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Decision Support System For Selection Of Expertise Using Analytical Hierarchy Process Method

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Abstract

Facial recognition is the process of human identification using a picture of facial expression. With the widespread use of computers, it is expected that facial recognition capabilities can be adopted on such smart devices. The adoption process becomes possible with the discovery of facial recognition methods, one of which is the main component analysis or better known as PCA (Principal Components Analysis). The research started by designing a computer program using the Matlab programming language. The Program was used to test the PCA method using a number of facial imagery. Testing is divided into three categories, which are based on the number of the trainer image, based on the number of key vector features, and the determination of the threshold value. In the end it can be concluded that PCA is quite worthy to be a facial recognition method. The research Data shows a pretty good introduction result with a fairly small error rate on testing using ten training imagery, which is one error introduction of 20 Tests.

Keywords: Facial recognition, key component analysis, identification, feature vectors, facial recognition methods

1. Introduction

University Faculty of Engineering Education study Program The state of Yogyakarta (PTI FT UNY) in curriculum offers courses Concentration (specialisation) in the fifth semester. The subject Group into three areas of expertise: Information System and Software Development, Network System, and Digital Media Development. Field The student's choice was taken until the end of college. Information about the course is given by the course. However, the information is limited to the selection of concentrations at the beginning of the fifth semester, more detailed information on areas of expertise is not delivered. Lacking information also includes prerequisite courses in each area of expertise.

Analytical Hierarchy Process is a method of decision making Multi-criteria in complex problems. This method combines Qualitative and quantitative factors to determine the priorities. Related to Selection of areas of expertise that have multiple criteria in taking Decision, the author proposed to develop a "support system for decision-making expertise using the Analytical Hierarchy Process (AHP) method".

1.1 Problem identification

Some of the issues that can be identified from the background that have been submitted are as follows:

1. There is an environment difference used by the user.
2. Environment difference raises the problem of lack of application quality.
3. Feasibility testing needs to be done according to the quality software for the application to be used by end users.

1.2 Problem limits

To make this research more directed, researchers limited the aspect of research conducted. Some of the limitations on this study are as follows:

1. This research is limited to testing software quality application field selection using AHP method.
2. The aspect of the quality software used include the aspects of functionality, reliability aspects, efficiency aspects, and usability aspects. The four-aspect elections are based on the built-in testing for internal aspects of the application (functionality, reliability, and efficiency) as well as external aspects of applications involving end users (usability).

1.3 The Problem

The problem formulation in this research is as follows:

1. How is the feasibility of selecting a field of expertise using the AHP method on the functionality aspect?
2. How is the feasibility of selecting a field of expertise using the AHP method on the reliability aspect?
3. How is the feasibility of selecting a field of expertise using an AHP method on the efficiency aspect?
4. How is the feasibility of selecting a field of expertise using an AHP method on usability aspects?

1.4 Research purpose

The objectives of this research are:

1. Know the feasibility of selecting a field of expertise using the AHP method on the aspect of functionality.
2. Know the feasibility of selecting a field of expertise using an AHP method on the reliability aspect.
3. Know the feasibility of selecting a field of expertise using an AHP method on the efficiency aspect.
4. Know the feasibility of selecting a field of expertise using the AHP method on the usability aspect.

1.5 Benefits of research

The benefits of this research are:

1. Getting the feasibility test results using the field of expertise selection uses the AHP method.
2. Help students Prodi PTI FT UNY Choose the appropriate field of expertise based on the criteria weights.
3. Assisting academic guidance lecturers in directing students to choose the field of expertise.
4. Contribute to the learning system in PTI FT UNY Prodi.

2. Literature

2.1 Eligibility for WEB-based applications

Software quality can be viewed from a process standpoint Software development (process) or product produced. From the standpoint of the software quality process can be measured using the ISO 9001 standard. While the software quality product standpoint can be measured using the ISO 9126 Standard or best ptactice developed software practitioners. The taxonomy of McCall is a well-known and recognized best practice by many parties, written by J. A. McCall in the technical report published in 1977 (Wahono, 2006).

