

Table 6.
Table testing the accuracy of the results with the results of the expert system

No.	Symptoms suffered	System	Specialists	result
1.	Z01, Z06, Z11	B	B	1
2.	Z02, Z11, Z12, Z13	A	A	1
3.	Z04, Z05, Z06	A	A	1

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No.	Symptoms suffered	System	Specialists	result
4.	Z02, Z05, Z06, Z07	A	B	0
5.	Z10, Z11, Z12, Z13	C	C	1
6.	Z01, Z06, Z09	B	B	1
7.	Z10, Z11, Z12, Z13	A	A	1
8.	Z11, Z15, Z16	C	C	1
9.	Z15, Z16, Z17	C	C	1
10.	Z01, Z02, Z04, Z05	A	A	1

3.5. Accuracy analysis

1 = Result diagnostic accuracy with the specialist (reference).
0 = different results with expert accuracy (reference).

In Table 6 has been tested accuracy by using 10 data samples of hepatitis and produce value calculation accuracy corresponding to the following equation.

Value Accuracy =

$$\frac{\text{the number of system test results x 100}}{\text{the number of reference test results}} \quad \text{.....(3)}$$

= 9/10 * 100%
= 90%

4. Conclusion

Based on the research and discussion that has been done in the design process to the implementation of systems based on mobile to diagnose hepatitis use probability Bayes, it can be summed up as follows: The system can help to make an early diagnosis of the infection or disease hepatitis before performing further tests, system can provide detailed information about the disease and provide solutions for the prevention and treatment, the system can provide valid results Bayes probability value obtained from the calculation any probabilities,and results accuracy with 10 sample data system is able to give an accuracy of 90% and Inaccuracy 10% is due at the time of the calculation method of Naive Bayes who use the highest value for the result and if the value obtained at the system will take the value of a chronological list of the first to result given to the user.

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