

QUALITY MEASUREMENT OF AUTOMATIC TEXT SUMMARIZATION APPLICATIONS BASED ON WEB

¹FIRDA MARYANA, ²ANA KURNIAWATI

^{1,2}Department of Computer Science and Information Technology, Faculty of Information System, Gunadarma University, Depok, Indonesia

Email: ¹firdamaryana@gmail.com, ²ana@staff.gunadarma.ac.id

ABSTRACT

The large number of electronic text documents, makes too much information that required to be accessed quickly and does not take much time in retrieving the core of the text document. Automatic text summarization is one of the solutions to help users to find the core of electronic text documents in a short description or summary. There are some examples of automatic text summarization application based on web, it does not guarantee that every application has the same quality one and other. There are many parameters to measure the software quality. ISO 25010 parameter is one of the standards that can be used to measure software quality and is the latest standard in 2011. Measurement of software quality is done in two dimensions of product quality dimension and quality in use dimension. The steps done in this measurement include the adjustment of ISO 25010 quality model, weight determination of characteristics and sub-characteristics using AHP method and questionnaire, testing is done with black box testing and stress testing, and a questionnaire is used to measure characteristics of usability and quality in use. Based on the quality measurement results obtained that the SUMMARYKu application is better than Autosummarizer applications.

Keywords: automatic text summarization; Autosummarizer; ISO 25010; measurement; SUMMARYKu; quality model;

1. INTRODUCTION

Rapid technology developments force people to follow. Technology allows people to meet needs more quickly, precisely, and efficiently [1]. Internet is one of development technology which is useful to share information. Every year, user internet has been increasing. Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) in 2016 say that user internet in Indonesian has reached 132,7 million from total population citizen 256,2 million. The growing number of internet users is also accompanied by the increasing number of user website in Indonesian. Website is an internet service application that provide which is most of user access, almost 80% application running in internet is from website [2]. Website can provide information in various shapes that have variant purposes such as, education, entertain, commercial, business, and art. For company, website can be used as information, communication, and publication media [3].

Website is one of the information media that play a role in dissemination of electronic text documents. Electronic text documents can be journals, papers, articles, and e-books. Total electronic text documents which saved in whole world cannot be calculated [4]. With many documents that provide information, in the end the internet user wants to access fast and do not waste time to get a summary for take decision. Automatic text summarization is one of solution for helping internet users to get a summary of document so user does not need read all text. Automatic text summarization is the process of filtering the most important information to produce a shorter version of the text document [5].

There are several examples of automatic text summarization applications based on web, these are SUMMARYKu, Tools4noobs, SMMRY, Autosummarizer, Free Summarizer, Text Compactor, and others. This diversity does not guarantee that every automatic text summarization application based on web has the same quality one and other. This is because the quality of the application depends on the characteristics and user needs. In this study, the automatic text summarization application based on web SUMMARYKu and Autosummarizer which will be tested for quality measured. SUMMARYKu is an automatic text summarization application based on web that made by researcher, and Autosummarizer is the third of the most popular automatic text summarization based on web by MakeUseOf. The first and second rank are Tools4noobs and SMMRY, but it has been measured by previous researchers.

Quality measurement of automatic text summarization application based on web is important for developers to measure the suitability of productivity the resulting software. This measurement is done to find bugs that still exist in automatic text summarization application based on web and to make the application performance better. Quality measurements are also performed to determine the quality comparison between two automatic text summarization applications based on web in the level of functionality, usefulness, and ease of access on a website. The quality measurement of a website is essentially subjective, so it takes a parameter to facilitate the measurement, and there are many parameters to measure the quality of a software.

This research use ISO 25010 quality model to measure two dimensions of software quality, that is product quality and quality in use dimension. Product quality has 8 characteristics and 31 sub characteristics, while quality in use has 5 characteristics and 9 sub characteristics. ISO 25010 is the latest standard in 2011 and is relevant to measure the quality of applications that replace the previous ISO model of ISO 9126 which since 2001 has been a guide in software quality analysis [6]. Characteristics and sub characteristics of ISO 25010 quality model will be tested on automatic text summarization application based on web SUMMARYKu and Autosummarizer using Analytical Hierarchy Process (AHP) weighting method with BPMSG AHP priority calculation tools. The AHP method is used because it has a hierarchical structure with the ability to generate the most important priority among the existing criteria. Some characteristics on the quality measurement of both applications will be done through observation and questionnaire.

The purpose of this research is to conduct assessment on product quality and quality in use of automatic text summarization application based on web SUMMARYKu and Autosummarizer using ISO 25010 Quality Model. In addition to prove whether the application SUMMARYKu and Autosummarizer have met international quality standards and see what characteristics are influential in the application refers to ISO 25010 standard.

2. RESEARCH PROCESS

2.1 Automatic Text Summarization

Automatic text summarization is a tool that provides a summary of a given document using an algorithm to extract the most important points from the original document [7]. Automatic text summarization is the reduction of a text document or a larger collection of documents into a set of words or short paragraphs but still contains the main meaning of the text document [8].

2.1.1 SUMMARYKu

SUMMARYKu is an automatic text summarization application based on website in Indonesian language. This application is a text Mining application. Created with MySQL database, Python programming language and Django Framework. The algorithm used by SUMMARYKu application is Term Frequency (TF). SUMMARYKu can be accessed in link www.summaryku.com [9]. The following Figure 1 is the SUMMARYKu application based on web view.