		Functions	Content and Structure	Infrastructure and Environment
Functionality	Suitability	Reviews and inspections, Test-driven development	Checklists, Lexical testing, Style guides, Reviews	
	Accuracy	Capture/Replay, Test-driven development	Static analysis, Link testing, Lexical testing, Reviews	Static analysis, Link testing
	Interoperability	Cross-browser and cross-platform compatibility testing	Test printing, Checklists, Reviews, Compatibility testing	Cross-browser and cross-platform compatibility testing
	Compliance	Compatibility testing, Style guides, Test-driven development	Checklists, Compatibility testing, Style guides, Reviews	Cross-browser and cross-platform compatibility testing
	Security	Analysis of common attacks, Reviews and inspections		Analysis of common attacks, Forced-error testing, Ethical hacking
Reliability	Maturity	Endurance testing		Endurance testing
	Fault Tolerance	Forced-error testing, Stress testing		Forced-error testing, Low-resource testing, Stress testing
	Recoverability	Forced-error testing, Fail-over testing		Fail-over testing, Forced-error testing, Low-resource testing
Usability	Understandability	Usability studies, Heuristic evaluation	Static readability analysis, Usability studies	
	Learnability	Usability studies, Heuristic evaluation		
	Operability	Usability studies, Heuristic evaluation		Heuristic evaluation
	Attractiveness		Publicity testing	
Efficiency	Timing Behavior	Load and Stress testing,Monitoring		Load and Stress testing, Monitoring
	Resource Utilization	Endurance testing	Load testing	Endurance testing, Monitoring

2.2 Link Testing

This test is used to ensure there are no broken links in a Web application. Broken links are links in hypertext navigation structures that point to no nodes (pages, images, etc.) or blanks called also broken links. Testing the correct link is a test start on the start page until the end page (Engels et al., 2006).

2.3 Browser Testing

A large number of different Web browsers can be used as clients For the WEB application. Depending on the manufacturer (for example, Microsoft, Mozilla, Opera), or versions (for example, IE 8.0, 9.0), or the operating system (for example, Windows or Macintosh), or hardware equipment (e.g., screen resolution and color depth), or configurations (e.g., activation of cookies, language scripts, Stylesheet), each Web browser shows different behaviors. Browser testing attempts to find errors in WEB applications caused by inconsistency between different Web browsers (Engels et al., 2006).

2.4 Security

Security is the most important aspect for Web applications. This aspect They are used to govern access to information, verify User identity, and encrypts confidential information.Testing mechanisms Security (e.g. encryption) to display confidential data on the Results page without logging in whether security is guaranteed. In addition it avoids the user entering some input characters that can lead to a security system's escape.

Stress testing that attempts to ruin a system tested in this regard is sometimes called a negative test (Gheorghiu, 2005). The main purpose of this test is to ensure that the failing and recovering system is known as recovery. Here are some of the ways in which stress testing can be applied to Web-based systems:

1. Multiply the number of users simultaneously with HTTP connections,
2. randomly shutdown and restart ports on the network/router switches connecting the server (via SNMP commands for example),
3. Take offline database, then restart,
4. Rebuild the RAID array while the system is running,
5. Running processes that consume resources (CPU, memory, disks, networks) on WEB servers and databases.

Zone Research Group in the book "Post Test Execution Phase." Integrated Approach to Web Performance Testing: A Practitioner's Guide (Subraya, 2006) reports that tariff increases occur when accessing Web pages more than 7 to 8 seconds. This report is popularized by the 8 second rule, which argues that if the Web page is not downloaded in 8 seconds, the user will go

elsewhere. Zona Research Group also provides a list of acceptable time based on connection speed
As shown in Figure 3. Subraya in the book Integrated Approach to Web Performance Testing: A practitioner's Guide (Subraya, 2006) states based on surveys from 117 organizations to investigate the existence of performance testing as follows:

Load Time	Percentage of Users Waiting
10 seconds	84%
15 seconds	51%
20 seconds	26%
30 seconds	5%

Willpower User waiting Load website (Subraya, 2006)

Modem Speed	Expected Load time
14.4 Kilobytes Modem	11.5 seconds
33.6 Kilobytes Modem	7.5 seconds
56 Kilobytes Modem	5.2 seconds
Cable DSL Modem	2.2 seconds
T1 and Above	0.6 seconds

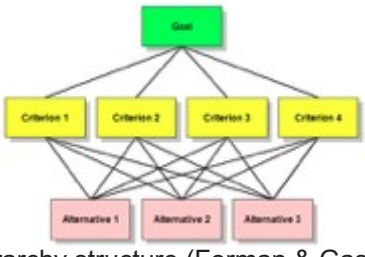
Acceptable time based on connection speed (Subraya, 2006)

2.5 Decision Support System
The decision support System is an interactive computer-based system that assists users in assessments and elections. The system not only provides data storage and retrieval but also enhances traditional information access with support for the creation of model-based decision making and Reasoning (Roger & Marek, 2007).
Alter in (Nizetic et al., 2007) mentions system decision making characteristics (SPK) is as follows:

1. SPK is specially designed to facilitate the decision making process.
2. SPK is only as a supporter not as an automation in decision making.
3. SPK should responded quickly if there is a change in the needs of decision making.

