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Blackbox Testing Model Boundary Value Of Mapping Taxonomy Applications and Data Analysis of Art and Artworks

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***Abstract*— The classification of artistic expertise in an area on products and actors of art greatly affects the progress of artistic life. One method of classifying cultural data is the taxonomic method. In the taxonomic method, an art product can be categorized into several domains. For example, the product of Kawung (Indonesian) batik cloth can be included in the domains of fashion, philosophy, and fine arts. An example from the taxonomy of art actors, for example, an artist can have various expertise in music, dance, fine arts, or others. The source of information used to classify this research is the big data of art actors in Malang, Indonesia. Big data is obtained from art actors directly who provide input from the instrument about the suitability of the art field with the expertise possessed by each of them. Individual artists generally have more than one artistic skill which can be classified taxonomically and ranked using fuzzy clustering. The purpose of ranking with fuzzy clustering is to determine the weight of artistic skills starting from the level just done to the most proficient to do. To achieve accurate weighing results, a taxonomy application for mapping and data analysis of artists and works of art was created. This research discusses functional testing (black-box testing) of the taxonomy application of mapping and data analysis on web-based artists and artworks.**

Keywords*— *taxonomy, fuzzy clustering, artists, black-box testing

I. Introduction

The Indonesian government through Law no.5 of 2017 encourages the advancement of traditional cultural arts. There are several stages of implementing the law, namely data collection, classification, and organization. The government through the Tourism Office has used the taxonomic method to classify cultural data. In the taxonomic method, an art product can be categorized into several domains. For example, the product of Kawung (Indonesian) batik cloth can be included in the domains of fashion, philosophy, and fine arts. An example from the taxonomy of art actors, for example, an artist can have various expertise in music, dance, fine arts, or others[1]. Data analysis was carried out based on instruments that have been distributed to artists in Malang, Indonesia. Individual artists generally have more than one artistic skill which can be classified taxonomically and ranked using fuzzy clustering. The purpose of ranking with fuzzy clustering is to determine the weight of artistic skills starting from the level just done to the most proficient to do. Descriptive data presented on the instrument will be selected based on sentences and words which will be classified as multitasking using machine learning[2]. Big data will go through the data preprocessing stage, namely case folding, tokenizing filtering, and stemming. Furthermore, the result of stemming is formed a set of terms or unique words. In the next stage, namely Extraction Feature, the frequency of occurrence of terms is calculated based on keywords in each document. After that, it is continued with the feature selection stage, the term weighting stage, and fuzzy clustering.

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The test method that will be used in testing this artist's taxonomy application is functional testing or better known as the Black-Box testing method. In this artist taxonomy web application test, it focuses on the Boundary Value Analysis model which discusses menu completeness. Modules and their operational processes. In principle, testing the Black-Box method or generally called functional testing is a way of testing software without knowing the structure or content of programming code[5][6]. The tester is aware of what the application has to do but has no knowledge of how the programming in the application runs it. The reason for using

the Black-Box method is one of which there is a separation of perspectives between the user and the application developer. Also, access to programming code is not required. So that the Black-Box testing method is very efficient for testing applications with a large programming structure.

II. RESEARCH METHOD

A. Software Testing

The research methodology used to test the application of taxonomy in mapping and analyzing data of artists and works of art as a means of advancing this culture is a black-box testing mode boundary value analysis. The implementation is done by using a web-based taxonomy software application test conducted at Merdeka University Malang.

B. Opinion data sampling

Sources of data for the taxonomy process are provided to individual artists online at https://bit.ly/taksonomiseniman. There is a need for a detailed description of the data instrument and data collection, the artist's data instrument that will be used in the fuzzy clustering process consists of several categories, namely: first, personal identity includes email, full name, gender, ethnicity, education, main occupation, how to obtain art skills and time to start deepening the art. the second is to identify the experience of the instrument, among others, namely the acquisition of awards, the experience of holding or creating works of art and the experience of art organizations[7]. the three instruments of the Art Branch that he is engaged in include types of theater arts, types of puppet stage arts, types of traditional dance, types of traditional open stage arts, types of traditional music, arts and other branches of fine arts. the last instrument is a position or role in performing arts. Following are the modules tested using the Black-Box method:

TABLE I. TEST MODULE DATA

Class Test	Items Test
Login	Fill in the login
	Verification
	Forgot password feature
Web Configuration	Fill in the web identity data
User Management	User list
	Edit feature
Import respondent data	External data pull feature
Clustering Process	Fill in the clustering process identity
Text mining process	Case folding
	Filtering
	Stemming
	TF
	IDF
Cluster Testing Process	Recap test results
	Recap of the final clustering results

