Day Care Recommendation System in Surabaya Based on Temporal Sentiment Analysis

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Abstract. Daycare is a place to nurture and educate children outside the home which is expected to temporarily replace the role of parents in working hours. The existence of daycare requires an Information System application that helps parents to choose the daycare they need. The choice of daycare also requires input from users about how they assess the daycare so that parents have no doubts. From these problems, it requires an application that can analyze comments, inputs and testimonials from users to provide appropriate daycare recommendations. This study aims to build a daycare information system that can provide recommendations to prospective customers through analysis of user comments in online media using the Sentiment Analysis method. Sentiment Analysis is the process of understanding, extracting and processing textual data automatically to get sentiment information contained in an opinion sentence that uses the Text Mining method. Data sources that will be processed in the classification process are data on opinions or comments on online news. The core process is the classification process to determine the highest probability of each category. The result shows that the system can rank the 10 best daycare in Surabaya based on temporal sentiment analysis.

1. Introduction
The choice to be a career woman means choosing to be a multi-role woman, as a mother for a child, as a wife and as a worker. What about the child if the mother is working, if the child is already in school and independent then it is not a problem. But when the child is still small and cannot be left alone, leaving the child in daycare is the solution.

According to the United Nations (1990) daycare is a means of parenting in groups, usually carried out during working hours. Daycare is an organized effort to care for children outside their homes for several hours in one day when parental care is not fully implemented. In this case, the notion of daycare is only a complement to parental care and not as a substitute for parental care [1]. On the other hand, information technology is growing rapidly and changing people's lifestyles, especially in developing countries like Indonesia. Information technology can be used to help career women in choosing daycare that is feasible and does not cause doubt. User confidence can be obtained from input from other users in online media. From the above problems, an application is needed that can help parents find and choose a Child Care Center based on input from daycare users in online media using sentiment analysis based on text mining. As explained before, the problems that will be taken are:

1. Building an information system to analyze user comments on the relevant daycare using Text Mining based Sentiment Analysis methods.
2. Provide recommendations to users regarding the feasibility of the daycare.
With the existence of an information system and recommendations based on sentiment analysis using text mining, it is expected that parents get recommendations regarding the feasibility of daycare as a place to entrust children through input from many users in online media.

2. Literature Review

2.1. Sentiment Analysis

Opinion mining or sentiment analysis can be considered a combination of text mining and natural language processing. One of the text mining methods that can be used to solve opinion mining problems is Naive Bayes Classifier (NBC). NBC can be used to classify opinions into positive or negative opinions. NBC can function well as a text classifier method. Text mining has a definition of mining data in the form of text in which data sources are usually obtained from documents, and the purpose is to search for words that can represent the contents of the document so that a connection analysis between documents can be done[2]. Text mining is the process of discovering new information or trends that were not previously revealed by processing and analyzing large amounts of data. Text mining can be considered a new research subject. Text mining can provide solutions to problems such as processing, organizing or grouping, and analyzing large amounts of unstructured text. In providing solutions, text mining adopts and develops many techniques from other fields, such as data mining, information retrieval, statistics and mathematics, machine learning, linguistics, natural language processing, and visualization. Research activities for text mining include extraction and storage of text, preprocessing of text content, statistical data collection and indexing, and content analysis[3][4][5]. In analyzing part or all of unstructured text, text mining tries to associate one part of text with another based on certain rules. The expected results are new information that was not clearly revealed before. Currently text mining has received attention in various fields including:

a) Security application
   Many text mining software packages are marketed in the form of security applications, especially plain text analysis such as internet news.

b) Biomedical applications
   Various text mining applications in the biomedical literature have been compiled. One example is PubGene which combines biomedical text mining with network visualization as an internet service.

c) Software and applications
   Large research and development departments including IBM and Microsoft, are researching text mining techniques and developing programs to further automate the mining and analysis process. Text mining software is also being researched by different companies working in the field of search and indexing in general as a way to improve their performance.

d) Online media applications
   Text mining is used by large media companies such as the Tribune company, to eliminate ambiguous information and to give readers a better search experience, which increases site loyalty and revenue. In addition, editors benefit from being able to share, associate and property news packages that significantly increase opportunities to monetize content.

e) Application marketing
   Text mining is also being used in marketing, more specifically in customer relationship management analysis.

