

## DATA VISUALIZATION OF PRIORITY REGION BASED ON COMMUNITY COMPLAINTS IN GOVERNMENT

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**ABSTRACT.** *The purpose of this study was to analyze and visualize the complaints of the people of Tangerang city that were obtained from the features of LAKSA and Tangerang social media. As the development of information technology, the government began to expand the communication and information media to better serve the wider community. Tangerang city uses LAKSA and social media to receive the aspirations of their people. This research shows the area in Tangerang city with the highest level of complaint so that it can facilitate the Tangerang city government in making decisions. Measure area used is a priority area determined by the Tangerang city government itself. The data visualization is using bar charts and percentage table charts to facilitate users reading the results of data visualization.*

**Keywords:** e-Government, Community complaint, Good governance, Community welfare

**1. Introduction.** In this modern era, everything must be done faster. Humans began to create a lot of things to simplify life, speed up work or increase profits. Modernization is not something that can be avoided; therefore, we must prepare ourselves and adapt to follow developments.

Modernization is a process of transformation from a direction of change to a more advanced or increasing direction in various aspects of people's lives. In simple terms it can be said that modernization is the process of changing from traditional ways to new ways that are more advanced, which is intended to improve the welfare of society [1]. One form of government development that adapts well to the times is the implementation of smart city or electronic-based governance which is categorized based on the associated

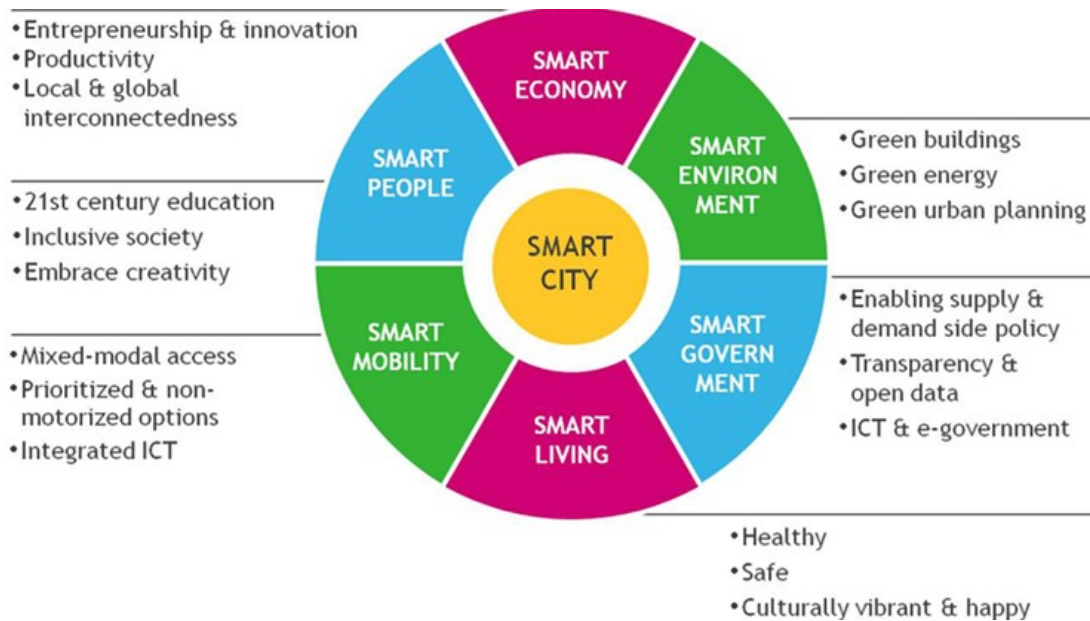


FIGURE 1. Chart smart city characteristics

smart city characteristics (SCC) [2]. In accordance with Presidential Instruction No. 3 of 2003 on Policies and National Strategies for the Development of eGovernment, it is a form of the seriousness of government in performing government functions using the information technology (IT) infrastructure. E-government products developed by local governments can also be diverse.

Tangerang city has implemented an electronic-based government by issuing e-government products in the form of a mobile application, namely Tangerang LIVE. Tangerang LIVE is an Android-based Tangerang city community portal that can be downloaded free of charge by the public. There are various features in this application, including News, LAKSA (Aspiration Service Your Suggestion Box), services, Emergency calls 112, Fresh (Market Price Information System), e-Paper, READY to Work, Licensing, PBB, and NIK Check.