2.6 Multi-Criteria Decision making
Multi-criteria decision making is a decision-making technique from several alternative options. There are two different categories of Multi-criteria decision Making (MCDM), which are Multiple Objective Decision Making (MODM) and Multiple Attribute Decision Making (MADM).

2.7 Analytical Hierarchy Process
Analytical Hierarchy Process is one of the methods of making multi-criteria decisions in complex problems. This method combines qualitative and quantitative factors to create priorities, warnings and evaluate existing alternatives. This method was developed by Prof. Thomas L. Saaty in 1970-an. AHP is an effective way for decision making in complex matters. The Analytical Hierarchy Process method modeled a complex problem into a hierarchical structure that represents the relationship between goal, criteria (criterion), sub-criteria (sub-criterion), and alternative.



AHP hierarchy structure (Forman & Gass, 2001)

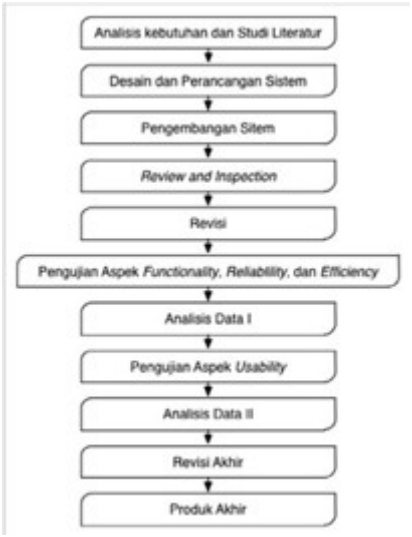
2.8 Research questions

1. Does the application for field selection using AHP method deserve the aspect of functionality?

2. Does the application for field selection use the AHP method worthy of the reliability aspect?
3. Does the application for field selection using the AHP method deserve the efficiency aspect?
4. Does the application for field selection use the AHP method worthy of usability aspects?

3. Research Method

This research uses research and development approaches or research and Development. The research and development method is a method of research used to produce a specific product, and to test the effectiveness of the product (Sugiyono, 2009). System development is directed at the efforts to produce ready-to-use products in real-hand field. Research flows conducted on this research are as follows:



Research flowchart

3.1 Research Object

The object examined in this research is the decision support system of the field of expertise using the Analytical method Hierarchy Process
(AHP).

3.2 Time and place of research

Research conducted in the Department of Electronic Engineering Education Faculty of Engineering, Yogyakarta State University. There is no implementation started in December 2013.

3.3 Data collection Techniques

The data collection techniques performed on this research are:

1. Observation
   Observation Technique is done to collect data related aspects of functionality, reliability, and efficiency in the system that is tested.
2. Questionnaire
   Questionnaire techniques were conducted to collect data related to aspects of usability System tested. Sampling is done by purposive technique Sampling. Minimum number of samples for experimental method according to Gay (Husein, 1999) is 15 samples, while on (Sugiyono, 2009) mentioned 30 samples. The study took 30 samples in consideration that the results were obtained more representative.

3.4 Research instruments

1. Instrument Functionality
2. Reliability Instruments

3. Instrument Efficiency
4. Instrument Usability

The usability testing instrument was adopted from the User Interface Usability Evaluation with Web-Based Questionnaires of Perlman (2011). The Questionnaires of Gary Perlman is a standard questionnaire created under the IBM Computer Usability Satisfaction Questionnaire ("Psychometric Evaluation") and a questionnaire of the "Satisfaction of" J.R. Lewis

No	Pertanyaan	Skor Penilaian
1.	Saya puas dengan kemudahan menggunakan sistem ini secara keseluruhan.	1 2 3 4 5 6 7
2.	Cara menggunakan sistem ini sederhana.	1 2 3 4 5 6 7
3.	Saya dapat menyelesaikan tugas dengan efektif saat menggunakan sistem ini.	1 2 3 4 5 6 7
4.	Saya dapat menyelesaikan tugas dengan cepat saat menggunakan sistem ini.	1 2 3 4 5 6 7
5.	Saya dapat menyelesaikan tugas dengan efisien saat menggunakan sistem ini.	1 2 3 4 5 6 7
6.	Saya nyaman saat menggunakan sistem ini	1 2 3 4 5 6 7
7.	Mudah mempelajari bagaimana menggunakan sistem ini.	1 2 3 4 5 6 7
8.	Saya yakin saya akan lebih produktif saat menggunakan sistem ini.	1 2 3 4 5 6 7
9.	Jika terjadi error, sistem ini memberikan pesan error dan pemberitahuan bagaimana untuk mengatasinya.	1 2 3 4 5 6 7
10.	Kapanpun saya melakuan kesalah dalam menggunakan sisitem ini, saya bisa kembali dengan mudah dan cepat.	1 2 3 4 5 6 7
11.	Informasi yang disediakan sistem ini jelas.	1 2 3 4 5 6 7
12.	Mudah untuk menemukan informasi yang saya dibutuhkan.	1 2 3 4 5 6 7
13.	Informasi yang disedakan sistem ini mudah dimengerti.	1 2 3 4 5 6 7
14.	Informasi yang disediakan efektif membantu saya menyelesaikan pekerjaan pada sistem ini.	1 2 3 4 5 6 7
15.	Tata letak informasi pada sistem ini sudah jelas.	1 2 3 4 5 6 7
16.	Tampilan sistem ini memudahkan saya dalam menggunakan.	1 2 3 4 5 6 7
17.	Saya menyukai tampilan sistem ini	1 2 3 4 5 6 7
18.	Semua Fungsi di sistem ini sesuai dengan harapan saya terhadap sistem ini.	1 2 3 4 5 6 7
19.	Secara keseluruhan, saya puas dengan kinerja sistem ini.	1 2 3 4 5 6 7

