



Priority Analysis of Community Complaints through E-Government Based on Social Media

Evaristus Didik Madyatmadja, Jennifer Olivia, Rizky Febriyanto Sunaryo

Abstract - Now days in this modern era of globalization, the development of information and communication technology has offered solutions to improve public service performance. This also provides new innovations for the government to be able to offer the latest solutions in improving its services. This report discusses research based on Presidential Instruction No. 3 of 2003 concerning national policies and strategies for the development of e-Government, various regions began to develop the application. The case is discussed about the application of e government in Tangerang city. LAKSA is a feature for the people of Tangerang City to convey their aspirations, aim to the government can effectively and efficiently fulfill the needs of the city of Tangerang. With this prosperity, the government response is needed in accordance with the level of urgency of the complaints conveyed by the community. This research will compare the methods that can be used to solve this problem, namely Naive Bayes and decision trees.

Keywords: e-Government, Data Mining, Social Media, complaints, naïve bayes, decision tree

I. INTRODUCTION

Every independent country must have a system of government. The government itself is an organization that has the authority to make and implement laws and laws in certain regions. As in Indonesia as a developing country, the Indonesian government is expected to be able to answer all problems that occur in the community quickly and precisely. However, the lack of response and communication media provided by the government often makes people anxious. Presidential Instruction No. 3 year of 2003 concerning national policies and strategies for the development of electronic government or e-government is a manifestation of the government's seriousness in the administration of government functions by utilizing information technology infrastructure (IT) [1].

In this modern era of globalization, the development of information and communication technology has offered solutions to improve public service performance. One of them is by using the internet as a network to disseminate information. The internet is a world community that is very democratic and has a code of ethics that is respected by every member [2].

The development of the internet concretely is with the use of social media in everyday life. Social media itself is an online media, with its users being able to easily participate, share and create creative content virtually. Communication that originally met face to face can now occur anytime anywhere through this online media. The transformation of cultural change occurs through the process of digitally (media changes to digital), interactivity (changes in digital media that can provide an interactive response to fellow users), and dispersal (production distribution processes and messages in digital media to involve activeness [3]. This also guides the Indonesian government to develop electronic government-based electronic government services.

In its development, most of the stages of e-government application development in Indonesia currently focus on providing websites and information application services. Tangerang as one of the cities in Indonesia that has begun to implement e-Government systems. LAKSA in Tangerang Live is an e-Government product of Tangerang City as an intermediary media to increase the active role of the community in providing public services by providing feedback from the community, so that it can achieve a transparent, accountable and effective governance.

The Department of Communication and Information (DISKOMINFO) of Tangerang City also succeeded in developing an e-Government application for the City of Tangerang, namely the Suggestion Box Service application or commonly referred to as LAKSA in the Tangerang LIVE application. The application that was inaugurated on February 29, 2016 can be accessed without charge by the public via an Android-based smart phone. Tangerang Live has a variety of features, including: News, LAKSA, panggilan Darurat 112, SEGAR, e-Paper, SIAP Kerja, Perijinan, PBB, and Cek NIK.

During the meeting in the Tangerang Live Room (TLR) room, according to Dadi Budaeri (2018) "Besides being able to save on the cost of making applications, Tangerang City Government also wants to collaborate with other regions [4]. Though LAKSA at Tangerang Live is expected to facilitate the government to be able to provide a better amount of information to the community, business, and or to other governments.

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II. DEFINITION OF E-GOVERNMENT

According to [6], the focus of e-government is information technology efficiency and quality improvement in public services. This is done by using retrenchment ICT-based network and completing the service with simple features.

The development of information and communication technology has brought new solutions to improve the performance of public services that are more effective and transparent.

Readiness of human resources (HR), regulations, budget funds, facilities and infrastructure are absolute thing that must be provided in the implementation of e-Government.

E-Government can be defined as the use of digital technology to transform government activities, which aims to improve effectiveness, efficiency and service delivery [8]. One of the objectives of implementing e-Government is for government institutions to be able to provide better public services.

Now a days, more and more developing countries have begun to implement e-Government products as a communication media for public services for the community. With the existence of e-Government, the government is expected to be able to improve services to the community, the internal effectiveness of government organizations is increasing and public access to information in a government environment is increasingly easy [9].