f) Academic applications
   The problem of text mining is important for publishers who have large databases to get information that requires indexing for search. This is especially true in science, where very specific information is often contained in written texts.
2.2. Temporal Sentiment Analysis
Temporal Sentiment Analysis (sometimes known as mining opinion or emotional AI) refers to the use of natural language processing, text analysis, computational linguistics, and biometrics to identify, extract, measure, and study subjective affective states and subjective information. Sentiment analysis is widely applied to customer material voices such as survey reviews and responses, online and social media, and health materials for applications that range from marketing to customer service to clinical medicine. In general, sentiment analysis aims to find out the attitude of the speaker, writer, or other subject in relation to several topics or the overall contextual polarity or emotional reaction to documents, interactions, or events. That attitude may be an evaluation or evaluation (see the appraisal theory), affective state (that is, the emotional state of the writer or speaker), or the intended emotional communication (meaning, the emotional effect intended by the author or interlocutor).

2.3. Related Works
Imam Fahrur Rozi, 2012, Journal of EECCIS, Implementation of Opinion Mining for Extraction of Public Opinion Data at Higher Education. In this study an opinion mining system was developed to analyze public opinion in universities. In the document subjectivity and target detection subprocesses, Part-of-Speech (POS) Tagging uses the Hidden Markov Model (HMM). In the results of the POS Tagging process then a rule is applied to find out whether a document includes opinion or not, and to find out which part of the sentence is the object that is the target of opinion. Documents identified as opinions are then classified into negative and positive opinions (subprocess opinion orientation) using Naïve Bayes Classifier (NBC) [6].

Abdurachman Rizal Bachmid, 2017, Opinion Analysis About Culinary in Surabaya on Social Media with Opinion Mining Based on Temporal Sentiment Analysis. The city of Surabaya is the capital of East Java Province, Indonesia as well as being the largest metropolitan city in the province. Surabaya is the second largest city in Indonesia after Jakarta. The city of Surabaya is also the center of business, trade, industry and education in East Java and the eastern part of Indonesia is also culinary. With a very large area and a fairly dense population, it is certain that the city of Surabaya has a variety of cuisines. Certainly this culinary diversity gives many responses and opinions from the public both positive and negative [7].

In previous studies, a decision support system has been made for recommendations for selecting daycare using the Analytical Hierarchy Process. The application has been proven to have helped parents to choose daycare according to their needs [8]. In this study, a decision support system was made to choose daycare based on user opinion that is based on sentiment analysis.

3. System Design
An overview of the recommended daycare recommendation system application as shown in the following figure 1.

![Figure 1. System Flow](image-url)
As in Figure 1, the blue groove is the system process of analyzing opinions, while the red flow is the process of how policy holders or users use the system. The two processes will later meet at the results of the analysis and end in the visualization process in the form of a trend. The system flow starts from social media data retrieval that discusses TPA in Surabaya. The process of retrieving data is carried out in several news portals that have been previously considered. Considerations start from the ease of retrieval, the status of ownership rights to news or information, and trends in comments that enter each day. The data will be separated between news and comments. After the process of retrieving social media data, news and comments are then carried out Text Mining. Text Mining is the process of extracting and taking words that can represent what is in the news or called keywords. This keyword will become a reference for users to search trends. Then, the system process performs opinion mining techniques from comment data to generate comment values. The opinion mining process consists of several stages which will later be explained in the next section. The results of opinion mining will be synchronized with the keyword news and stored in the database. The last flow is user interaction into the system. Users enter keywords into the system. The keyword will be used as the search key for the analysis results. The analysis results are then visualized in the form of trend charts. Users will also be able to search for trends based on year, month in a year, or based on date intervals.

3.1. Social Media Data
Data is obtained from social media containing documents and comments. In the initial stage, the two contents are separated and screened respectively. Comments on a data source are separated to be screened and the value of the comments is searched.

This research collected comments about tourist attractions in East Java to find out what the public comments about attractions in East Java. Comments made by users can vary, such as criticism, support, opinions, etc. The use of the language used is Indonesian. These comments will be taken by the system. The system will look for the sentiment values of each comment. The comments will be divided into two types, positive and negative comments. The section was conducted so that this study can assess the extent of the community's response to child care in Surabaya.

At the stage of taking this comment, the link taken comes from social media that has provided an API and can be used by anyone who needs it to be processed according to their needs. The return of this API is in the form of JSON which can be directly entered into the database. This content is then done by Text Mining to find important words that are in the content so that it can analyze the connection between the content.