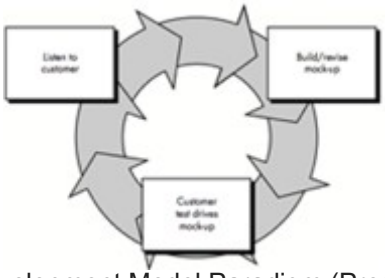
The Satisfaction Usability Questionnaire

3.5 Data Analysis Techniques

1. Analysis of aspects of Functionality
2. Analysis of the aspect of Reliablility
3. Analysis of Efficiency aspects
4. Analysis of Usability aspects

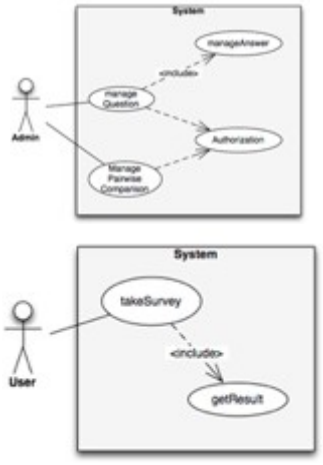
3.6 Software development

Development refers to the model of prototype development. The prototype paradigm starts from identifying issues that resume user-focused design and development. The resulting prototype was subsequently evaluated by the user. This process will be repeated so that this development model as a whole refers to user satisfaction. The prototype development Model implements some of the functions of the real software. This is done in order for the user to get an overview of the program to be produced, so that it can describe more details (Pressman, 2010).



Prototype Development Model Paradigm (Pressman, 2010)

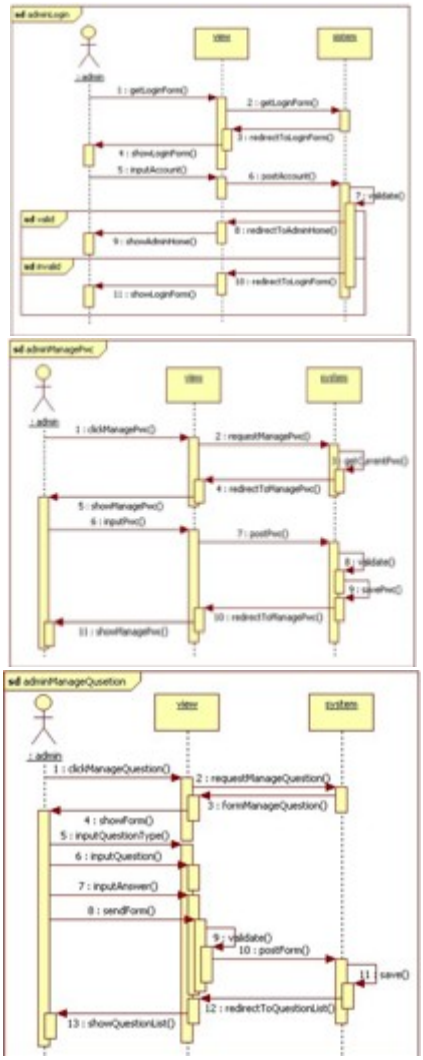
1. Identification of problems and potentials
   Identification of problems and potentials with observation to Students and the curriculum section of PTI FT UNY
2. Needs analysis
   At this stage, the intensive development of the blindness is performed for the decision making system.
   Analysis of the needs of Keputusas support system in this research includes analysis on the functional needs, interfaces, and constraints that must be met by the system.
3. System Design
   The design of the decision support system on this research includes design on functional modeling, data modeling, and display. Design in functional modeling is represented by using UML (Unified Modeling Language) While data modeling using ERD (Entity Relationship Diagram)
   a. Use case diagram
      The Use case diagram is a form of diagram depicting the expected functionality of a system seen from a user's perspective outside the system.