III. DEVELOPMENT OF E-GOVERNMENT

There are four phases to develop an e-Government proposed by the World Bank (2002), namely Presence (presence), Interaction (interaction), Transaction (transaction) and Transformation (transformation). Proposing the Value Chain of E-Service model, which sets four stages in e-Government development [10].

According to Gupta, the phase of e-Government development for websites in Indonesia, includes:

1. Presence, which is to bring up regional websites on the internet. In this stage, basic information needed by the community is displayed on the government website.
2. Interaction, namely the regional web that provides facilities for interaction between the community and the regional government. In this stage, the information displayed is more varied, such as download and email communication facilities on the government website.
3. Transactions, namely the local government web which in addition has interaction facilities also features public service transaction facilities from the government.
4. Transformation, namely in this case government services increase in an integrated manner.

IV. DECISION TREE

Decision tree (decision tree) can divide large data sets (learning datasets) into smaller record sets by applying a set of rules (rules), so that the resulting set of members become similar each other by paying attention on the destination variable (target variable) [11]. Decision tree is one of the popular data mining classification methods used because it is easily interpreted by humans with the basic concept of converting data into decision trees and decision rules [12].

There are several ways to make decision trees. These below are the following steps to create a proper decision tree, are:

1. The tree starts as a single node (root) that presents all data.
2. After the root node is formed, then the data in the root node will be measured by the information gain to choose which attribute will be used as the divider attribute.

The Decision Tree also acts as a decision support tool developed to help find and make decisions on problems by considering the various factors within the scope of the problem. With a decision tree, humans can easily identify and see the relationship between the factors that influence a problem and can find the best solution by considering these factors.

V. NAÏVE BAYES

The Naïve Bayes classification is a statistical classifier and is based on the Bayes theorem. Bayes decision theory is a fundamental statistical approach in pattern recognition, the use of this algorithm in terms of classification must have a problem that can be seen by statistics [13]. Naïve Bayes is a decision class using mathematical probability calculations on the condition that the decision value is correct, based on object information [14].

Naïve Bayes classification can handle quantitative data and discrete data, as well as sturdy for noise points that are isolated, for example averaged point when estimating the opportunity for conditional data. This classification is relatively easy because it only requires a small amount of training data to estimate the parameters (mean and variance of the variables) needed for classification.

The advantage of using naïve bayes is that it only requires a small amount of training data to determine the estimated parameters needed in the classification process. Because it is assumed to be an independent variable, only the variance of a variable in a class is needed to determine the classification, not the whole of the covariance matrix.

The stages of the Naive Bayes algorithm process are [15]:

1. Count the number of classes / labels.
2. Count the Number of Cases Per Class
3. Multiply All Class Variables
4. Compare Results by Class

VI. PROBLEM IDENTIFICATION, LEARNING OBJECTIVES, LEARNING SIGNIFICANCES

Within the last ten years, the implementation of e-government in Indonesia showed various programs ran by government in department and organization have experienced many obstacles and constraints. The progress has been achieved, but if it is compared to initial plan and target, then the development of e-government in Indonesia is still left behind. Below is the E-government Development Index according to the survey done by United Nations in 2016. The survey result shows that Indonesia is in the middle rank among countries in the world.

Based on data from TangerangNews.com, Tangerang City Regional Secretary Dadi Budaeri (2018), said that it needed 2,600 workers. But at this year's CPNS acceptance, the Tangerang City government was only raided by 284 people. In addition, the population in the city of Tangerang in 2013 reached 1,952,296 people with 504,354 households (KK) [5]. That number is estimated to be higher, because the population

growth rate reaches an average of 2.77 percent per year.

The high rate of population growth in a region can certainly affect the level of welfare of the population in the area itself. Prosperity refers to a better condition, a human condition where people are prosperous, in a healthy or peaceful state [6].

The well-being of the population of a region is also determined by the economic growth of the region itself. If the annual economic growth rate continues to shrink, the people will not prosper.

According to the Tangerang City Central Bureau of Statistics the macro-economic conditions in the City of Tangerang showed a positive economic growth rate where the Tangerang City Economic Growth Rate (LPE) recorded growth of 6.73 percent in 2013 and 6.17 in 2014, but slowed down in 2015 where there was an LPE of 5.58 percent [7].

