INDONESIAN MULTI DOCUMENT SUMMARIZATION USING VIKOR METHOD

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ABSTRACT

The VIKOR method is a decision support method that selects more than one criterion, focusing on ranking based on alternative results and conflicting criteria. Automatic text summarization in multiple documents is summarizing using many documents with the same theme using applications that run on a computer device. Previous research on multi-document summarization with the Textrank method has an accuracy of 74%. But the method has a weakness in determining the importance of a sentence. Stages of automatic text summarization that will be carried out include receiving text input, preprocessing, extracting some features such as: sentence position, similarity with title, keyword, connection weight between sentences, sentences containing numerical words, word frequencies, and centrality. Furthermore, the feature extraction results are used to enter the VIKOR method. After getting the ranking from all sentences, then sorting out 25% of the sentences based on the VIKOR index values obtained. The selected sentence will be processed using the TF-IDF method and will be arranged based on the results of cosine similarity. Intrinsic testing is done by comparing the system summary with a summary of the manual results from three experts. Based on the results of intrinsic testing, ROUGE of 30 test data divided into 10 news topics. It was concluded that automatic text summarization on multi documents using the VIKOR method by a first expert produced the highest with a fairly good average of recall of 74,58%, precission 77,5% , and f-measure 75,25%.

Keywords: VIKOR method, Algorithm, Optimization, MCDM, Multi document automatic summary.

1. INTRODUCTION

Automatic text summarization is a short presentation of a text document that maintains the order of the contents of the reading by taking the core and maintaining the sequence of discourse from the reading by utilizing applications that are run on the computer [1]. Multi-document is a collection of several text documents that have the same theme that is usually collected in one cluster and then will produce an output in the form of a text summary of the main information which is packed more briefly [2]. There are various ways that can be done to perform automatic summarization of the text, one of which is by using the VlseKriterijuska Optimizacija I Komoromisno Resenje (VIKOR) method which is one of the Multi-Criteria Decision Making (MCDM) methods. This method is a decision support method by selecting more than one criterion that focuses on ranking and selection based on alternative results and conflicting criteria [3].

The research conducted by NI Widiastuti about automatic text summarization using the VIKOR method, the research was developed again by Novia Hadiana PH. With the average value obtained was quite good, namely recall of 74.10%, precision 67.35% and f-measure 69, 97%. Based on these results prove that the VIKOR method is good enough to do automatic text summarization [4]. For the previous multi-document research, the Textrank method has been used, this method produces fairly good summary results. This is shown from the accuracy value obtained by 74%. However, the Texrank method has a weakness in determining the level of importance of a sentence [5]. In another multi-document study using one of the MCDM methods, TOPSIS which is also a ranking method similar to VIKOR produces an average score that is not good, namely recall of 0.51, precision 0.52, and f-measure 0.52 [6]. However, in how to determine the ranking of the TOPSIS method, take the closest solution of the ideal solution and the solution furthest from the ideal negative solution but not consider the importance of the relative distance of the two. Because the highest value of the alternative from TOPSIS is not always the closest ideal solution that affects the results of the ranking [7]. Therefore, the use of the VIKOR method can overcome this problem. Because the highest value of the VIKOR method is the closest ideal solution in determining the results for decision making.

In several studies in other fields explained that the VIKOR method is an appropriate method used in a ranking because the results are good. As in research [8]. Stating that the VIKOR method has a system calculation time of less than 1 second and the determination of the Vikor method value can be set according to its v value. In other studies stated that

the application of the VIKOR method can help resolve decision making practically and quickly [9].

Based on this description, this study aims to see whether the VIKOR method can be used for automatic text summarization in multi-language news documents. In this study it is expected to produce a summary of multi-document text using the VIKOR method well.

2. CONTENTS OF RESEARCH

2.1 System Analysis

The automatic text summarization system that will be built in this research can be seen in Figure 1. Starting from inputting several input documents, the preprocessing title will be used in the similarity feature with the title. Preprocessing contents are used for feature weighting, calculation of other extraction features. The results of the process will be carried out by the classification and ranking process using the VIKOR method so as to produce several summary results to be then combined with TF-IDF and cosine similarity so as to produce a multi-document summary.