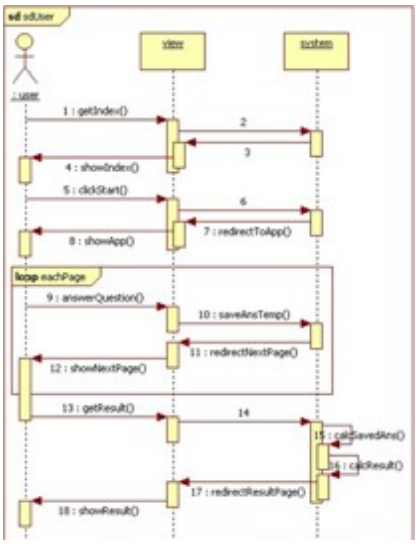


   b. Activity Diagram
      The activity diagram illustrates the various activity flow in the system being designed, how each flow begins, the possible decision, and how they end. Activity diagrams can also describe parallel processes that may occur in some executions (Dharwiyanti & Wahono, 2003).

c. Sequence Diagram

Sequence diagrams illustrate the interaction between objects in and around the system (including users, displays, etc.) in the form of messages that are depicted on time. Sequence diagram consists of vertical dimension (time) and horizontal dimension (related objects) (Dharwiyanti & Wahono, 2003).



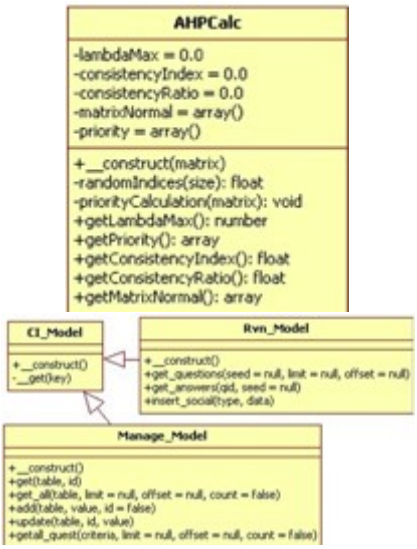


d. Class Diagram

A Class is a specification that if an instantiation will result in a An object and is the core of object-oriented development and design. Class describes the state (attribute/property) of a system, while offering services to manipulate the state (method/function) (Dharwiyanti & Wahono, 2003).

e. Entity Relationship Diagram (ERD)

The Data used in the decision support system in this research is stored in a database. The Data is modeled with the Entity Relationship diagram (ERD) ERD is a graphical notation in conceptual data modeling that has the connection between storage. ERD is used to model data structures and inter-data relations, as it is relatively complex (Kusrini & Koniyo, 2007).



3.7 System implementation

Implementation or system creation is done according to the design of the system that has been created. Implementation is done by coding process using Codeigniter and RDBMS MySQL framework.

3.8 Testing System

System testing is conducted to ensure that software that has been developed is eligible for use by end users. The aspects used to test include functionality, reliability, and efficiency, and usability.

a. Testing aspects of Functionality

1. Suitability Components
   The aspect tested on this component is whether the system can process from the index until all stages are completed. The number of stages of the system can be known by calculating the number of functions in each module controller as well as libraries.
2. Component Accuracy
   The aspect tested on this component is whether the existing links on the system can run well or not.
3. Component Interoperability
   The aspect tested on this component is whether the system can run well on different browsers and operating systems. Testing is done with the browsershoot.org tool.
4. Component Security
   The aspect tested on this component is how the system protects the management page of unentitled users. Each component is searched for the elementary quality preference (EP) value with the formula EP = (Xmax-X)/Xmax. The EP value on each component is used to calculate the global evaluation (P/GP) value with the formula:
   P/GP = (W1 EP. 1 + W2 EP2 + W3 EP. 3 + W4 EP4)

b. Reliability testing aspects

Testing on the reliability aspect seen from the system's fault tolerance. Tests are performed to know that the system can still be used when many users. Testing using the Help tool load.wpm.neustar.biz to simulate visitors. Tests were also conducted using the ApacheBench (AB) tool with the 200 concurent connection and 10000 request parameters. Assuming the number of users is a number of students one generation in the PTI Prodi or as many as 120 people.

c. Efficiency aspects testing.

Testing on the efficiency aspects seen from timing behavior, that is, how
Fast user can access the system. This test uses the webtoolhub.com and webpagetest.org tools. Test results are then compared to the 8 second rule.

d. Usability aspect Testing

Testing on the usability aspect was done by testing the internal consistency of data gained through research using the use of the method of satisfaction by J.R. Lewis, using the Alpha Cronbanch.