In addition to population growth rates and economic growth, the level of welfare of a region is also influenced by how the local government can meet and answer the needs of the people of the region. Two-way services and communication that are running well between the government and the community can solve problems that occur in the area more quickly.

The application of e-Government in the City of Tangerang is expected to run well. From the background obtained the problem can be formulated as follows:

1. Has the data obtained from the LAKSA application been classified as a priority complaint category based on the frequency of the complaint reported?
2. Has the Tangerang City Government handled complaints from the public according to the level of frequency of the complaints reported?

Based on the list of learning problems that have been formulated above, the objectives to be achieved from this learning are as follows:

1. General

In general, the purpose of Tangerang City e-Government service analysis research is to provide an indication of the conditions of the problem of public complaints through LAKSA in the Tangerang Live application.

2. Special

To find out the highest frequency of the types of complaints submitted by the people of Tangerang City through LAKSA on Tangerang LIVE using the Decision Tree and Naive Bayes methods.

Based on the research objectives achieved, this learning is expected to provide benefits as follows:

1. Creating healthy relationships and active two-way communication between the community and the local government.
2. The government can know the community's needs for public facilities and infrastructure.
3. The government can make more objective decisions because it is based on public report data.
4. The government can anticipate a problem that is likely to occur in the future by estimating the problems that the community complains about.
5. The government can estimate regional expenditures or annual budgets to meet the public needs for public facilities and infrastructure

VII. VII. RESULT

7.1. Data Collection and Analysis

The data used in this learning is obtained from data cleaning result from Tangerang city government. data of Tangerang City community complaints, namely the LAKSA feature through Tangerang Live

7.2. Data Cleaning for RapidMiner

Data Cleaning is a process of detecting and repairing (or removing) corrupt or inaccurate data sets, tables and databases. This term refers to the identification of incomplete, incorrect, inaccurate and irrelevant data, which then dirty the data will be replaced, modified or deleted.

This process is quite important in the use of rapid miners to prevent duplicate data, ambiguous data and naming conflicts. Conflicts that often arise are when the same name is used for different objects (Homonyms) or different names are used for the same object (synonym), and this causes overlapping or overlapping data.

7.3. Data Transferring into RapidMiner

Below is the total score data from the results of the data cleaning until the word scoring obtained from the research conducted by the Bina Nusantara thesis student on the Tangerang City public service complaint data, namely the LAKSA feature through Tangerang Live.

Table-I: List of Complaints

Complaint ID	Complaint Types	Total Score	Score	Freq	category
ADN111	E-KTP	560	1	560	HIGH
ADN314	Penerangan jalan umum	452	2	226	HIGH
ADN121	Kartu Keluarga	621	3	207	HIGH
ADN146	PAM	350	5	70	MED
ADN007	Lalu lintas	357	7	51	MED
ADN147	PLN	300	6	50	MED
ADN241	Kecelakaan	350	10	35	MED
ADN070	Kebakaran	306	9	34	MED
ADN201	Jalan rusak	208	8	26	LOW
ADN915	Mobil Jenazah	16	4	4	LOW

The score on words are sorted by the urgency level of complaints from the Tangerang City government. While the total score obtained from the x word score the frequency of the word appears in the complaint. After getting the lowest score, the middle value and the biggest value, the rapid miner automatically determines the categories for high, medium and low.

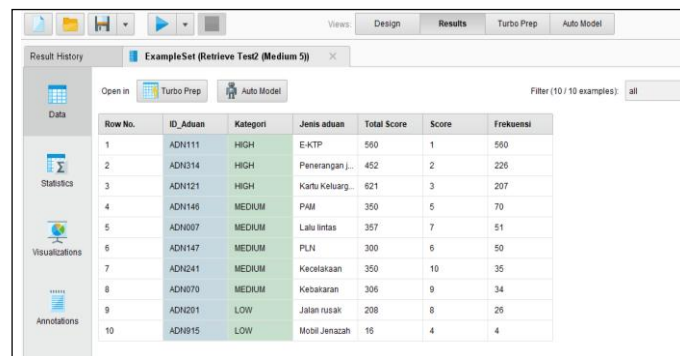


Fig. 1. Determining Id and Label

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7.4. Data Clustering Using Decision Tree Method

In order to make decision tree on the RapidMiner we can use the Decision Tree feature in the operators found on Rapid Miner.