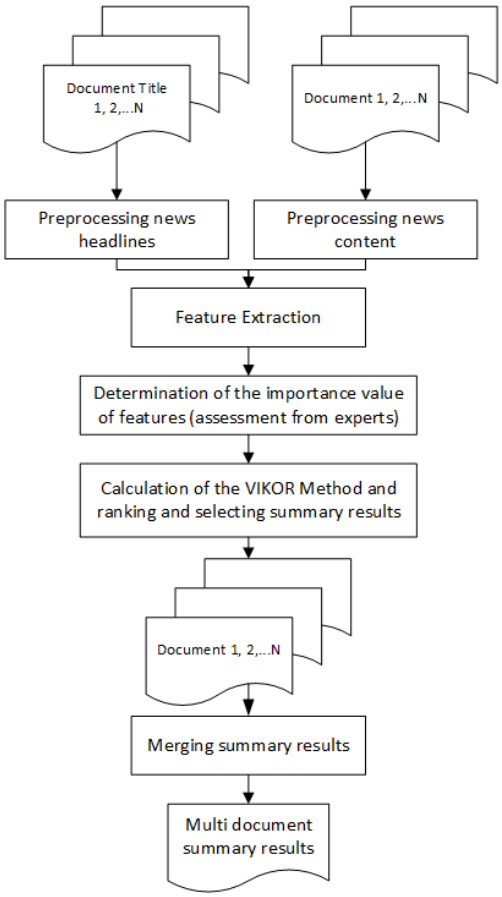


Figure 1. System Analysis

2.2 Preprocessing Analysis

The preprocessing stage is a stage to tidy up and prepare documents that will be used in the calculation process on feature extraction. Preprocessing in this study consists of various stages described in Figure 2.

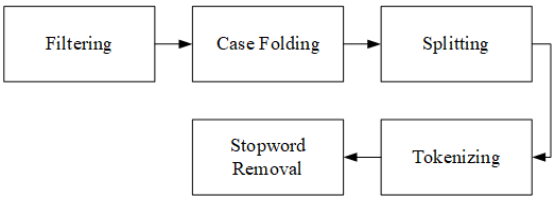


Figure 2. Preprocessing Analysis

Preprocessing steps are carried out on input data. Input data documents through all stages of the preprocessing stage. The results of documents that have passed the preprocessing stage can be seen in table 1.

Table 1 Document Preprocessing Results

No	Sentence Splitting
1	pyeongchang pemerintah korsel mengerahkan militer mengisi kekosongan pekerja akan bertugas olimpiade musim dingin pyeongchang
2	pasalnya pekerja terkena norovirus
3	virus menyebabkan seseorang mual muntah diare
4	sejauh 32 pekerja dirawat karena norovirus
5	mencegah menyebarnya virus sebanyak 1200 pekerja dikarantina
6	mengatasi kekurangan tenaga kerja keamanan diisolasi sekitar 900 personel militer ditugaskan mengambil alih pekerjaan keamanan sipil bunyi pernyataan panpel olimpiade pyeongchang rabu 7 februari 2018 dilansir insidethegames
7	mereka nantinya bekerja 20 tempat pertandigan pekerja dinyatakan pulih
8	mencegah infeksi norovirus lanjut kementerian keamanan pangan obat obatan menginspeksi kebersihan restoran fasilitas makanan terkait olimpiade
9	pusat pengendalian penyakit korsel memamtau pasien diare meminta orang mengikuti langkah pencegahan norovirus
10	pernyataan itu panpel juga memberikan saran terhadap masyarakat untuk mencuci tangan selama 30 detik dengan air yang mengalir dan sabun setelah pergi ke toilet.

2.3 Feature Extraction

Feature extraction is the process of sentence processing using features so as to produce feature values that will be used for document summarization. This process is done after going through the preprocessing process. The features used are sentence positions, keywords, similarities with titles, weight similarities between sentences, numerical sentences, word frequencies, centrality.