4. Findings

4.1 Results of system development

1. Encoding implementation

System implementation is done after the analysis and design process is completed. The system is implemented with PHP programming language and uses the Codeigniter framework.
The modules are separated by necessity, so that each module can be responsible for its own task. There are three main modules in this system:

a. User module, this module is responsible for managing authorization. User Module Use the Ion Auth Library as the Authorization Manager.
b. Manage module, this module is used as the backend of the system. Determination Comparison (Pairwise comparison) criteria and management Each criterion's question is in this module.
c. RVN module, this module is the main module front end system accessed Users. This module is tasked with displaying questions and User answers to be counted based on AHP calculations.

2. Implementasi Tampilan

Admin View Implementation

4.2 System Testing

System testing is done in the aspects of functionality, reliability, usability, and efficiency. The aspects of functionality, reliability, and efficiency will be tested by researchers using some of the tools that provide facilities for testing Web applications

1. Testing aspects of Functionality

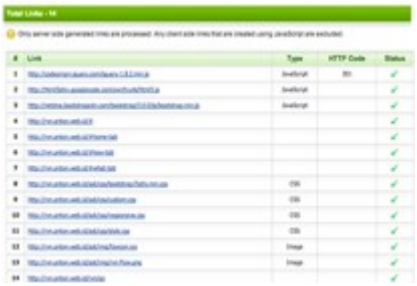
Testing is done on components of aspects of functionality as follows.

a. Suitability components

Number of functions

Nama Controller / Lib	Jumlah fungsi
User/auth.php	10
Manage/ahp.php	6
Manage/manage.php	7
Manage/user.php	7
Rvn/rvn.php	3
Libraries/ahpcalc.php	8
Jumlah Total	41

b. Acurracy components



c. Component Interopability

No	Sistem Operasi	Browser	Hasil
1.	Linux Debian 6.0	Firefox 10.0.2	√
2.	Linux Debian 6.0	Opera 10.6	√
3.	Linux Debian 6.0	Chrome 30.0	√
4.	Windows 7	Firefox 10.0.2	√
5.	Windows 7	Opera 10.6	√
6.	Windows 7	Chrome 30.0	√
7.	Windows 7	IE 7.0	-
8.	Windows 7	IE 8.0	√
9.	Windows 7	IE 9.0	√
10.	OS X 10.9	Safari 7	√
11	OS X 10.9	Chrome 32.0	√
12	OS X 10.9	Firefox 26.0	√

The test results of the component interoperability

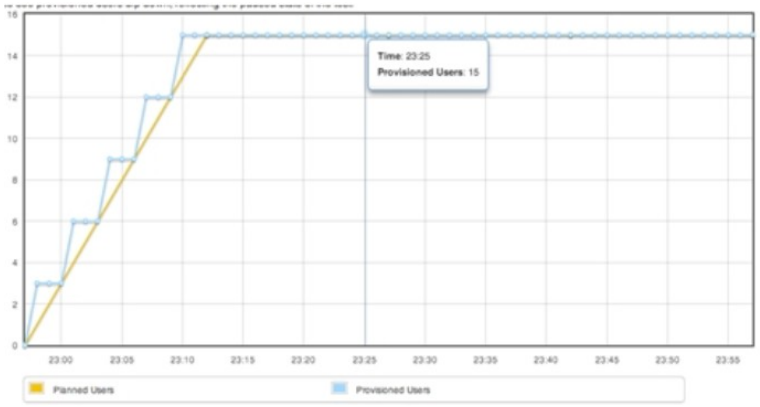
The test results showed the system could not run properly on One browser, so that the value of X for the component Interopability is 1/12 (8%). The EP value for the interopability component is 92%.

d. Component Security
Management features are placed with a prefix/manage address in the app. Testing is done by accessing the prefix with the Curl tool without going through the authentication process first. The test result indicates that the user will be redirected to the login page with the prefix/auth. All management features are not accessible to users who are not entitled. So the obtained X value for the security component is 0 and the EP value is 100%.

```
➜ ~ curl -i http://rvn.anton.web.id/manage
HTTP/1.1 302 Moved Temporarily
Date: Sat, 19 Apr 2014 05:26:22 GMT
Server: Apache
X-Powered-By: PHP/5.3.27
Set-Cookie: rvn_s=a%3A4%3A%7Bs%3A10%3A%22session_id%22%3Bs%3A32%3A%221cf168ce422
b7f6cddbd8023850dac71%22%3Bs%3A10%3A%22ip_address%22%3Bs%3A12%3A%2236.73.105.13%
22%3Bs%3A10%3A%22user_agent%22%3Bs%3A11%3A%22curl%2F7.30.0%22%3Bs%3A13%3A%22last
_activity%22%3Bi%3A1397885184%3B%7Dea5fb7ffd23facdfbd4dc37f3894c3f8; expires=Sat
, 19-Apr-2014 07:26:24 GMT; path=/
Location: http://rvn.anton.web.id/auth
Content-Length: 0
Connection: close
Content-Type: text/html
```

Component Security Test Results

2. Reliability Testing aspects
The test results using the load.wpm.neustar.biz tool can be seen in Figure 26. The test results show that the system can serve 15 users per minute.