3.2. Text Mining
After the social media data is obtained, then text mining starts. Text Mining is its function to search for representative words in the content so that the words can be analyzed and their relevance searched. Text mining is the application of data mining concepts and techniques to look for patterns in text, namely the process of analyzing text to find useful information for a particular purpose. Based on the irregularity of the text data structure, the text-ing process requires some initial stages which in essence is to prepare so that the text can be changed to be more structured. The process of text mining is done in 5 stages, namely Tokenizing, Filing, Stemming, Tagging, and Analyzing. The five stages were carried out sequentially and interconnected. But in this study, the analyzing process is not needed because the text mining process is only used to search for important words that can represent the text without looking for how far the relationship between comments or text. The following is an explanation of the text mining stage with examples of sentences that will be processed using the text mining method is from one of the community comments about daycare in Surabaya. “TPA An-Nur tempatnya bagus dan bersih :!”
3.2.1. Tokenizing.
Tokenizing is the first stage in text mining. Tokenizing is the process of cutting text into a collection of words (array of words). The process of cutting text is based on spaces in each word. Tokenizing is used to sort words contained in the text. Each of these words will be processed in later stages to become words that can represent the text. The tokenizing algorithm is:

- The comment sentence is taken from the database to do the text mining process. If there are spaces, the word explode / separated into words.

![Figure 2. Tokenizing](image)

Figure 2 explains how tokenizing results from a sentence. The yellow label above is the sentence that will be in text mining and the result is the words that are labeled in blue. In principle the tokenizing process is to separate every word that composes a text or document. In general, each word is identified or separated by other words by a space character, so the tokenizing process relies on space characters in the document to do the word separation.

Tokenizing process produces a collection of words that become a reference in keyword searches. The number of keywords is not necessarily the same as the results of tokenizing because in the filtering process there will be several words that are discarded.

3.2.2. Filtering.
Filtering is the process of removing words that are not important or commonly called stoplist. Non-representative words can be conjunctions, help words, conjunctions, etc. The author has created a stoplist word database that is used as a stoplist reference to search for words that need to be filtered. Each word is checked into the database whether the word is a stoplist or not. If it is a stoplist, the word will be automatically discarded. Algorithms for filtering themselves are:

- After going through the tokenizing process, then from one unity the sentence becomes a word
- The system will check per word into the stoplist database if one of the words goes to the list of stop lists, it will be deleted.

![Figure 3. Filtering](image)

Figure 3 explains how the results of the filtering process in text mining. Words labeled blue are filtered words. The three words are included in the stoplist, so they must be discarded. Therefore, the collection of words decreases.

In the next stage there will be no more word dumping. The tokenizing words are checked one by one whether they are included in the stoplist or not. With filtering, words that are not important or do not
represent the text will be discarded. Discarded words usually consist of conjunctions, substitute words, or explanatory words.

3.2.3. Stemming.
Stemming is the process of throwing affixes on a word so that the content contains basic words that can represent the content. This stage is the main stage because rooted words will be searched for root or the initial form to form a base word that can represent the text. In stemming, no words will be discarded, so the number of words in filtering and stemming remains the same.

The process of stemming is quite difficult, the system must know which words have affixes, be it prefixes or suffixes. The stemming process starts from removing the ending and continues with the prefix because not all words beginning with are not basic words, such as shoes, tables, pertamax, etc.

### Table 1. Affixes.

| Affixes  |                       |
|----------|------------------------|
| Suffixes | _kan, _pun, _i, _nya, _in, _is, _isme, _wan, _ah, _wi |
| Prefixes | ber, per, me, di, ter, ke, se, pe, pem, peng |

The stemming process is carried out per word starting from checking suffix. If the word is not in the database and there is a suffix, then delete the suffix. If not, then automatically go to the next stage, which is looking for the prefix. To search for a prefix is the same as searching for a suffix, only checking starts from the first character. Finally the new word is then defined and proceed to the next process. The process of checking words into the database is carried out continuously until the word becomes pure word.

Algorithm stemming itself is:

- After getting the words that come from the filtering process, the system will check for words that have affix
- If the word has an appropriate prefix in the table, the prefix suffix will be deleted
- If the word has an appropriate suffix on the table, then the suffix will be removed
- If there are appropriate prefixes and suffixes in the table, the prefix and suffix words will be deleted

![Figure 4. Stemming.](image)

Figure 4 explains how stemming results in a sentence. Blue labeled words are words that have affixes. Stemming will produce a clean word from affixes. However, stemming results still do not make the word into a basic word or pure word, this is because at the time of the cutting, there must be some words that are still not properly written. In addition, non-standard words are still not justified, so the tagging process must be done.
3.2.4. Tagging.