Through the LAKSA feature on Tangerang LIVE, the government can provide a number of information aimed at the public, business, and/or fellow governments. This application is the estuary of all the wealth of information held by the local government which is used as a support for the development of e-government implementation.

In research determining the level of urgency of public complaints by calculating the frequency of the words appearing and calculating the total score on the LAKSA feature on Tangerang LIVE, the results show that the E-KTP problem is the most priority issue of the people of Tangerang city [3].

In addition to creating e-government products in the form of complaints applications to accommodate the aspirations of the community, social media is also one of the places that is quite dense to accommodate public complaints against the government. Even though social media applications or websites are non-government products, the public is not reluctant to express their aspirations there. The model is built based on all types of data obtained from social media Twitter [4].

The term social media consists of two words, namely “media” and “social”. “Media” is defined as a means of communication [5]. The word ‘social’ is referred to as a social reality in which every individual takes action that has an impact on society. This statement states that media and all software are “social” or in the sense that both are products of social processes [6].

However, the city government does not yet know the area with the highest complaint that must be prioritized and cannot know the frequency of complaints of each region in each sub-district. Then the results of this research analysis will be given to the Tangerang city government in order to facilitate the Tangerang city government to solve problems that occur in Tangerang city. Tangerang city government can also find out the problems that occur in various areas in Tangerang city so that they can provide treatment more quickly.

This research is also expected to help the community in their lives. Quick and appropriate response from the government to the needs of citizens can increase the level of welfare of the community. Especially for those who have contributed their aspirations through social media, they feel they have been cared for with answers from the government.

Around the 1990s, a new concept emerged in the public service system which is often referred to as the New Public Management or abbreviated as NPM. The concept of NPM emerged as a representation of public services that were considered inefficient, unproductive, low-quality performance and lack of creativity. The beginning of the initiative to implement NPM in Indonesia can be seen through the Presidential Instruction of the Republic of Indonesia Number 7 of 1999 concerning Performance Accountability of Government Agencies which is then intended to achieve the creation of Good Governance in Indonesia. One of the main prerequisites for the realization of Good Governance is progress in the field of information technology. Through advances in information technology, the delivery of information related to state government can be easily conveyed to the public. For this reason, the Indonesian government strived to find a solution and strategies to realize good governance, which later emerged the term Electronic Government [7].

Electronic Government or often referred to as e-Gov is a form of implementing the use of information technology for government services to citizen. The development of e-Gov is an attempt to implement an electronic government system to effectively and efficiently improve the quality of public services in accordance with the principles of New Public Management (NPM).

So the implementation of e-government in the local government environment is expected to be a vehicle for accelerating information exchange, providing service facilities and transaction activities with citizens (G2C), the business community (G2B) and of course with the government itself (G2G).

Currently, LAKSA application can be accessed directly through an Android-based smartphone. Communities simply download the LAKSA application through the Google Play Store. Not only for the people of Tangerang city, this application can also be accessed by people outside Tangerang city. Tangerang city's Community Satisfaction Index (IKM) towards regional government until the end of last year experienced a significant increase.

The main contribution of this research is that the government can find out the estimated costs incurred in a certain area. Information on this cost estimate is obtained from incoming complaints. This research resulted in the number and types of complaints in certain areas.

The novelty in this research is to determine the criteria for the number of public complaints so that the government can determine the right budget in certain area.

**2. Background Study.** Data mining is a process that uses statistical, mathematical, artificial intelligence and machine learning techniques to identify useful information and knowledge from vast amounts of data. Data mining is a series of processes to investigate the added value of a dataset in the form of knowledge that is not known manually [8].

Clustering is the process of grouping data into different groups so that data in one cluster has a good resemblance and data between clusters has minimal resemblance [9].

The cluster method can measure its own ability to find hidden patterns in the data under investigation. There are several methods that can be used to measure the similarity value between objects being compared. One of these is the weighted Euclidean distance. Euclidean distance calculates the distance of two points by knowing the value of each attribute at both points [10].

The K-means algorithm is an iterative algorithm that tries to split a data set into non-overlapping K subgroups where each data point belongs to only one group [11]. It can make the data points between clusters as synchronous as possible and at the same time distinguish the clusters (as far as possible). This assigns data points to the cluster so that the sum of the squares of the distance between the data point and the cluster centroid (arithmetic mean of all data points belonging to that cluster) is minimal. The less variation we have within the group, the more homogeneous (comparable) data points within the same group.