Reliability test Results

The reliability aspect of the system is also affected by the server used. Systems are tested using shared web hosting that does not implement Bandwidth limitation (unmeterred bandwidth) so it is possible to Serve many users. Assuming the number of users is a number of students PTI Prodi Force in 120 people, the system can handle it in 6.1 seconds without problems.

3. Efficiency Testing
Results from testing using the webtoolhub.com and webpagetest.org tools.

						Document Complete			Fully Loaded		
	Load Time	First Byte	Start Render	Speed Index	DOM Elements	Time	Requests	Bytes In	Time	Requests	Bytes In
First View	2.143s	0.473s	1.629s	1897	56	2.143s	15	449 KB	2.215s	15	449 KB
Repeat View	0.404s	0.164s	0.468s	483	56	0.404s	1	4 KB	0.527s	1	4 KB

Efficiency test results with webpagetest.org

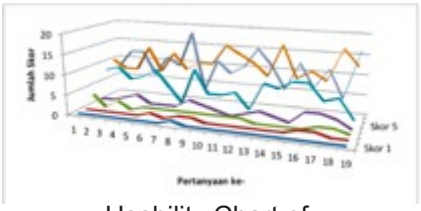
Efficiency test results with tools.pingdom.com

4. Usability aspect Testing

No	Pertanyaan	Jumlah Skor						
		1	2	3	4	5	6	7
1.	Saya puas dengan kemudahan menggunakan sistem ini secara keseluruhan.	0	0	3	1	8	10	8
2.	Cara menggunakan sistem ini sederhana.	0	0	0	1	9	8	12
3.	Saya dapat menyelesaikan tugas dengan efektif saat menggunakan sistem ini.	0	0	2	2	6	8	12
4.	Saya dapat menyelesaikan tugas dengan cepat saat menggunakan sistem ini.	0	0	0	3	7	14	6
5.	Saya dapat menyelesaikan tugas dengan efisien saat menggunakan sistem ini.	0	0	1	1	9	8	11
6.	Saya nyaman saat menggunakan sistem ini	0	1	1	1	5	13	9
7.	Mudah mempelajari bagaimana menggunakan sistem ini.	0	0	1	1	1	9	18
8.	Saya yakin saya akan lebih produktif saat menggunakan sistem ini.	1	1	1	3	10	11	3
9.	Jika terjadi error, sistem ini memberikan pesan error dan pemberitahuan bagaimana untuk mengatasinya.	0	1	1	2	4	11	11
10.	Kapanpun saya melakuan kesalah dalam menggunakan sisitem ini, saya bisa kembali dengan mudah dan cepat.	0	0	1	1	4	16	8
11.	Informasi yang disediakan sistem ini jelas.	0	0	1	0	5	14	10
12.	Mudah untuk menemukan informasi yang saya dibutuhkan.	0	0	1	1	1	12	15
13.	Informasi yang disedakan sistem ini mudah dimengerti.	0	0	0	2	8	9	11
14.	Informasi yang disediakan efektif membantu saya menyelesaikan pekerjaan pada sistem ini.	0	0	0	1	7	17	5
15.	Tata letak informasi pada sistem ini sudah jelas.	0	0	0	0	9	9	12
16.	Tampilan sistem ini memudahkan saya dalam menggunakan.	0	1	0	3	9	11	6

17.	Saya menyukai tampilan sistem ini	0	1	1	3	5	9	11
18.	Semua Fungsi di sistem ini sesuai dengan harapan saya terhadap sistem ini.	0	0	1	2	6	17	4
19.	Secara keseluruhan, saya puas dengan kinerja sistem ini.	0	0	0	0	1	13	16