2.3.1 Sentence Position (F1)

In general, important sentences in a story lie in the initial or final sentence [10]. The sentence

position can be calculated by the formula (1) as follows:

$$sentence\ position\ = Max\left(\frac{1}{i}, \frac{1}{n-i+1}\right) \quad (1)$$

Description :
i = sentence sequence in the document
n = the total number of sentences in the document

2.3.2 Important Keyword (F2)

The keyword is checked for the number of times it appears in the sentence. The keywords obtained will be taken ≤ 10 words. A weight of 0.1 will be given if the keyword appears in the sentence [10]. A weight of 0 will be given if the keyword does not appear. The keywords taken can be seen in table 2.

Table 2 Keyword List

No	Word	Amount
1	Pekerja	5
2	Norovirus	4
3	Pyeongchang	3
4	Olimpiade	3
5	Keamanan	3
6	Virus	2
7	Diare	2
8	Pernyataan	2
9	Militer	2
10	Mencegah	2

From the list of keys obtained, they will be examined for each sentence. Each occurrence will be given a value of 0.1 and if there is no occurrence will be given a value of 0. The results of the calculation of keywords can be seen in table 3.

Table 3 Keyword Calculation

Sentence	$\sum total\ bobot$
S1	0,5
S2	0,2
S3	0,2
S4	0,2
S5	0,3
S6	0,6
S7	0,1
S8	0,4
S9	0,2
S10	0,1

2.3.3 Similarity of Sentences with Titles (F3)

The title in a news is the compaction of a news and describes the contents of the news [11]. If many sentences have similarities with the title, the sentence has a high level of importance. This feature is calculated using equation 2 as follows:

$$Similarity = \frac{|Word\ in\ Tittle \cap Word\ in\ Sentence\ (i)|}{|Word\ in\ Tittle \cup Word\ in\ Sentence(i)|} \quad (2)$$

Titles that have passed the preprocessing stage are then checked for compatibility with each sentence. The similarity calculation with the titles in all sentences can be seen in table 4.

Table 4 Result of 3rd Feature Calculation

Sentence	Similarity Weight
S1	$score(S1) = \frac{5}{22} = 0{,}2273$
S2	$score(S2) = \frac{1}{13} = 0{,}0796$
S3	$score(S3) = \frac{0}{15} = 0$
S4	$score(S4) = \frac{1}{13} = 0{,}0455$
S5	$score(S5) = \frac{0}{17} = 0$
S6	$score(S6) = \frac{2}{36} = 0{,}1143$
S7	$score(S7) = \frac{0}{19} = 0$
S8	$score(S8) = \frac{2}{23} = 0{,}08696$
S9	$score(S9) = \frac{2}{21} = 0{,}09524$
S10	$score(S10) = \frac{0}{22} = 0$

2.3.4 Connection Weight Between Sentences (F4)

This feature calculates many of the same words between one sentence and another [11]. Calculation of sentence weight can be seen in table 5.

Table 5 Connection Weight Between Sentences

Sentence	$\sum total$
S1	9
S2	7
S3	2
S4	7
S5	6
S6	7
S7	4
S8	7
S9	5
S10	2

2.3.5 Numerical Sentence (F5)

In summarizing text, especially news texts, you must consider words that contain numerical elements. Because sentences that contain numerical sentences are important [11]. Kalimat numerik dihitung dengan rumus 3.

$$Scoref5\ (Si)\ \frac{many\ numbers\ in\ sentences(s)}{long(s)} \quad (3)$$

2.3.6 Word Frequency (F6)

The appearance of the word is checked for its existence in each document because the meaning of a word can be determined by how many words appear in each document. For this reason, a method can be used to extract the word frequency data in a document that is tf-isf. Tf-isf is a statistical method used to evaluate the meaning of words in a sentence on a

document [10]. Calculation of word frequency can be seen in formulas 4 and 5.

$$isf = log\left(\frac{N}{n_i}\right) (4)$$

$$word\ frequency = Tf_i * isf\ (5)$$

Description :

N = the total number of sentences in the document

ni = number of words containing the word i

The results of the word frequency feature calculation can be seen in table 6.