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Tree
Total Score > 254
| Total Score > 404.500: HIGH {HIGH=3, MEDIUM=0, LOW=0}
| Total Score ≤ 404.500: MEDIUM {HIGH=0, MEDIUM=5, LOW=0}
Total Score ≤ 254: LOW {HIGH=0, MEDIUM=0, LOW=2}
    
```

Fig. 2. Decision Tree Flow

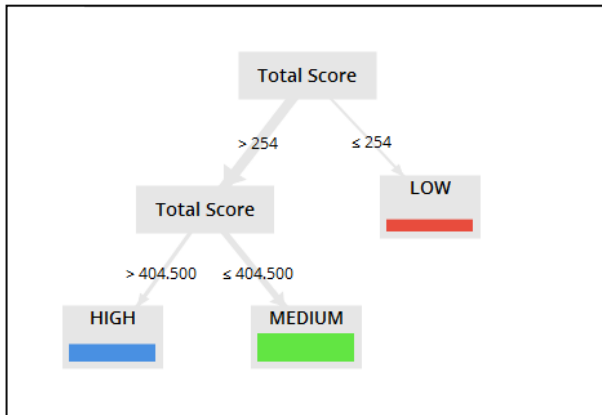


Fig. 3. Decision Tree Result

7.5. Accuracy Level Using Decision Tree Method

To determine the accuracy of this method, we can use the apply models feature and the performance of operators on the rapid miner. The following are the results of calculating accuracy for 10 categories of complaints.

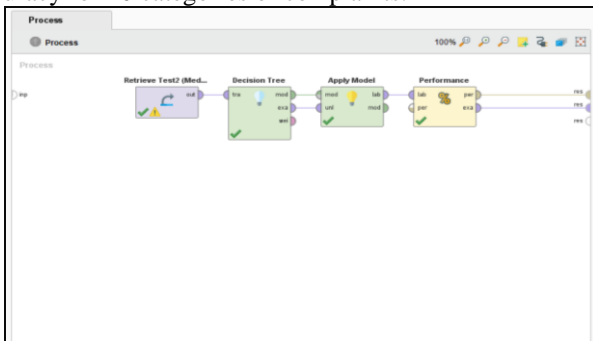


Fig. 4. Determining the Accuracy Level

accuracy: 100.00%				
	true HIGH	true MEDIUM	true LOW	class precision
pred HIGH	3	0	0	100.00%
pred MEDIUM	0	5	0	100.00%
pred LOW	0	0	2	100.00%
class recall	100.00%	100.00%	100.00%	

Fig. 5. Accuracy Level Result

7.6. Accuracy Level Using Naïve Bayes Method

The Naïve Bayes classification is a statistical classifier and is based on the Bayes theorem. Bayes decision theory is a fundamental statistical approach in pattern recognition, the use of this algorithm in terms of classification must have a problem that can be seen by statistics [13].

[16] conducted a credit assessment study using a credit card that applied the classification method using Naive Bayes to produce 82% accuracy.

Accuracy data type of complaint after the stemming process produces an accuracy level of 90.00% with a total class recall showing the success rate with true high 100.00%, true medium 100.00%, true low 50.00%.

accuracy: 90.00%				
	true HIGH	true MEDIUM	true LOW	class precision
pred HIGH	3	0	0	100.00%
pred MEDIUM	0	5	1	83.33%
pred LOW	0	0	1	100.00%
class recall	100.00%	100.00%	50.00%	

Fig. 6. Accuracy Level with Naïve Bayes Method

VIII. DISCUSSION

This learning only uses 10 categories of complaints from all complaints that entered LAKSA on Tangerang Live. While in its implementation, the problems faced by the people of Tangerang City were not limited by only 10 categories of complaints.

This learning only classifies existing data into three priority classes, and the priority sequence is obtained from calculating the results of the frequency of words appearing with word scores. While in its implementation, the urgency of the problems faced by the people of Tangerang City cannot be sorted only by the formula. Such a complaint for an 'accident' problem has a score of 10 words, but only has 35 frequency of occurrence. Further research can do classification by adding other methods and attributes. So that over time, this classification model can be more accurate. This study is similar to [17], performed by analyzing, ranking and prioritizing risk factors that cause the failure of hydraulic turbine generator sets.

IX. CONCLUSION

Good communication is the key to resolving conflicts, so it is often necessary for mediators to mediate the key. LAKSA at Tangerang Live is a key mediator for the people of Tangerang to be able to give their aspirations to the service of the Tangerang City government. So that through this application, it is expected that the Tangerang City government can fulfill its community needs based on its priority level.

In this learning, a decision tree is used to determine whether the complaint includes HIGH, MEDIUM, or LOW priorities. After entering the clean data on the rapid miner, it is found that the complaint with the LOW priority is a complaint with a total score below or equal to 254 points, while the MEDIUM priority complaint is a complaint with 254 points to equal 404.5 points, and HIGH priority complaints is a complaint with more than 404.5 points.