Figure. 1 SUMMARYKu application based on web

2.1.2 Autosummarizer

Autosummarizer is a tool that can help users in summarizing large text documents, so they can find the most important sentences. Autosummarizer made by A. Tandini in New York in 2013, server location of Autosummarizer in Netherlands. Autosummarizer can be accessed through the link www.autosummarizer.com [10]. Figure 2 below is an Autosummarizer application based on web view.

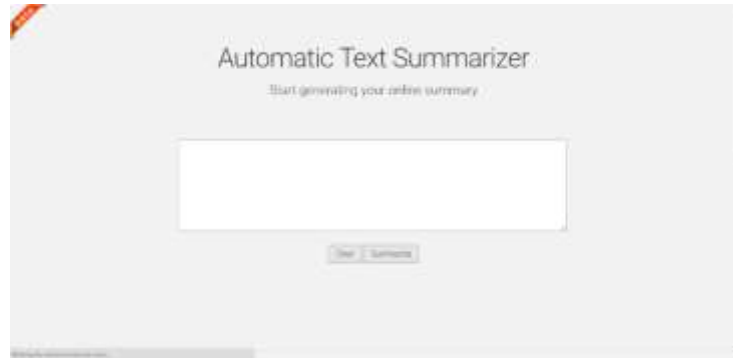


Figure. 2 Autosummarizer application based on web

2.2 ISO 25010 quality model

ISO 25010 Quality Model is the development of ISO 9126. ISO 25010 has two main dimensions, Product Quality dimension and Quality in Use (QinU) dimension. Product quality defines the basic characteristics of the product while QinU defines characteristics related to human interaction with the system. Product quality dimension consist of eight quality characteristics, namely functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability [11]. Figure 3 below illustrates the characteristics and sub characteristics of the product quality dimension.

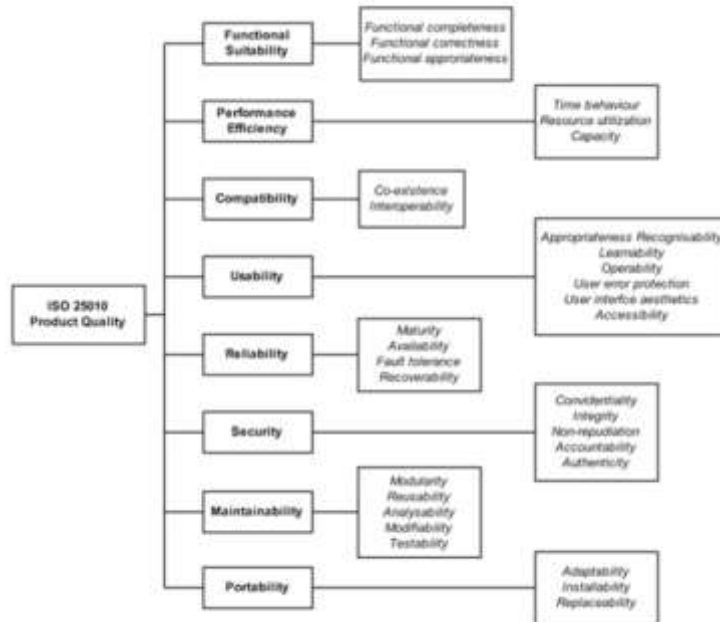


Figure. 3 Characteristics and sub-characteristics of product quality dimension

Quality In Use (QinU) defines characteristics relating to human interaction with the system while product quality defines the basic characteristics of a product. The QinU consists of 5 characteristics, namely effectiveness, efficiency, satisfaction, freedom from risk and context coverage [11]. Figure 4 describes the characteristics and sub characteristics contained in the QinU dimension.

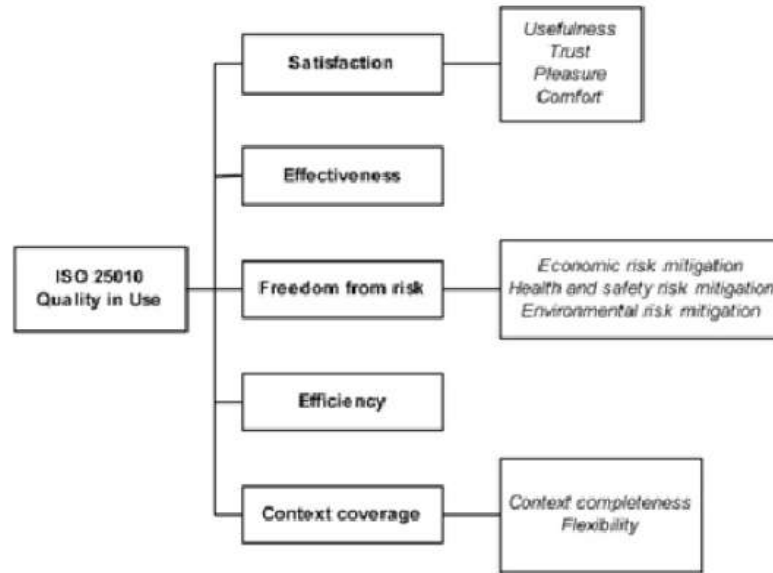


Figure. 4 Characteristics and sub-characteristics of QinU dimension

2.3 Analytical hierarchy process

Analytical Hierarchy Process (AHP) is a decision-making model developed by Thomas L. Saaty in 1980. This model has been successfully applied to a variety of decision making situations. AHP does not only act as the sole decision maker to choose the most suitable alternative, but expanded also to group decision making. AHP will unite decision maker's preference rating for each decision alternative under each criterion in the decision hierarchy [12].