Table 6 Result of Word Frequency Calculation

Sentence	TF-ISF
S1	10.6198
S2	2.6989
S3	4.3979
S4	2.6989
S5	4.6989
S6	23.7167
S7	4.3010
S8	12.3187
S9	10.7959
S10	12.3979

2.3.7 Centrality (F7)

The centrality in a sentence in a document is the similarity of words between one sentence and another. If a sentence has high centrality, then the sentence has the highest probability of being included in the summary results [10]. Centrality is used to find the relationship between sentences in the document until the highest centrality value is found in a sentence. The value of centrality is calculated using formula 6.

$$Centrality = \frac{|Word\ in\ Sentence(i) \cap Word\ in\ Sentence(j)|}{|Word\ in\ Sentence(i) \cup Word\ in\ Sentence(j)|} \quad (6)$$

Keterangan:

i = sentence index i

j = sentence index j

The results of the calculation of centrality can be seen in table 7.

Table 7 Result of Calculation Centrality

Sentence	Centrality Max Value
S1	0.07692
S2	0.25
S3	0.0909
S4	0.25
S5	0.1
S6	0.07692
S7	0.1111
S8	0.0556
S9	0.0625
S10	0.05128

After the weight of all features is obtained, this value will be used in the calculation of the VIKOR method. The results of all features can be seen in table 8

.

Table 8 Calculation of All Features

	F1	F2	F3	F4	F5	F6	F7
S1	1	0,5	0,273	9	0	10.619	0.077
S2	0,5	0,2	0,077	7	0	2.698	0.25
S3	0,333	0,2	0	2	0	4.397	0.091
S4	0,25	0,2	0,077	7	0.25	2.698	0.25
S5	0,2	0,3	0	6	0,167	4.699	0.1
S6	0,2	0,6	0,114	7	0,115	23.716	0.077
S7	0,25	0,1	0	4	0,2	4.301	0.111
S8	0,333	0,4	0,087	7	0	12.319	0.056
S9	0,5	0,2	0,095	5	0	10.796	0.062
S10	1	0,1	0	2	0,076	12.398	0.051

2.4 VIKOR Method

VIKOR is one of the multi-criteria decision making (MCDM) methods that focus on ranking and selection based on alternative results and conflicting criteria that produce solutions that are probably the closest to the ideal solution [3].

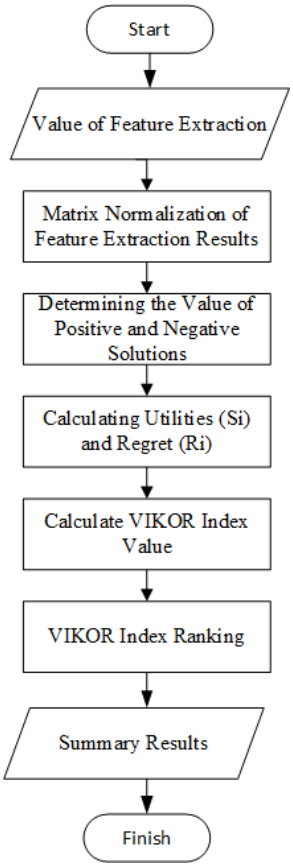


Figure 3 VIKOR Method

2.4.1 Feature Weight

Calculation of feature weight is done as input data for the subjective function of the VIKOR method. For weighting, the features themselves are determined by experts [3], where the expert in the field of automatic text summarization in Indonesian comes from Indonesian literary education background, namely Mahmud Fasya M.A, expert 2 Dina Novalia S.S, and the third expert Tri Ratna Nigrum S, Pd. The weight of features used in this study is given the following weights:

Table 9 Feature Weight

No	Fitur	Pakar 1	Pakar2	Pakar 3
1	Sentence Position	14,29%	15%	20%
2	Keywords	21,43%	20%	20%
3	Similarity with the title	25%,	15%	30%
4	Sentences Connection	7,14%.	10%	5%
5	Numerical Sentence	3,57%	5%	5%
6	Word Frequency/ TF-ISF	17,86%,	25%	10%
7	Centrality	10,71%	10%	10%