**3. Research Method.** Data visualization is also considered as modern visual communication. Data visualization involves creating and studying visual representations of data, meaning that “information is abstracted into schema form, including attributes or variables of information units” [12].

Data visualization as well as communicating, success or failure of communication is determined by how the speaker conveys information given to the opposite communication. A good visualization is certainly focused, provides clear answers, and not too detailed. To achieve a good visualization process of data visualization, the following is the process of visualizing data [13]:

- Acquire includes the process of retrieving data, both from the Internet or from a local disk.
- Parse is the process of providing the right data structure for the data to be processed.
- Filter is the process of sorting out data in accordance with the objectives to be achieved.
- Mine includes the process of conducting statistical analysis or data mining of data to achieve goals. This process is optional.
- Represent is the process of changing data in the form of text into an appropriate basic graphic.
- Refine is the process of enriching basic graphics with various visual encodings. This process is optional.
- Interact is the process of changing a static graph into a dynamic graph. This process is also optional.

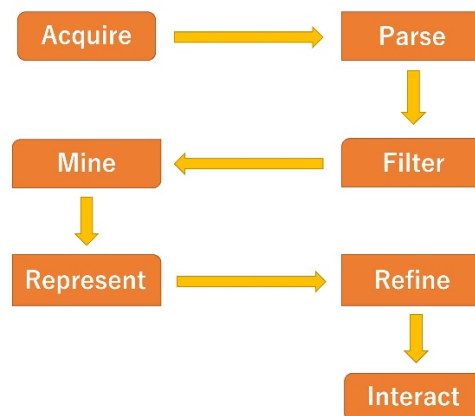


FIGURE 2. Data visualization process by Fry’s “visualizing data”

Tableau is a tool that can visualize database content. The Tableau interface contains an available database in which the user can select the view and then drag and drop the appropriate visual coding such as position, color, shape and size. Tableau data processing supports a variety of visualizations, such as bar charts, time series, scatter charts, and heat maps, as well as analysis of operations such as filtering, sorting, and search [14].

In visualizing data to optimize problems in computer science, especially in the academic field the author uses Tableau. Tableau architecture in visualizing data can be seen in the image below [15].