2.4 Research methodology

Testing the quality of automatic text summarization based on web which case study are SUMMARYKu (www.summaryku.com) and Autosummarizer (www.autosummarizer.com) is using ISO 25010 Quality Model. ISO 25010 is an update of ISO 9126 where there are additional characteristics and sub characteristics. The ISO 25010 Quality Model was selected for use in this study by reason of providing more detailed assessment result with addition of characteristics and sub characteristics of the previous model. The stages of quality testing illustrated in Figure 5 below.

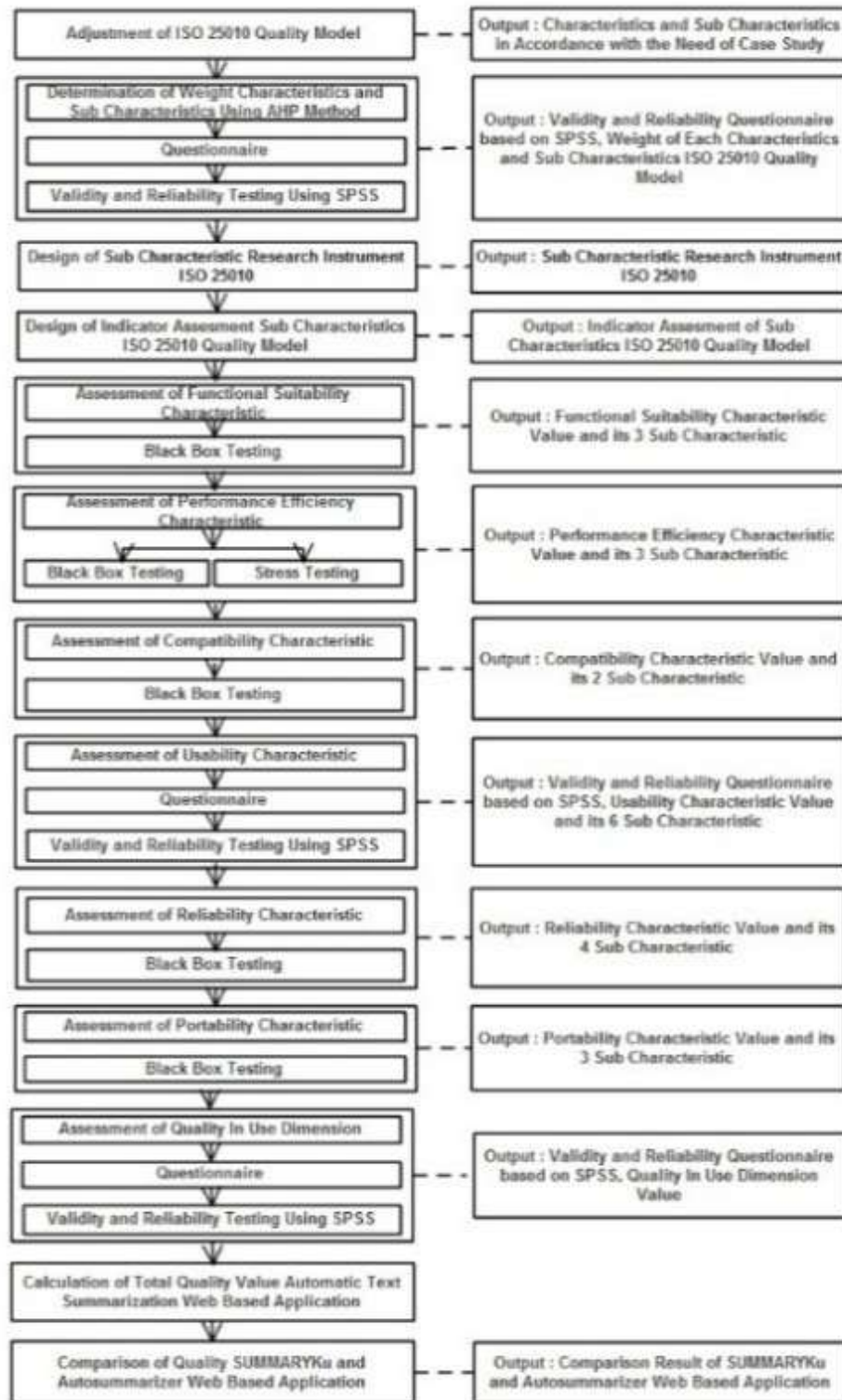


Figure. 5 Stages of quality testing of automatic text summarization application based on web

2.5 Calculation of application quality value

Calculation quality value of automatic text summarization application based on web SUMMARYKu and Autosummarizer is done by calculating the score value of each characteristic of ISO 25010, the characteristic value obtained from the calculation of total sub characteristic score. The total calculation of each sub characteristic is described in the previous section. After that, the sub characteristic value of the observation result or questionnaire is indicated by the level of the indicator, the value of that level is calculated by the weight of the sub characteristic to see whether the result of the calculation is equal to the weight or lower than the weight. Sub characteristic value is obtained from the equation as follows [13].

$$valueSC_n = W_n \times \frac{L_n}{maxL} \quad \text{Eq. (1)}$$

Where:

valueSC_n = Value of sub characteristic of – n

W_n = Weight from sub characteristic of – n

L_n = Level from observation result = questionnaire of sub characteristic

maxL = Level from observation result = questionnaire of sub characteristic

(maxL = 5)

After that value of each sub characteristic is summed to get the value of characteristic ISO 25010 quality model both on product quality dimension and quality in use dimension. Calculation of each characteristic is obtained by following formula.

$$valueC_n = \sum valueSC_n \quad \text{Eq. (2)}$$

$$\sum valueSC_n = valueSC_1 + valueSC_2 + \dots + valueSC_n \quad \text{Eq. (3)}$$

Where:

valueC_n = Characteristic value of – n

After having value of each characteristic, then all of characteristic value is calculated with this following formula.

$$TvalueC = \sum valueC_n \quad \text{Eq. (4)}$$

Where:

TvalueC = Total characteristic value

Total characteristic value becomes quantitative value of automatic text summarization based on web SUMMARYKu and Autosummarizer.