Tagging is the process of justifying words that are not properly written. This error is usually obtained from accidental writing or writing errors. The tagging process is also used as a substitute for non-standard words to be standard. Because all social media users can provide comments without any special language rules, there must be words that are not standard or not in the Indonesian dictionary. The words abbreviations, regional languages, slang or English are usually used by users in giving comments. Those non-standard words that must be processed by tagging.

Algorithm Tagging itself is:

- After the stemming process is complete, the system gets words that have no affixes
- Then the system checks into the database the default word, if one word has a non-standard word and the original word is present, the system will change the word to the original word

The author has created and defined a database containing hundreds of non-standard words to check whether including raw words or not. If including nonstandard words, then change the word to default according to the database.

| No | Standard Words | Non Standard Words |
|----|----------------|--------------------|
| 1  | Sy             | Saya               |
| 2  | Kalo           | Kalau              |
| 3  | Pngen          | Ingin              |
| 4  | Lo             | Kamu               |
| 5  | Btw            | Buat               |
| 6  | ...            | ...                |

Tagging is very influential on the database of words created. The more complete the word data, the better the results of tagging. This is because the word checking process, the system must check the word into the database one by one. If the word database is incomplete, many words that will not be justified will cause the word to be impure. In addition, the standard word database is also a reference. The more nonstandard word references, the better the results of tagging.

3.2.5. Keywords.

After all the stages of text mining are passed, the words become keywords for the text. Keywords are important words that can represent text or documents, so that during the opinion analysis process, these keywords will be used as references.

All comment data from social media will be processed using text mining and stored in each data table. after obtaining keywords, then the opinion analysis process begins.

3.3. Opinion Mining (Sentiment Analysis).

The next stage is the opinion mining process. Opinion mining is the main stage of this research. In NLP (Natural Language Processing), Opinion mining is often called Sentiment Analysis. Sentiment analysis is the development of text mining to understand, extract and process textual data automatically to get information on sentiments contained in an opinion sentence.

In this study, sentiment analysis refers to the classification of opinions into 3 classes, namely positive, negative and neutral. To conduct sentiment analysis, it is necessary to have word and rule data. Word deviation is used as a sentiment reference word and rule that is used as a sentiment calculation technique.

3.3.1. Word Degree.

The word degree is used to give a value to each word. This value is a number 1, -1, and 0 with 1 are positive, -1 is negative, and 0 is neutral. The author has created his own database of Indonesian word degrees based on Sentiwordnet English.

The process of defining word degrees starts with adjectives, verbs, and nouns. Then each word is checked into Sentiwordnet English to find out the sentiment value. In addition, the word degree must save the word type to facilitate the system in making role judgments on comment sentiments. Because of the difficulty of finding Indonesian Sentiwordnet, the author must interpret the words into English
first to compare them to the English password at http://sentiwordnet.isti.cnr.it/. The author also added several English words that are often used in tourist attractions.

Figure 5. Sentiwordnet of English.

3.3.2. Stoplist.
A stoplist is words that are not needed or do not represent the response of the comment that has been stored in the database. The function of the stoplist itself is to discard the word contained in the stoplist database.

3.3.3. Rule.
After the word degree database is created, the design rule process starts. The rule is used to provide rules for rating comment sentiment. This process does not use special algorithms, but with impression techniques. This technique is simpler than using an algorithm.

Impression techniques tend to analyze the wording of a sentence. This technique analyzes the location of adjectives, verbs, and propositions in a sentence. Proposition is a statement about things that can be judged to be true or false, for example: tidak (not). Rule said, among others:

a) Single Adjectives
   If in a sentence only consists of adjectives, without any verbs and propositions around them, then the value of the sentence follows the adjective. Example:
   “Saya murka” (I’m wrath)
   “Murka” or wrath is an adjective with a negative connotation. The word “murka” is checked in the word database to check the word type and its value. Because there are no verbs and propositions, the value of the sentence follows the word “murka”, which is -1.

b) Single Verb
   In this case, the rule is almost the same as the first rule. If in a sentence only consists of verbs only, without any adjectives and propositions around it, then the value of the sentence follows the adjective. Example:
   “Saya setuju” (I agree)
   “Setuju” or agree is a positive connotation adjective. The “setuju” word is checked in the word database to check the word type and its value. Because there are no adjectives and propositions, then the value of the sentence follows the word “setuju”, namely 1.