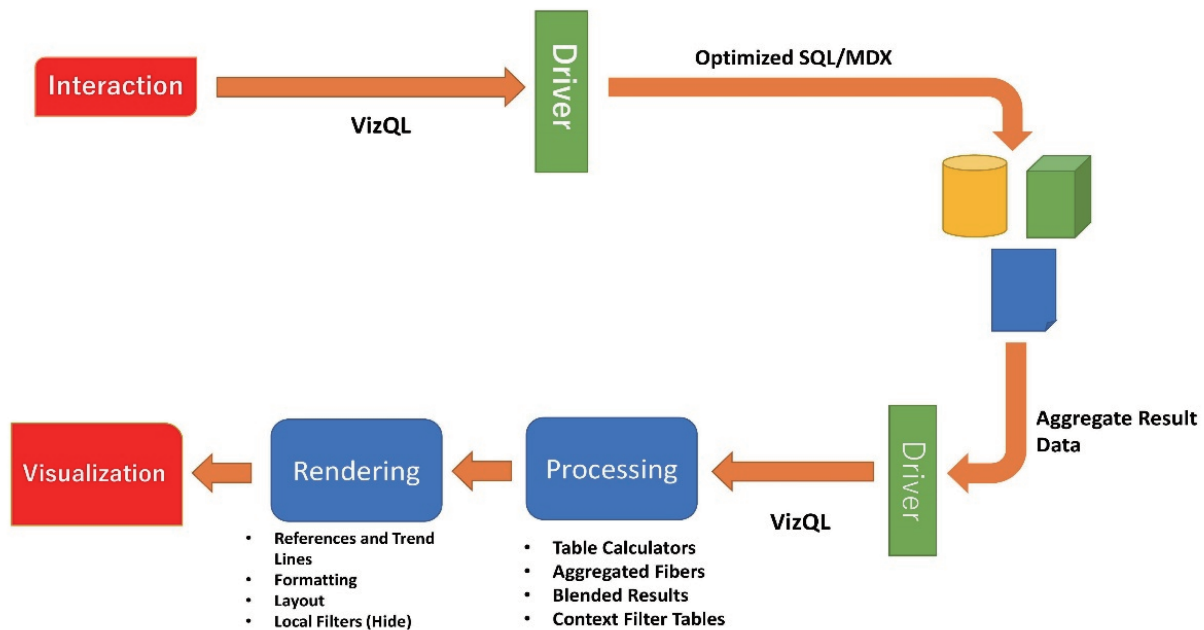


FIGURE 3. Tableau data processing architecture

After loading the complaint data to be used, csv format or complaint data is changed into a list format by using pandas to manipulate the matrix and data so that the complaint data is more easily processed and reads the data into each row in one document that makes it easy and possible to produce data similarity and categorization more leverage [16].

K-means categorization is done using TF-IDF. TF-IDF is a combination of TF (Term Frequency) and IDF (Inverse Document Frequency). TF-IDF is a numerical statistic that counts the number of words that appear in one document. After getting a numerical value from TF-IDF, the K-means algorithm can be analyzed or can be called by determining the number of categories that will be used for labeling analysis later. This study will divide the number of categories and prediction into 13 sections representing each district in Tangerang city. Then the new document will be given to the categorization algorithm or classifying and predicting the class for the complaints data received. The following will explain the stages carried out in this study.

#### 4. Results.

4.1. **Data interpreter.** Data is the result of direct observation of an event, which is a symbol that represents an object or concept in the real world. According to the Big Indonesian Dictionary interpretation also defines interpretation. In brief, data interpretation is an interpretation of the results of observations. Data interpreter can clean Microsoft excel workbook.

4.2. **Dimensions and measure.** In the visualization of data using Tableau, settings can be made by dragging and dropping dimensions or measurements in rows or columns on the Tableau worksheet. This research displays data in the province of Banten. Following is the selection of dimensions and measurements:

- Drag FID on columns. Set the FID measure to COUNT DISTINCT.
- Drag provinces, kec and kel in the rows.
- Choose include only Banten province and sub-district list in Tangerang city.

4.3. **Totals and grand totals.** Determine the calculation of sub totals by using analysis – totals – show rows grand totals – add sub totals. Then the complaints for each region are separated and the totals and grand totals are again counted.

4.4. **Priority complaint category.** Based on previous research [17], the Tangerang city government prioritized 10 types of complaint categories.

TABLE 1. Priority complaint category

No	Category ID	Category type
1	7	Fire
2	16	Traffic
3	23	KTP
4	24	KK
5	30	Damaged Roads
6	38	Street Light
7	69	Accident
8	79	PDAM
9	263	Ambulance
10	306	PLN

Then do the separation of priority category complaints by selecting only the Category ID only the categories that have been determined by the Tangerang city government before.

4.5. **Visualization result.** The next step is to determine the percentage of complaints per priority category for each region. The way to determine the percentage of complaints per priority category for each region is to use Analysis – Percentage of – Column in Pane.

In Table 2 it can be seen that the area with the highest level of complaints is Tangerang District by 22.40%, then Cipondoh District by 15.29%, then Karawaci District by 10.22%, then Pinang District by 7.11%, then Cibodas District by 6.41%, then Batu Ceper District by 6.35%, then Karang Tengah Sub-district by 6.09%, then Neglasari Sub-district by 5.65%, then Periuk Sub-district by 5.58%, then Benda Sub-district by 4.57%, then Ciledug Sub-district by 4.06%, then Larangan Sub-district by 3.74%, and then Jatiuwung Sub-district by 2.54%.

5. **Conclusion.** One of the main prerequisites for the realization of Good Governance is progress in the field of information technology. Through advances in information technology, the delivery of information related to state government can be easily conveyed to the public. Adult information can now be easily obtained through a cell phone. Therefore, the delivery of government information through e-government products is very beneficial for the community [17].