3. RESULTS FROM SECONDARY STUDIES

3.1 Result of adjustment ISO 25010 Quality Model

SUMMARYKu and Autosummarizer application quality testing will be done with 6 characteristics, are functionality suitability, performance efficiency, compatibility, usability, reliability and portability. And 21 sub characteristics, are functional completeness, functional correctness, functional appropriateness, time behavior, resource utilization, capacity, co-existence, interoperability, appropriateness recognisability, learnability, operability, user error protection, user interface aesthetics, accessibility, maturity, availability, fault tolerance, recoverability, adaptability, installability, and replaceability on product quality dimensions. Figure 6 below is the result of adjustment of ISO 25010 quality model on product quality dimension.

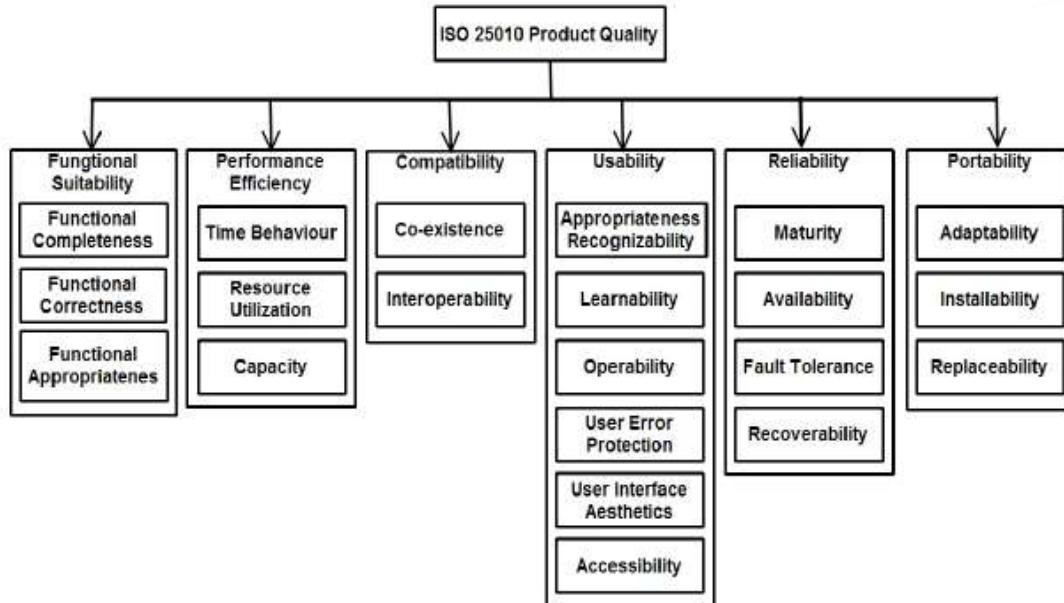


Figure. 6 Adjustment result of ISO 25010 quality model in product quality dimension

In the quality in use dimensions there are 5 characteristics, are effectiveness, efficiency, freedom from risk, satisfaction and context coverage and 9 sub characteristics, are economic risk mitigation, health and safety risk mitigation, environmental risk mitigation, usefulness, trust, pleasure, comfort, context completeness and flexibility. Figure 7 below is the result of adjustment of ISO 25010 quality model on quality in use dimension.

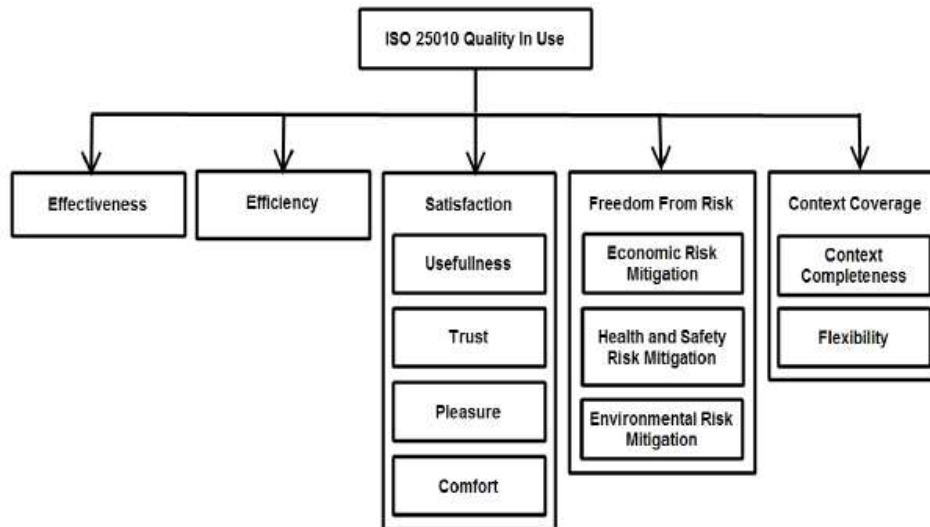


Figure. 7 Adjustment result of ISO 25010 quality model in quality In use dimension

3.2 Result of weighting characteristic and sub-characteristic of ISO 25010 product quality dimensions and quality in use dimensions using AHP method

The determination of weight characteristic and sub characteristic based on the results of questionnaires distributed to 30 respondents with IT background, the last education S1 and S2, the age range 20-35 years consisting of 16 females

and 14 males. Weighting characteristics and sub characteristics using BPMSG AHP priority calculation tool at https://bpmsg.com/academic/ahp_calc.php. Before determining the weights, do the validity and reliability testing first.