c) Proposition before adjectives
   If there is a proposition before the adjective in a sentence, then the sentiment value in the sentence follows the XOR logic rule. XOR logic is:
Table 3. Logic of XOR.

| Proposition | Adjective | Value |
|-------------|-----------|-------|
| 1           | 1         | 1     |
| 1           | -1        | -1    |
| -1          | 1         | -1    |
| -1          | -1        | 1     |

Example:
“saya tidak marah” (I am not angry)
"Tidak" (Not) is a negative proposition and
"marah" (angry) is a negative adjective, so the sentiment value in that sentence is 1 (positive)

d) Proposition Before Verbs
Rule is equal to number 3, that is if there is a proposition before the verb in a sentence, then the sentiment value in the sentence follows the XOR logic rule. Example:
“Saya tidak menolak pembangunan resto baru”
(I do not refuse the construction of a new restaurant)
“Menolak” (refuse) is a verb that has a negative connotation and “tidak” is a negative proposition, so the result is positive.

e) Verbs Before Adjectives
Apart from propositions, adjectives can also change the sentiment value of the verb. After some training, the assessment of sentiments from the meeting between verbs before adjectives was not in the logic rules, passing the opposite of OR. Here's the logic definition for this case:

Table 4. Table OR.

| Proposition | Adjective | Value |
|-------------|-----------|-------|
| 1           | 1         | 1     |
| 1           | -1        | -1    |
| -1          | 1         | -1    |
| -1          | -1        | 1     |

Example:
“Dia memahami dengan baik” (He understands well)
“Paham” is positive verb and “baik” is positive adjective. By following table 4., the sentence has sentiment value 1 (positive).

f) Proposition + Verb + Adjective
Often propositions, verbs, and adjectives appear together, so a rule is needed to capture the sentence. The process of calculating sentiment values starts from calculating verb combinations and adjectives, namely in rule 3. For example:
“Dia tidak memahami dengan baik” (He doesn't understand well)
On rule 5, the word "memahami dengan baik" is positive. Then the negative proposition is before the said sentence. So following the XOR rule, the calculation is -1 XOR 1. The result is -1 (negative).

g) All symbols in the comment are deleted except for points and comma
All characters or symbols that are not needed will be deleted except points and commas. Both symbols are used in the next rule.

h) Point and commas separate sentences
If in a comment there is a comma or point symbol, then the comment is considered to be several sentences and each sentence is calculated as the sentiment value. The value of comments is derived from the sum of the sentiment values of the sentences.

Example:
“Makanannya sangat enak tapi tempatnya kurang bersih” (The food is very good but the place is not clean)
In accordance with rule 7, the comments are divided into 2 sentences, namely "makanannya sangat enak" (the food is very tasty) and "tapi tempatnya kurang bersih" (but the place is not clean). The first sentence follows rule 2 so the result is 1 (positive) and the second sentence...
follows rule 1 so the result is -1 (negative). The sentiment value of comments is obtained from the sum of the values of the two sentences, namely $1 + -1 = 0$ (neutral).

i) Some words in English are entered into the database Regional languages will be automatically ignored, but some words in English can be detected such as: good, great, nice, wonderful, beautiful and some other English words related to tourism objects. For nonstandard words, it will be checked into the default word database first. If it's not there, then the word is automatically ignored too.

For example:
“saya tidak tidak marah” (I'm not not angry)
On rule 3, the word “saya tidak tidak marah” is positive. Then the negative proposition is before the sentence fragment. So that it follows the XOR rule, the calculation is $-1 \text{ XOR } 1$. The result is $-1$ (negative).

Another example:
“itu tidak tidak tidak marah” (It's not not not angry)
On rule 3, the word “saya tidak marah” (I am not angry) is positive. Then the negative proposition is before the sentence fragment. So following the XOR rule, the calculation is $((-1 \text{ XOR } -1) \text{ XOR } -1)$ $\text{(n)}$. According to the sentence, the result is $1$ (positive). In conclusion, if the word “Tidak” is even, it includes positive sentences, whereas if the word "Tidak" is an odd number, including negative sentences. There is the word "Tidak" (No) numbering n in one sentence.

j) Sentences with question marks
Sentences with question marks are considered not including a comment. These three things are the main keys in opinion mining on this research. The word degree is used as a reference value from the sentiment value in each word. Whereas rules are used to put the values of the word degrees into various sentence arrangements.