2.4.2 Normalization of the Matrix

The decision matrix that has been obtained from several criteria taken from the calculation of feature extraction weight will be normalized to produce a new matrix of the weight of the previous features. Calculation of matrix normalization uses formula 7.

$$f_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m}\left(x_{ij}^2\right)}}, i = 1, \dots, n; j = 1, \dots, m \quad (7)$$

Description :

x_{ij} = matrix element from column i row to j

n = number of sentences

m = number of features

The results of matrix normalization can be seen in table 10:

Table 10 Normalize Feature Results

	F1	F2	F3	F4	F5	F6	F7
S1	0.0716	0.0358	0.0195	0.6443	0.0000	0.7603	0.0055
S2	0.0664	0.0266	0.0102	0.9301	0.0000	0.3586	0.0332
S3	0.0688	0.0413	0.0000	0.4126	0.0000	0.9072	0.0188
S4	0.0333	0.0266	0.0102	0.9311	0.0333	0.3590	0.0333
S5	0.0262	0.0393	0.0000	0.7862	0.0218	0.6157	0.0131
S6	0.0081	0.0243	0.0046	0.2830	0.0047	0.9588	0.0031
S7	0.0425	0.0170	0.0000	0.6798	0.0340	0.7309	0.0189
S8	0.0235	0.0282	0.0061	0.4937	0.0000	0.8688	0.0039
S9	0.0420	0.0168	0.0080	0.4198	0.0000	0.9064	0.0052
S10	0.0794	0.0079	0.0000	0.1587	0.0061	0.9841	0.0041

2.4.3 Calculate Ideal Positive And Negative Ideal

The ideal positive solution is the largest value of each extraction feature. whereas the ideal negative solution is the smallest value of each extraction feature. Maximum and minimum values from the normalization of features can be seen in table 11.

Table 11 Ideal Solution Values

Ideal Solution	F1	F2	F3	F4	F5	F6	F7
A^*	0.079	0.041	0.019	0.931	0.034	0.984	0.033
A^-	0.008	0.008	0	0.159	0	0.359	0.003

2.4.4 Calculate Utilities (S) dan Regret (R)

In calculating the utility size and regret, the feature weight value (W) is given by all experts. In this study, the calculation example uses the weights of experts 1. Calculation of Utilities (S) and Regret (R) using formulas 8 and 9.

$$S_i = \sum_{j=1}^{n} W_j \frac{(f_j^* - f_{ij})}{(f_j^* - f_j^-)} \quad (8)$$

$$R_i = max_j \left[W_j \frac{(f_j^* - f_{ij})}{(f_j^* - f_j^-)} \right] \quad (9)$$

Description :

W = weight of the feature

f_j^* = Max value of features from matrix normalization

f_j^- = Min value of features from matrix normalization

f_{ij} = feature value from result of matrix normalization

Si = Utility Values

Ri = Max Value of Utilities

The results of Utility and Regret calculations can be seen in table 12.

Table 12 Values of Utilities And Regret

Sentence	Utilities (Si)	Regret (Ri)
S1	0.2754	0.0986
S2	0.4540	0.1786
S3	0.4284	0.2500
S4	0.4849	0.1785
S5	0.5721	0.2500
S6	0.6481	0.1908
S7	0.6266	0.2500
S8	0.5807	0.1715
S9	0.5846	0.1573
S10	0.6687	0.2500
Max	0.6687	0.2500
Min	0.2754	0.0986

2.4.5 Calculate VIKOR Index

The VIKOR index is calculated using the specified weight value (v). As for in a journal stating that the value (v) used is ≤ 0.5, if both aspects are considered relevant then the value (v) used is 0.5 [12]. Utilities (Si) and Regret (Ri) will be substituted into the equation. VIKOR index calculation uses equation 10.

$$Q_i = \left[v\ \frac{(S_i - S^-)}{(S^* - S^-)}\right] + \left[(1-v)\ \frac{(R_i - R^-)}{(R^* - R^-)}\right] (10)$$

Keterangan :
v = vikor index weight value
S^*= Max value of utilities
S^-= Min value of utilities
R^*= Max value of regret
R^-= Min value of regret

The results of the calculation of the VIKOR index will be ranked based on the smallest to the largest value. The results of the calculation and ranking of the VIKOR index can be seen in table 13.