3.2.1 Determination of weight characteristics and sub-characteristics questionnaire validity testing

Validity test using Bivariate Pearson (Pearson Product Moment) correlation technique by correlating each variable score with total score of variables. The result of the correlation is compared with the critical value at the significant level of 0.01 which has the trust level of 99% and the significant level of 0.05 which has 95% confidence level. In SPSS software, a significant level of 0.01 is indicated by 2 flags sign (**), while a significant level of 0.05 is indicated by 1 flag (*). Table 1 below are validity testing results characteristics and sub characteristic ISO 25010 on product quality dimensions.

Table. 1 Summary of Validity Testing Results Characteristics and Sub Characteristic ISO 25010

No	Dimensions	Characteristics and Sub Characteristic	Total Questions
1	Product Quality	Product Quality Characteristic	15
		Sub Characteristic on	3
		Fungtional Suitability	
		Sub Characteristic on	3
		Performance Efficiency	
		Sub Characteristic on	1
		Compatibility	
		Sub Characteristic on Usability	15
		Sub Characteristic on Reliability	6
		Sub Characteristic on Portability	3
		Total	46
2	Quality In Use	Quality In Use Characteristic	10
		Sub Characteristic on Context	1
		Coverage	
		Sub Characteristic on Freedom	3
		From Risk	
		Sub Characteristic on	6
		Satisfaction	
		Total	20
		Total Questions	66

Based on the summary of validity testing results characteristics and sub characteristic ISO 25010 questionnaire in Table 1, there are 46 questions on the product quality dimension and 20 questions on the quality in use dimension so that the total question is 66 and all questions are valid.

3.2.2 Determination of weight characteristics and sub-characteristics questionnaire reliability testing

This testing is conducted to measure the accuracy and consistency of scores on each instrument that has been filled by the respondent. The accuracy and consistency of the score is known from the Cronbach-Alpha value which is then converted into the reliability coefficient category. Reliability testing results on product quality instruments can be seen in Table 2.

Table. 2 Reliability Testing Results of Product Quality

Instrument	Cronbach Alpha (r11)	Total Instrumen	Reliability
Product Quality of ISO 25010	0.938	15	Reliable
Sub Characteristic on Functional Siutability	0.805	3	Reliable
Sub Characteristic on Performance Efficiency	0.879	3	Reliable
Sub Characteristic on Compatibility	1.000	1	Reliable
Sub Characteristic on Usability	0.964	15	Reliable
Sub Characteristic on Reliability	0.925	6	Reliable
Sub Characteristic on Portability	0.853	3	Reliable

Based on result in Table 2, all instruments tested on the product quality dimension produce data with very high reliability or consistency (Very Good). It shows that all instruments that measured produce reliable data.

Table. 3 Reliability Testing Results of Quality In Use

Instrument	Cronbach Alpha (r11)	Total Instrumen	Reliability
Quality In Use of ISO 25010	0.918	10	Reliable
Sub Characteristic on Context Coverage	1.000	1	Reliable
Sub Characteristic on Freedom From Risk	0.817	3	Reliable
Sub Characteristic on Satisfaction	0.871	6	Reliable

Based on result in Table 3, all instruments tested on the product quality dimension produce data with very high reliability or consistency (Very Good). It shows that all instruments that measured produce reliable data.

3.2.3 Result of weighting characteristics on product quality dimension using AHP method

The determination of characteristic and sub characteristic weights is done by distributing questionnaires to 30 respondents and the results will be obtained. Table 4 below is summary of weighting all sub characteristics result of product quality dimension.

Table. 4 Weighting Sub Characteristics of Product Quality Dimension

Characteristic	Relative Weight of Characteris tic	Sub Characteristic	Relative Weight of Sub Characteristic	Relative Weight of of Sub Characteristic (based on characteristic weight)
Functional Suitability	33,7%	Functional	6.3%	2,12%
		Completeness		
		Functional	45,8%	15,44%
		Correctness		
Functional				

		Appropriateness	47,9%	16,14%
Performance Efficiency	24,2%	Time Behaviour	68,1%	16,48%
		Resource Utilization	25,0%	6,05%
		Capacity	6,9%	1,67%
		Co-Existence	10,0%	1,84%
Compatibility	18,4%	Interoperability	90,0%	16,56%
		Appropriateness	2,7%	0,34%
Usability	12,5%	Recognizability	24,3%	3,04%
		Operability	31,4%	3,92%
		User Error Protection	8,0%	1%
		User Interface Aesthetics	3,7%	0,46%
		Accessibility	29,9%	3,74%
		Maturity	11,4%	0,71%
		Availability	5,0%	0,31%
		Fault Tolerance	25,5%	1,58%
Reliability	6,2%	Recoverability	58,1%	3,60%
		Adaptability	75,1%	3,76%
		Installability	17,8%	0,89%
		Replaceability	7,0%	0,35%
Portability	5,0%			

Table 5 below is the summary of weighting all sub characteristics result of quality in use dimension.