This study provides a vision of the types of complaints that have been prioritized by the Tangerang city government in each district area in Tangerang city. Tangerang city itself has 13 districts, namely, Batu Caper, Benda, Cibodas, Ciledug, Cipondoh, Jatiuwung,

TABLE 2. Result of determining the percentage of complaints per priority category for each region

No.	District	Total complaints	Percentage of complaints
1	Tangerang	353 data	22.40%
2	Cipondoh	241 data	15.29%
3	Karawaci	161 data	10.22%
4	Pinang	112 data	7.11%
5	Cibodas	101 data	6.41%
6	Batu Ceper	100 data	6.35%
7	Karang Tengah	96 data	6.09%
8	Neglasari	89 data	5.65%
9	Periuk	88 data	5.58%
10	Benda	72 data	4.57%
11	Ciledug	64 data	4.06%
12	Larangan	59 data	3.74%
13	Jatiuwung	40 data	2.54%

Karang Tengah, Karawaci, Larangan, Neglasari, Periuk, Pinang, and Tangerang sub-districts.

From this study it can be concluded that of the 10 categories determined by the Tangerang city government, Tangerang sub-district is the district with the highest number of complaints of 22.40% with a total of 353 complaints data. The contribution of this research is that Tangerang city government pays more attention to Tangerang district and other areas based on the results of the visualization, so that the government can properly determine the needed budget in each area, to community welfare. The results of this study can be concluded in Table 2.

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#### REFERENCES

- [1] Abdulsyani, *Sociology, Schematics, Theory, and Applied*, Bumi Aksara, Jakarta, Indonesia, 1994.
- [2] T. U. Wien, *European Smart Cities*, Technical Report, Vienna University of Technology, Vienna, Austria, 2015.
- [3] E. D. Madyatmadja, J. Olivia and R. F. Sunaryo, Priority analysis of community complaints through e-government based on social media, *International Journal of Recent Technology and Engineering (IJRTE)*, vol.8, no.3, DOI: 10.35940/ijrte.c5011.098319, 2019.
- [4] M. A. Albahar, Detecting fraudulent Twitter profiles: A model for fraud detection in online social networks, *International Journal of Innovative Computing, Information and Control*, vol.15, no.5, pp.1629-1639, 2019.
- [5] Wikipedia, *Wikipedia Definition of Social Media*, [https://en.wikipedia.org/wiki/Social\\_media](https://en.wikipedia.org/wiki/Social_media), 2019.
- [6] D. Laughey, *Themes in Media Theory*, Open University Press, New York, 2007.
- [7] C. Fuchs, *Social Media: A Critical Introduction*, SAGE Publication, Ltd., Los Angeles, 2014.
- [8] The Indonesian Ministry of Trade's Public Relations Team, *Guide to Optimizing Social Media for the Indonesian Ministry of Trade*, Indonesian Ministry of Trade's Public Relations Center, Jakarta, 2014.
- [9] M. Bramer, *Principle of Data Mining*, Springer Science, 2007.
- [10] P. N. Tan, M. Steinbach and V. Kumar, *Introduction to Data Mining*, Pearson Education, Boston, 2006.

- [11] J. Han, M. Kamber and J. Pei, *Data Mining Concept and Techniques*, 3rd Edition, Morgan Kaufmann-Elsevier, Amsterdam, 2012.
- [12] M. Friendly and D. J. Denis, *Milestones in the History of Thematic Cartography, Statistical Graphics, and Data Visualization*, [https://www.researchgate.net/publication/240118128\\_Milestones\\_in\\_the\\_history\\_of\\_thematic\\_cartography\\_statistica\\_l\\_graphics\\_and\\_data\\_visualization](https://www.researchgate.net/publication/240118128_Milestones_in_the_history_of_thematic_cartography_statistica_l_graphics_and_data_visualization), 2008.
- [13] B. Fry, *Visualizing Data*, O'Reilly Media, 2007.
- [14] C. Stolte, D. Tang and P. Hanrahan, Polaris: A system for query, analysis, and visualization of multidimensional relational databases, *IEEE Trans. Visualization and Computer Graphics*, vol.8, no.1, pp.52-65, DOI: 10.1109/2945.981851, 2002.
- [15] C. T. Center, *Tableau Desktop Fundamental*, Tableau Classroom Training, Jakarta, Cybertrend Training Center, 2015.
- [16] S. A. Putri and A. K. Rahmah, *Categorization of Community Complaints Tangerang City through Laksa Features*, Undergraduate Thesis, Bina Nusantara University, Jakarta, 2020.
- [17] E. D. Madyatmadja, H. Nindito and D. Pristinella, Citizen attitude: Potential impact of social media based government, *Proc. of the 2019 3rd International Conference on Education and E-Learning (ICEEL2019)*, pp.128-134, DOI: 10.1145/3371647.3371653, 2019.