III. RESULTS AND DISCUSSION

The purpose of testing this taxonomy web software is to determine the level of effectiveness and functionality of the application. The taxonomy web software has a system specification that is implemented is the application specification Text Mining Audience Opinion on Traditional Cultural Art Work Using Fuzzy Clustering:

TABLE II. SYSTEM SPECIFICATION

The programming language used	PHP
Admin page	Admin backend Admin template
URL	http://pelaku-seni.metodefuzzy.com/
A browser application that can be used	Microsoft Edge, Mozila Firefox, Chrome, Safari
Database	MySQL (MariaDB)

Before being able to login in figure 1, the username and password must be added first by a Super admin level user. There is no forget password feature available. If you have forgotten your password, the user must report it to Super admin.

Figure 1. Login page

For web configuration that is used in figure 2 and 3, it can only be done by super admin level users, and limited User Management has the ability to have no date and time when a user was added and there is no history log that records the activity of each user.

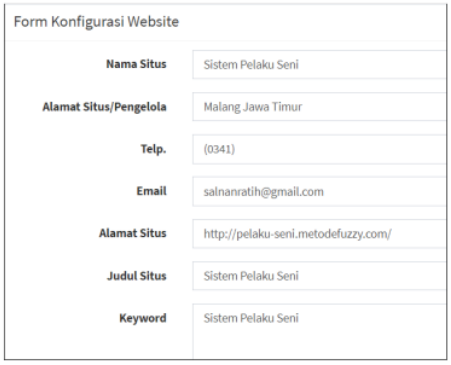

Figure 3. Web configuration page

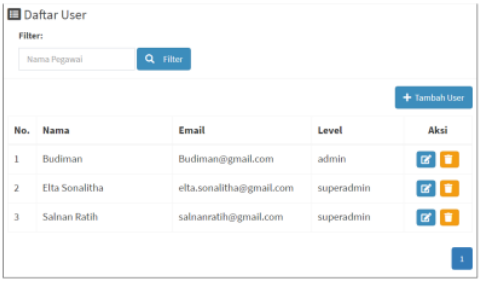

Figure 4. List of users

In the web configuration testing phase, the user list is identified. Has a user data recap with basic features of input update and delete data, there is no date and time when a user is added and there is no history log that records the activity of each user.

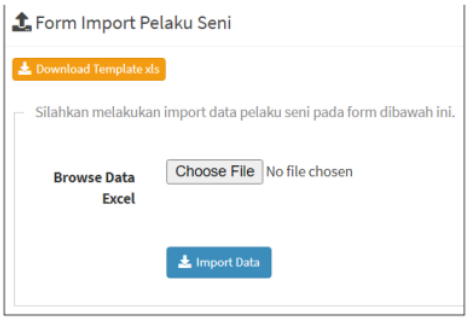

Figure 5. Form for importing external data

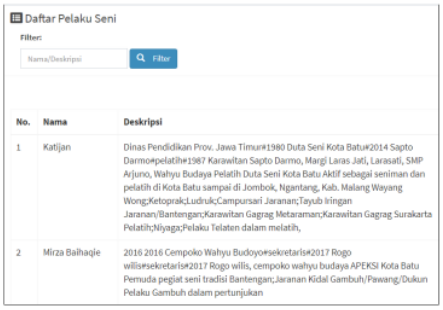

Figure 6. Recap of data on art actors' instruments

Figures 5 and 6 represent the identification of test results. Acceptance of respondent data has not been integrated directly into the application. So that the admin must import from the Google Form results sheet and adjust it to the provided xls template.

A. *Clustering Process*

In the implementation process in figure 7, the results of the testing of the clustering process include the user filling in the name of the testing process as the identity of the test, the user fills in the number of clusters dividing the instrument data into several clusters, to group similar instrument data, the user fills in the number of iterations and the user clicks the Cluster Process button to run the process. Implementation of the Clustering Process takes between 7 seconds to 2 minutes.