Table. 5 Weighting sub-characteristics of Quality In Use dimension

Characteristic	Relative Weight of Characteristic	Sub Characteristic	Relative Weight of Sub Characteristic	Relative Weight of of Sub Characteristic (based on characteristic weight)
Context Coverage	36,6%	Context Completeness	87,5%	32,03%
		Flexibility	12,5%	4,57%
Effectiveness	30,1%	Effectiveness	30,1%	30,01%
Efficiency	15,6%	Efficiency	15,6%	15,6%
Satisfaction	10,9%	Usefulness	27,1%	2,95%
		Trust	54,4%	5,93%
		Pleasure	6,4%	0,70%
		Comfort	12,2%	1,32%
		Economic		

Freedom from Risk	6,8%	Risk	63,7%	4,33%
		Mitigation		
		Environmental Risk	25,8%	1,75%
		Mitigation		
		Health and Safety Risk	10,5	0,72%
		Mitigation		

3.3 Testing of automatic text summarization SUMMARYKu

SUMMARYKu is an automatic text summarization application based on web. This application is an application of text mining. Created with MySQL database, Python programming language and Django Framework. The algorithm used by SUMMARYKu application is Term Frequency (TF). SUMMARYKu application will be tested for its quality through www.summaryku.com that accessed on AXIOO neon RNE 14 inch with Intel Core i7-3630QM (2,640 GHz) processor, 4 GB RAM, 500 GB Hard Drive and Windows 7 (32 bit) Operating System using standard of ISO 25010 Quality Model.

3.3.1 Quality testing results of automatic text summarization applications SUMMARYKu

The testing result of product quality in SUMMARYKu application is described in Table 6 below.

Table. 6 Testing result of product quality dimension on SUMMARYKu

Characteristics	Relative Weight	Sub-characteristics	Relative Weight per sub char (W_n)	Level (L_n)	Nilai Subchar ($valueSC_n$)	Nilai char ($valueC_n$)
Performance Efficiency	24,2%	Time Behaviour	16,48%	5	16,48%	24,2%
		Resource Utilization	6,05%	5	6,05%	
		Capacity	1,67%	5	1,67%	
Compatibility	18,4%	Co-Existence	1,84%	5	1,84%	18,4%
		Interoperability	16,56%	5	16,56%	
Usability	12,5%	Appropriateness	0,34%	4	0,27%	10
		Recognizability				
		Learnability	3,04%	4	2,43%	
		Operability	3,92%	4	3,14%	
		User Error	1%	4	0,8%	
		Protection				
		User Interface	0,46%	4	0,37%	
Reliability	6,2%	Aesthetics				4,3%
		Accessibility	3,74%	4	2,99%	
		Maturity	0,71%	4	0,57	
		Availability	0,31%	5	0,31%	
		Fault Tolerance	1,58%	4	1,26%	
		Recoverability	3,60%	3	2,16%	

Portability	5,0%	Adaptability	3,76%	5	3,76%	5%
		Installability	0,89%	5	0,89%	
		Replaceability	0,35%	5	0,35%	
Sum of Total Weights	100%	Product Quality Testing Result of SUMMARYKu			95,01%	1%

Table 6 shows that the quality of automatic text summarization application SUMMARYKu on product quality dimension is 95.01%. The results show that the quality of SUMMARYKu, 4.99% below the maximum weight value of 100% overall quality. This shows that the quality of SUMMARYKu application on product quality dimension is good. Table 7 the following is the testing result of quality calculations on the dimensions of quality in use.

Table. 7 Testing result of Quality In Use Dimension on SUMMARYKu

Characteristics	Relative Weight	Sub-characteristics	Relative Weight per sub char (W_n)	Level (L_n)	Nilai Subchar ($valueSC_n$)	Nilai char ($valueC_n$)
Effectiveness	30,1%	Effectiveness	30,01%	4	24,00%	24,00%
Efficiency	15,6%	Efficiency	15,6%	4	12,48%	12,48%
Satisfaction	10,9%	Usefulness	2,95%	4	2,36%	8,72%
		Trust	5,93%	4	4,74%	
		Pleasure	0,70%	4	0,56%	
		Comfort	1,32%	4	1,06%	
Freedom from Risk	6,8%	Economic Risk	4,33%	4	3,46%	5,44%
		Mitigation				
		Environmental Risk	1,75%	4	1,4%	
		Mitigation				
		Health and Safety Risk Mitigation	0,72%	4	0,58%	
Context Coverage	36,6%	Context	32,03%	4	25,62%	29,28
		Completeness				
		Flexibility	4,57%	4	3,66%	
Sum of Total Weights	100%	Quality in Use Testing Result of SUMMARYKu			79,92%	

Table 7 shows that the quality of automatic text summarization application SUMMARYKu on the dimension of quality in use is 79.92%. These results show that the quality of SUMMARYKu, 20.08% below the maximum weight value of the overall quality of 100%. This shows that the quality of SUMMARYKu application on the quality in use dimension is good.

3.4 Testing of automatic text summarization autosummarizer

Autosummarizer is an automatic text summarization application that can assist users in summarizing large text documents so they can find the most important sentences. Autosummarizer made by A. Tandini in New York in 2013, location server of autosummarizer in Netherlands. The autosummarizer application will be tested for quality through

www.autosummarizer.com which is accessed on a 14-inch AXIIOO neon RNE notebook with an Intel Core i7-3630QM (2,640 GHz) processor, 4 GB RAM, 500 GB Hard Drive and Windows 7 (32 bit) Operating System ISO quality model 25010. Here is the testing result of each dimension in ISO 25010 Quality Model.

3.4.1 Quality testing results of automatic text summarization applications autosummarizer

The testing result of product quality and quality in use in autosummarizer application is described in Table 8 below.