Based on the results of the decision tree, it can be seen that Tangerang City has some urgent complaints from the frequency of words that appear on the LAKSA feature in Tangerang Live, and after calculating the total score it is found that the E-KTP problem is the most important priority of the Tangerang City community.

The results of the priority analysis of the Tangerang City community complaint through the LAKSA feature in Tangerang Live using the decision tree method have a level of accuracy of 100% for the 10 categories of complaints that have been prepared.

While the priority analysis uses other classification methods, namely the Naive Bayes method has an accuracy rate of 90% for 10 categories of complaints that have been prepared. This shows that the decision tree method has a better accuracy rate for 10 categories of complaints than the naïve Bayes method.

Overall based on the research conducted, it can be concluded that the decision tree method is more appropriate for determining the urgency level in Tangerang City based on LAKSA feature, because this method has a higher number of accuracy level than the Naive Bayes method. The higher number of accuracy level, the more similar the results will be when it implemented on the field. Because of the high level of accuracy then we will be able to make decisions more quickly and precisely.

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REFERENCES

1. Indonesia Presidential Instruction No. 3 of 2003 concerning national policies and strategies for the development of electronic government.
2. Azis, S. Easy & Free Website Creation: for Personal Web, Commercial Organizations, 2013.
3. McLuhan, M. Understanding media: The extension of man. London, UK: Routledge, 1990.
4. Pangestu, M.A. Tangerang Live Application, 2018
5. Fauzi, A.I. Tangerang News. <http://tangerangnews.com/kota-tangerang/read/24971/Sudah-Ada-174-Aplikasi-di-Pemkot-Tangerang>, 2018
6. Centeno, C., van Bavel, R., & Burgelman, J. C. A Prospective View of e-Government in the European Union. The Electronic Journal of E-Government, 3(2), 59–66, 2005.
7. Central Bureau of Statistics of Tangerang City. Poverty Analysis of Tangerang City, 2017.
8. Forman, M. Using IT to Transform the Effectiveness and Efficiency of Government. Journal E-Government and Information Technology, 2005.
9. Kase, J. Information Systems Strategic Planning (SI) in the South Central of Timor Regency Government, 2010.
10. Gupta, M.P. (2004). Toward E-Government: Management Challenges, New Delhi, McGraw Hill Publishing Company.
11. Berry, Michael J.A dan Gordon S. Linoff., 2004, Data Mining Techniques for Marketing, Sales, Customer Relationship Management, Second Edition, Willey Publishing, Inc.
12. Witten, I. H., Frank, E., Hall, M. A. (2011). Data Mining Practical Machine Learning Tools and Techniques (3rd ed). USA: Elsevier.
13. Santosa, Budi (2007). Data Mining Techniques for Using Data for Business Purposes.
14. Larose & Daniel, T. Discovering Knowledge in Data: An Introduction to Data Mining. s.l.:John Willey & Sons. Inc., 2005.
15. Xhemali, Daniela, Chris J.H, and Roger G.S. Naive Bayes vs. decision trees vs. neural networks in the classification of training web pages, 2009
16. Madyatmadja, E, D & Aryuni, M. Comparative Study of Data Mining Model for Credit Card Application Scoring in Bank. Journal of Theoretical and Applied Information Technology, Vol59 no 2, 2014.
17. Beibei Xu, Diyi Chen, Huanhuan Li, Keyun Zhuang, Xiao Hu, Jinwei Li, Hans Ivar Skjelbred, Jiehong Kong, Edoardo Patelli. Priority Analysis for Risk Factors of Equipment in a Hydraulic Turbine Generator Unit, Journal of Loss Prevention in the Process Industries, (58) pp 1-7, 2019.

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