Usability Testing Results



Usability Chart of

No	Nomor Item																		Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1	6	5	7	6	5	7	6	4	6	7	5	6	5	5	5	6	5	6	6	108
2	6	5	4	5	6	7	3	2	2	3	6	7	7	6	5	5	4	5	6	94
3	6	7	3	5	3	2	7	1	7	7	6	6	7	5	7	4	5	3	6	97
4	6	7	7	5	6	7	6	5	7	6	6	7	6	6	7	7	7	6	6	120
5	5	6	7	7	7	6	7	4	7	6	7	6	5	6	5	5	6	6	6	114
6	5	6	7	6	7	6	7	5	6	7	6	6	5	6	6	6	6	5	6	114
7	5	6	6	6	5	6	7	5	6	6	7	7	7	6	5	5	6	6	7	114
8	5	6	5	6	5	6	7	6	6	6	6	7	7	6	7	5	6	6	7	115
9	6	7	6	6	5	5	6	6	5	5	6	7	7	6	5	6	6	6	7	113
10	5	6	7	7	6	5	6	7	6	7	7	7	7	6	7	6	7	6	7	122
11	6	5	7	5	5	6	6	5	7	5	7	6	5	5	7	6	5	6	7	111
12	5	7	6	7	6	7	7	6	5	6	6	7	5	6	7	6	7	6	7	119
13	6	5	4	5	5	6	5	6	5	6	6	5	4	5	6	5	5	5	6	100
14	7	4	7	6	6	7	7	6	7	6	7	6	7	6	6	6	7	6	7	121
15	6	5	5	6	5	6	6	5	4	4	5	6	5	5	6	6	5	6	7	103
16	6	7	6	7	7	6	7	5	7	6	6	7	7	6	5	6	6	4	7	118
17	6	6	7	7	7	6	7	6	6	6	7	6	6	7	7	6	6	7	6	122
18	7	7	7	6	5	7	7	5	5	6	6	7	6	6	7	7	7	7	6	121
19	5	6	6	5	5	5	6	4	6	6	5	6	6	6	5	5	6	5	5	103
20	4	7	5	5	5	4	4	3	4	5	5	4	5	6	5	5	4	4	6	90
21	5	6	7	6	4	6	7	7	3	5	5	7	5	6	5	7	3	5	6	105
22	7	5	6	4	7	6	7	6	7	7	6	7	6	7	7	4	6	6	7	118
23	7	5	5	6	6	5	6	5	7	6	6	6	6	6	6	5	7	6	6	112
24	3	7	6	6	7	3	7	6	6	7	7	6	7	7	6	7	2	6	7	113
25	7	3	7	6	6	7	7	6	6	6	6	7	7	5	7	5	7	6	7	118
26	3	7	6	6	6	7	7	5	6	7	6	6	6	5	6	6	7	5	7	114
27	7	7	3	4	7	6	6	6	5	7	3	7	6	6	7	2	7	7	6	109
28	3	7	5	4	7	6	7	7	6	6	7	3	7	4	6	7	4	6	7	109
29	7	5	5	7	7	5	7	5	7	6	7	7	4	7	7	4	7	7	7	118
30	7	7	7	6	7	7	7	6	7	6	7	7	6	7	6	7	7	6	7	127

Rincian hasil penelitian usability yang dilakukan terhadap 30 orang responden.

5. Data Testing Usability Results
Data of the usability test results are incorporated into the statistical formula Alpha Cronbanch as follows:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=i}^{K} \sigma_{Yi}^2}{\sigma_X^2}\right)$$

sehingga diperoleh hasil,

$$\alpha = \frac{19}{19-1}\left(1 - \frac{19.976}{77.596}\right)$$

$$\alpha = \frac{19}{18}(1 - 0.257)$$

$$\alpha = \frac{19}{18}(0.743)$$

$$\alpha = 0.784$$

Values obtained later compared to the value range in the table The internal consistency of Alpha Cronbach and obtained results in the range of 0.7 ≤ α ≤ 0.9 are represulated as ' good '. The representation indicates that the tested system has fulfilled the usability testing aspects and is worth use by end users.

4. Conclusion

Based on the results of research and research discussion can be concluded as follows:

1. Application meets eligibility on the aspect of functionality. It can be seen in the results of the testing aspect of functionality that resulted in global evaluation (P/GP) Sebesar99, 5%. The global evaluation value shows that the system is at the satisfactory level.
2. Application meets eligibility on realibility aspect. In testing the reliability aspect of the system can handle 15 users every minute. On testing using Apache Bench shows the system can handle requests as much as 19.67 requests every second without having problems with the 200 concurent connection.
3. Applications meet the feasibility of the efficiency aspect. The efficiency test resulted in the user's wait time of 1.09 seconds. These results are much smaller than the 8-second rule.
4. Tested applications have fulfilled eligibility for usability aspects and are worth use by end users. The usability aspect testing resulted in an internal consistency value of 0784. The value is after compared to a range of values in the internal consistency table Alpha Cronbach obtained results in the range of 0.7 ≤ α ≤ 0.9 which is represulated as ' good '.

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