Table. 8 Testing Result of Product Quality Dimension on Autosummarizer

Characteristics	Relative Weight	Sub-characteristics	Relative Weight per sub char (W_n)	Level (L_n)	Nilai Subchar ($valueSC_n$)	Nilai char ($valueC_n$)
Functional Suitability	33,7%	Functional Completeness	2,12%	3	1,27%	26,53%
		Functional Correctness	15,44%	4	12,35%	
		Functional Appropriateness	16,14%	4	12,91%	
Performance Efficiency	24,2%	Time Behaviour	16,48%	5	16,48%	24,2%
		Resource Utilization	6,05%	5	6,05%	
		Capacity	1,67%	5	1,67%	
Compatibility	18,4%	Co-Existence	1,84%	5	1,84%	5,15%
		Interoperability	16,56%	1	3,31%	
Usability	12,5%	Appropriateness Recognizability	0,34%	4	0,27%	10%
		Learnability	3,04%	4	2,43%	
		Operability	3,92%	4	3,14%	
		User Error Protection	1%	4	0,8%	
		User Interface Aesthetics	0,46%	4	0,37%	
		Accessibility	3,74%	4	2,99%	
Reliability	6,2%	Maturity	0,71%	5	0,71%	5,3%
		Availability	0,31%	5	0,31%	
		Fault Tolerance	1,58%	5	1,58%	
		Recoverability	3,60%	3	2,7%	
Portability	5,0%	Adaptability	3,76%	5	3,76%	5%
		Installability	0,89%	5	0,89%	

	Replaceability	0,35%	5	0,35%
Sum of Total Weights	100%	Product Quality Testing Result of Autosummarizer		76,18%

Table 8 shows that the quality of automatic text summarization application autosummarizer on product quality dimension is 76.18%. The results show that the quality of autosummarizer 23.82% below the maximum weight value of 100% overall quality. This shows that the quality of autosummarizer application on product quality dimension is good. Table 9 the following is the testing result of quality calculations on the dimensions of quality in use.

Table. 9 Testing result of Quality In Use dimension on autosummarizer

Characteristics	Relative Weight	Sub-characteristics	Relative Weight per sub char (W_n)	Level (L_n)	Nilai Subchar ($valueSC_n$)	Nilai char ($valueC_n$)
Effectiveness	30,1%	Effectiveness	30,01%	4	24,00%	24,00%
Efficiency	15,6%	Efficiency	15,6%	4	12,48%	12,48%
Satisfaction	10,9%	Usefulness	2,95%	4	2,36%	8,72%
		Trust	5,93%	4	4,74%	
		Pleasure	0,70%	4	0,56%	
		Comfort	1,32%	4	1,06%	
Freedom from Risk	6,8%	Economic Risk Mitigation	4,33%	4	3,46%	5,44%
		Environmental Risk Mitigation	1,75%	4	1,4%	
		Health and Safety Risk Mitigation	0,72%	4	0,58%	
Context Coverage	36,6%	Context	32,03%	4	25,62%	29,28
		Completeness				
		Flexibility	4,57%	4	3,66%	
Sum of Total Weights	100%	Quality in Use Testing Result of Autosummarizer				79.92%

Table 9 shows that the quality of automatic text summarization application autosummarizer on the dimension of quality in use is 79.92%. These results show that the quality of autosummarizer, 20.08% below the maximum weight value of the overall quality of 100%. This shows that the quality of autosummarizer application on the quality in use dimension is good.

3.5 Quality comparison of automatic text summarization application SUMMARYKu and autosummarizer

Table 10 below is the result of quality comparison of automatic text summarization applications based on web SUMMARYKu and Autosummarizer using ISO 25010 Quality Model.

Table. 10 Testing Result of SUMMARYKu and Autosummarizer Using ISO 25010 Quality Model

Application	Dimension		Total Quality Application	Maximum Quality
	Product Quality	Quality In Use		
SUMMARYKu	95,01%	79,29%	87,15%	100%
Autosummarizer	76,18%	79,29%	77,74%	100%

The results on Table 10 above can be seen through the graphic on Figure 8 below.

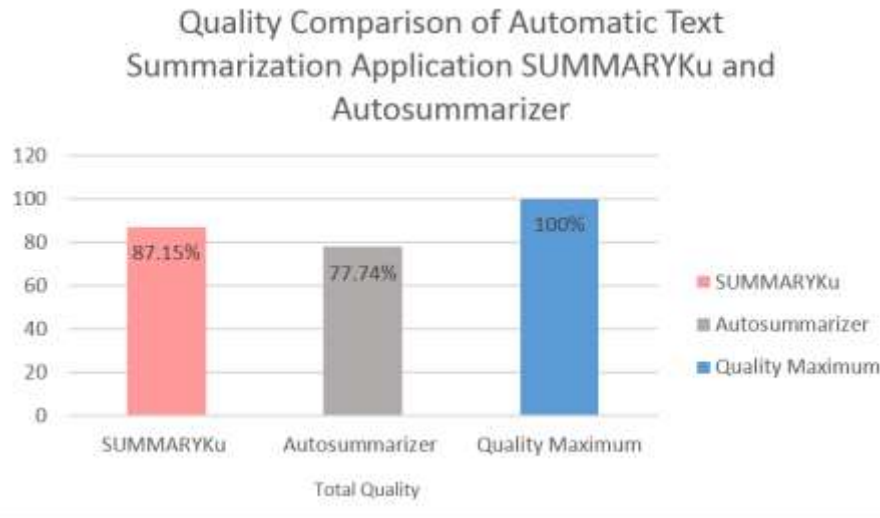


Figure. 8 Quality comparison of SUMMARYKu and autosummarizer

Figure 8 above shows that SUMMARYKu application has a quality advantage compared to the Autosummarizer application. Overall SUMMARYKu application has a quality value of 87.15% and Autosummarizer of 77.74%. SUMMARYKu application is superior to 9.41% compared to Autosummarizer application. But both applications have been able to meet the needs of users, viewed by percentage of application quality is not too far from the maximum total maximum quality of automatic text summarization applications.