Table 13 VIKOR Index Value

Sentence	Qi	Rank
S1	0	1
S2	0.4913	2
S4	0.5302	3
S9	0.5871	4
S8	0.6289	5
S3	0.6945	6
S6	0.7785	7
S5	0.8771	8
S7	0.9465	9
S10	1	10

2.4.6 Summary Results

In taking sentences that will be used for summary results, compression is used 25% of the many sentences in the document [5]. Summarization results can be seen in table 14.

Table 14 Hasil Peringkasan

Sentence	Sentence Fill	Rank
S1	pyeongchang pemerintah korsel mengerahkan militer mengisi kekosongan pekerja akan bertugas olimpiade musim dingin pyeongchang.	1
S2	pasalnya pekerja terkena norovirus.	2

Because this is a multi-document study, the output from the summary results is the result of several documents with the same topic. All documents go through the same process.

2.5 Merging Summary Results

After the summary results of several documents have been obtained using the VIKOR method, all the summary results are combined by calculating the occurrence of words with TF-IDF and calculating the similarity between documents with cosine similarity and then compiling and displaying a multi-document summary.

2.5.1 TF-IDF Method

The Tf-IDF method is a method that checks and gives weight to the relationship between the appearance of words (term) between sentences one with the other sentences. This method combines two concepts for calculating weight, namely term frequency (Tf) is the frequency of occurrence of term j in the sentence i. Document frequency (df) is the number of sentences where a term appears [13]. In the process, this method is the same as the IF-ISF method. TF-IDF can be calculated by formulas 11 and 12.

$$idf = log\left(\frac{N}{idf}\right) (11)$$

$$Wij = Tf_{i\,j} * idf (12)$$

Keterangan :
N : sum of all sentences
Idf : value of occurrence of words
W_{ij} : weight of words from sentences
Tf_{ij} : number of occurrences of words in sentences

2.5.2 Cosine Similarity

Cosine similarity is a method to measure the distance between documents or sentences with the query relevance approach. The greater the similarity of the query vector with the sentence vector, the query is seen as more relevant to the sentence [10]. The value used in the calculation of cosine similarity is the TF-IDF calculation value. Calculation of cosine similarity using formula 13.

$$Sim\ (Si, Sj) = \frac{\sum_{j=1}^{m} W_{ij} * W_{ij}}{\sqrt{\sum_{j=1}^{m}(W_{ij}{}^2)} * \sqrt{\sum_{j=1}^{m}(W_{ij}{}^2)}} (13)$$

Keterangan
Si, Sj : similarity between sentences Si and Sj
W_{ij} : weight of words from sentences in the list of sentences Si and Sj

The results of calculating cosine similarity can be seen in table 15.

Table 15 Cosine similarity Value

	S1	S2	S3	S4	S5	S6	S7	S8
S1	-	0.092	0.029	0.059	0.014	0	0.233	0
S2	0.092	-	0	0	0	0	0	0
	S1	S2	S3	S4	S5	S6	S7	S8
S3	0.029	0	-	0.148	0.068	0	0.053	0
S4	0.059	0	0.148	-	0.138	0	0.143	0
S5	0.014	0	0.068	0.138	-	0	0.049	0.107
S6	0	0	0	0	0	-	0	0
S7	0.233	0	0.053	0.143	0.049	0	-	0
S8	0	0	0	0	0.107	0	0	-
Total	0.426	0.092	0.298	0.488	0.376	0	0.478	0.107

The result of the cosine similarity value is then sorted by the largest to the smallest value. Because the greater the similarity value, the sentence is an important sentence. Sorting results can be seen in table 16.