3.4. Comment Value.
Comments that have calculated the sentiment value, then collected into one table in each place, so as to form a table of the number of places. The aim is to group comments on each place The resulting table will be as many as the number of places in the system, but the number of rows in each table is different because the number of comments in each place is certainly different. Then, the system calculates the value of place comments by adding all comments to that place. The comment value on each comment table is then added up. This sum value is assumed to be c_value. c_value will be used in the next process.

4. Implementation
There are many ways that people use to express their opinions, one of which is through social media. The opinions expressed by the Indonesian people about childcare in Surabaya from social media are the right step to find out the people's thinking about child care in Surabaya, but these opinions are very diverse because social media never limits one's thoughts. Opinion analysis is the right way to find information from these opinions. We propose a new approach in opinion analysis about child care in Surabaya, namely opinion mining based on temporal sentiment analysis. Here is a database of the types and values of each word in sentiment analysis. Can be seen in Figure 6.

![Database sentiment](image_url)
In Figure 7, figure 8 and figure 9 can be seen from the results of word calculations using sentiment analysis.

**Figure 7.** Calculation Testing for Sentence “tempat ini sangat indah namun kurang aman”

**Figure 8.** Calculation Testing for Sentence “penitipan anak yang tidak baik”

**Figure 9.** Calculation Testing for Phrase “sangat ramah dan nyaman”
The recommendation system using comments from social media can be filtered based on date data. Users can choose the comment period that appears on social media. And the number to be assessed can be chosen, namely 5, 10 or 15 selected places.

**Figure 10. User Choose 5 Recommendations**
Figure 10 above is a display of the Surabaya Child Care Recommendation System Based on Sentiment Analysis where the situation when the user selects the five recommendations displayed on the system.

**Figure 11. Recommendation Result for 5 Places**
Figure 11 above is a display of the results of the Surabaya Child Care Recommendation System Based on Sentiment Analysis where the situation is when the user selects five recommendations. There is a score which is the result or value of the daycare center based on the average score of the comments regarding the daycare.

**Figure 12. Recommendation for 10 Places**
The picture above is a display of the Surabaya Child Care Recommendation System Based on Sentiment Analysis where the situation when the User selects the ten recommendations displayed on the system.

**Figure 13. Recommendation Result for 10 Places**
The picture above is a display of the results of the Surabaya Child Care Recommendation System Based on Sentiment Analysis where the situation is when the User selects ten recommendations. However, in the picture there are only six child care centers, because in the database the system can
only filter six existing child care centers. There is a score which is the result or value of the daycare center based on the average score of the comments regarding the daycare.

| Positif  | Negatif  | Netral        |
|----------|----------|---------------|
| sekolah mahal | Good service, walau biaya mahal... |               |

**Figure 14. Calculation Testing**
The picture above is a display when the User selects the "Lihat Komentar" (See Comments) button located in the results of the recommendation. This button is useful for viewing a collection of comments on a daycare center. By selecting the button, the User will know what positive, negative, and neutral comments are at the daycare center.

**Figure 15. Daycare Photo**

5. **Testing**
The picture below is a graph of the testing results on the ease of use.

**Figure 16. Usability Graphic**
Figure 16 is a graph of the results of trials on the level of ease of use. This trial was conducted on 12 parents, of the 12 people 3 people felt this application was quite easy to use, 8 people felt this application was easy to use and 5 people felt this application was very easy to use. Can be seen from the results of testing that this application is easy to use.
Figure 17. Graphic of Easy to Understand Interface
Figure 17 is a graph of the testing results for the ease of display to be understood. This testing was conducted on 12 parents, from 12 people there was 1 person felt that the appearance of this application was very difficult to understand, 5 people felt the appearance of this application was quite easy to understand and 6 people felt the appearance of this application was easy to understand. From these results it can be concluded that the appearance of this application is easy to understand.

Figure 18. Graphic of Easy to Get Helpful Information

6. Conclusion
Analysis of opinions regarding child care in Surabaya is one of the right ways to find out how far the response of the daycare community in Surabaya. This analysis makes it easier for surveyors to search for information while at the same time facilitating data collection dynamically. The community can also judge which daycare centers in Surabaya are ranked first and last place, so people can see rankings based on time intervals. It can be said that Foursquare social media is very rarely used by users of social media, so the data obtained is not so much. This system can rank the 10 best daycare in Surabaya based on temporal sentiment analysis.

Suggestions from this research that the rules made in impression techniques need to be increased or added because the structure of a sentence is very many and varied.

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