4. CONCLUSION

The quality measurement of automatic text summarization application based on web SUMMARYKu dan Autosummarizer using ISO 25010 Quality Model has been successfully done with predetermined methods. Overall, both automatic text summarization application based on web SUMMARYKu dan Autosummarizer was obtained good quality with value above 80%. The quality value of the application is related by its weight and sub characteristic value. Determination of weight on each characteristic and sub characteristic in ISO 25010 quality model resulted from questionnaires distributed to 30 respondents who have experience using automatic text summarization applications based on web and have a background in the field of technology, be it developers or users of applications whose last education S1 and S2 by using Analytical Hierarchy Process (AHP) method.

The results of the questionnaire then processed using BPMSG AHP calculation tool with the value of consistency ratio (CR) <10%, so the weighting result becomes more accurate. After obtaining characteristic and sub characteristic weight, black box testing was done to both applications and also distributed questionnaires to 100 respondents who are users of automatic text summarization application based on web that is students and lecturers to provide an assessment usability characteristic and quality in use characteristic. After that, do calculation of quality values to get the total value and the results of the comparison of both applications. The total quality value of the SUMMARYKu application is 87.15% and the Autosummarizer application is 77.74%. SUMMARYKu application is superior to 9.41% of Autosummarizer applications.

In the product quality dimension, the value of SUMMARYKu application is 95.01% while the Autosummarizer application is 76.18%. SUMMARYKu is 18.83% superior to Autosummarizer application. The superiority of the percentage value of the SUMMARYKu application to the product quality dimension is due to the higher quality of SUMMARYKu values in the sub characteristic functional suitability and compatibility. In the quality in use dimension, the value of SUMMARYKu and Autosummarizer applications is 79.29% These results have a difference of 20.71% of the maximum value of quality in use dimensions of 100%. As a whole, the quality of automatic text summarization application based on web SUMMARYKu and Autosummarizer are good from the perspective of the user, because each characteristic is at level 4 with good quality predicate.

ACKNOWLEDGEMENT

Special thanks to Gunadarma University, Depok, Indonesia for providing resources to carry out this research.

REFERENCES

1. Fabianus Hendy Evan, Y.S.P.W.P., Pranowo, *Pembangunan Perangkat Lunak Peringkat Dokumen dari Banyak Sumber Menggunakan Sentence Scoring dengan Metode TF-IDF*. Seminar Nasional Aplikasi Teknologi Informasi (SNATI), 2014.
2. Yuhefizar, I.H.M., Rahmat Hidayat ST, *Cara Mudah Membangun Website Interaktif Menggunakan Content Manajemen System Joomla* 2006: Elex Media Komputindo.
3. Selvia Ferdiana Kusuma, R.E.P., Umi Laili Yuhana, *Pengukuran Kualitas Website Berdasarkan ISO 9126: Systematic Mapping*. Jurnal Manajemen Informatika, 2015. 4: p. 26 - 35.
4. Silvia, P.R., Vivi Regina Aprilia. *Aplikasi Automatic Text Summarizer*. 2014.
5. Luh Gede Putri Suardani, I.P.G.H.S. *Perancangan dan Implementasi Peringkasan Teks Otomatis Artikel Berbahasa Indonesia*. in *Prosiding Seminar Nasional Teknologi Informasi & Aplikasinya*. 2015. Bali.
6. Veenendaal, E.v., *The New Standard for Software Product Quality*, in *The Magazine for Professional Testers*. 2014: Germany.
7. Ajmera, S., *Automatic Text Summarization*. 2015, Indian Institute of Technology Mandi: India.
8. Al-Hashemi, R., *Text Summarization Extraction System (TSES) Using Extracted Keywords*. International Arab Journal of e-Technology, 2010. 1: p. 164-168.
9. Maryana, F. *Tentang Aplikasi Summaryku*. 2016 [cited 2018 10 April]; Available from: www.summaryku.com.
10. WebsiteOutlook. *Autosummarizer.com Stats and Valuation*. 2017 [cited 2018 17 April]; Available from: www.autosummarizer.com.
11. ISO/IEC. *Systems and Software Engineering—Systems and Software Quality Requirements and Evaluation (SQuaRE)*. 2011.
12. Xiao, G., *Specification of the ahp hierarchy and rank reversal*, in *Department of Food and Resource Economics*. 2010, University of Delaware: USA.
13. Izzatillah, M., *Quality Measurement Of Transportation Service Application Using ISO 25010 Quality (Case Study: Go-Jek)*, in *Computer Science and Information Technology*. 2016, Gunadarma University: Indonesia.

AUTHORS PROFILE



Firda Maryana S. Kom received a Bachelor degree in Computer Science from Gunadarma University, Depok, Department of Information System in 2016. Currently continuing her master degree in Gunadarma University at Department of Business Information System.



Dr. Ana Kurniawati, ST., MMSI received a Bachelor degree of Engineering from Gunadarma University, Depok, in 1998. Received Master of Information Systems Management from Gunadarma University, Depok, in 2002. Received a Doctorate from Gunadarma University, Depok, in 2010. Her research interests are Design of Human Body Balancing Detection System Computer Based Personal, Data Mining, Database, and Document Similarity Detection. She is a Secretary of Information System Department in Gunadarma University.