Table 16 Sorting Results

Document	Sentence	Value	Order
1	S1	0.2492	1
4	S7	0.2476	2
2	S3	0.2381	3
3	S6	0.1958	4
1	S2	0.1005	5
2	S4	0.0914	6
4	S8	0	7
3	S5	0	8

3. DISCUSSION

3.1 Accuracy Testing

Accuracy testing that will be carried out is by evaluating summary results using the intrinsic evaluation method. One of them is using ROUGE [14]. Calculation of accuracy with this method by looking at the summary results of the system and the results of manual summarization of humans (experts). The documents used to amount to 30 news documents which are divided into 10 topics. This evaluation measures the value of recall and precision of the sentence and a combination of the two that produces f-measure. These values are obtained through formulas 14, 15, and 16.

$$recall = \frac{hits}{hits+misses} \quad (14)$$

$$precission = \frac{hits}{hits+noice} \quad (15)$$

$$f - measure = \frac{2*precission*recall}{recall+precission} \quad (16)$$

Description :

$hits$= The number of words in the sentence that successfully extracted the system in accordance with the results of the human extract (expert).

$misses$= Number of words in sentences extracted by humans (experts) but not contained in the extracts of the system.

$noice$ = The number of words in the sentence extracted by the system but not in the sentence extracted by humans.

This formula is applied to 30 news documents for each expert. The results of the calculation of accuracy can be seen in table 17.

Table 17 ROUGE Accuracy Average 30 data

Expert	Average Recall	Average Precission	Average F-measure
1	0.7458	0.7750	0.7525
2	0.6317	0.6702	0.6439
3	0.6934	0.7822	0.7272

3.2 Cohesion Testing

Cohesion evaluation aims to calculate cohesion between sentences. Cohesion evaluation is calculated based on the cosine similarity value obtained from the sentences generated by the system based on the weight of each expert. If the value is close to 0 then the summary sentence is not unified, and if the value approaches 1 then the summary sentence is solid [15]. Cohesion testing can be calculated using formula 17

.

$$CoH = \frac{\log(C_s * 9 + 1)}{\log(M * 9 + 1)} \quad (17)$$

$$N_s = \frac{(o) * (o-1)}{2}$$

$$C_s = \frac{\sum \forall Si, Sj \in summary\ Sim_{cos}(Si, Sj)}{N_s}$$

$$M = maxSim_{cos}(i,j), i,j \leq N$$

Keterangan :

CoH : cohesion value from summary results

C_s : average similarity values of all sentences summary results

$Sim_{cos}(Si, Sj)$: cosine similarity between Si and Sj sentences

N_s : similarity value which is not 0

o : sum of sentences summary results

N : number of sentences in the document

M : maximum value of similarity of sentences in the document

The results of cohesion testing can be seen in table 18.

Table 18 Cohesion Testing

Topic	Expert 1	Expert 2	Expert 3
1	0.3246	0.1970	0.2619
2	0.2875	0.2948	0.2481
3	0.2018	0.1766	0.2339
4	0.3184	0.3305	0.2968
5	0.3563	0.3479	0.3563
6	0.1704	0.2070	0.1728
7	0.2951	0.2271	0.3487
8	0.2108	0.2355	0.3085
9	0.2482	0.3754	0.2849
10	0.3557	0.2726	0.3557
Min	0.1704	0.1766	0.1728
Max	0.3563	0.3479	0.3563

4. PENUTUP

4.1 Conclusion

Based on the results of the research that has been done, the application of the VIKOR method for multi-document text summarization is good enough. This statement is supported by the results of the average accuracy testing for 30 test data divided into 10 news topics using the ROUGE method. The test was carried out by comparing the results of the system summary and manual summary obtained from three experts. Expert 1 produces the highest average value of recall of 74.58%, precision of 77.50% and f-measure of 75.25%.

4.2 Suggestion

Suggestions from the authors for this research are to develop future multi-document automatic text summarizing research, namely :

1. Although the results obtained are quite good, this study has not yet achieved high accuracy. Further research is needed using other methods and the development of VIKOR methods such as fuzzy VIKOR etc.
2. Determination of sentences that will be used as a summary is still lacking in the calculation of the relationship between the sentences. This causes the summary of the resulting multi-document summary to be unified because of the lack of interrelationship between the sentences of the document summary with each other. It is expected that testing using experts is taken into account again the interrelationship between the sentences.

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