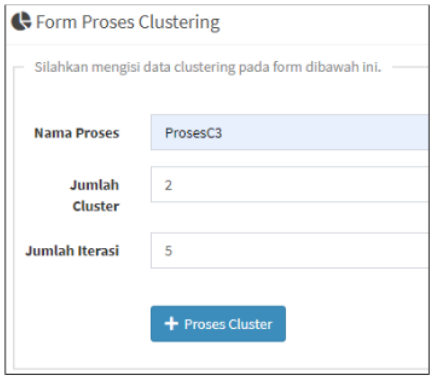

Figure 7. Form for the clustering process

B. *Preprocessing Data*

To generate characteristic values for each opinion cluster, each description goes through several stages as follows: the first case folding includes. At this stage, the program removes ASCII characters other than letters and performs a lower case. after that, it is implemented and obtains test results in the form of a table display that is used not fully responsive models[8]. The user must scroll down the page without looking at the table header again, The resulting data shows all text to be a lower case, the resulting data shows no characters other than letters and In the Case Folding results List view, there are no features or information on the original description data and case results. folding as a comparison. the second filtering process is taking important words from the tokenizing results[9]. This step can be done with 2 techniques, namely, stop lists (removing unnecessary words) and word lists (storing important words). From this process, the results are obtained. There is already a recap of the filtering results and in the filtering results list view, there are no features or information on words that are informatively grouped in the table, which ones are stop lists or word lists. So that the accuracy of the filtering process cannot be known. The third one is Stemming, at this stage, the aim is to find the root word from the filtering results by removing the affixes and the test results are obtained[6]. There is already a stemming result recap and the table display used is not a fully responsive model. The user must scroll down the page without looking at the table header again.

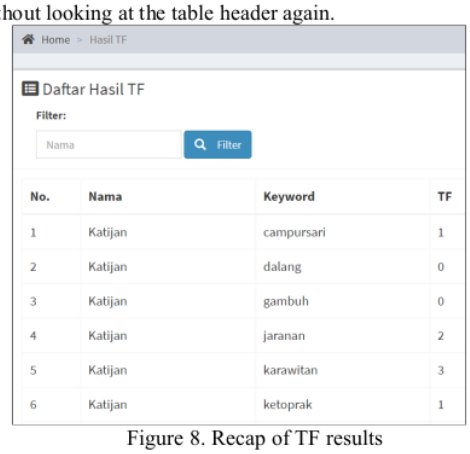

Figure 8. Recap of TF results

Daftar Hasil DF IDF

Filter:

Keyword | Filter

No.	Keyword	DF	IDF
1	campursari	22	0.969
2	dalang	16	1.288
3	gambuh	4	2.674
4	jaranan	28	0.728
5	karawitan	38	0.423
6	ketoprak	14	1.421

Figure 9. Recap of IDF results

In figure 8 is a recap of the TF (Term Frequency) results which is aimed at calculating the frequency of occurrence of each of these keywords so that after implementation, the table display used is not fully responsive, the user must scroll down the page without looking at the header table again. the results of the TF, produce the frequency of occurrence of keywords in the form of names of art that the artist is engaged in. On the TF Result List page, the navigation record is not available. The last button to go to the last record[10]. There is no information on the total number of keywords, total keywords per respondent, and the TF ranking to find the highest or lowest keyword for an artist. Then in Figure 9 is the IDF (Inverse document frequency) with the test results, namely, there is no information on the total number of keywords in all, and the sorting of columns and table views used are not fully responsive models. The user must scroll down the page without looking at the table header again[11].

C. *Cluster Testing Process*

The user selects the identity of the clustering process created at the Clustering Process stage with the test results shown in the figure below 10, displayed the results of each test in each clustering process, namely the name of the clustering process in the previous chapter must be made manually, it is suggested that it can be made automatically with a naming template which refers more to the word "process"[12][13]. Sorting cannot be done to find out which clustering process has the smallest V so that the best cluster value can be found.

Home > Hasil Pengujian

Daftar Hasil Pengujian

No.	Nama Pengujian	Vc	Vw	Vb	V
1	Pengujian 21	• Cluster_1 = 22.82469807 • Cluster_2 = 13.52833775	0.111111111111111	13857.158895	0.00000801831
2	Pengujian 22	• Cluster_1 = 4.779091 • Cluster_2 = 22.710350472934	0.96296296296296	15952.224214	0.00006036543

Figure 10. Recap of clustering test results

A variant within-cluster Vw, this variation is utilized to see the comes about of the change of information dissemination in a cluster. The littler the Vw value, the way better the cluster. Variation between clusters (Vb). This variation is utilized to see the comes about of the change of information dissemination between clusters. The more noteworthy the Vb value, the way better the cluster. To see the variations of all clusters, it can be seen at the V value, the littler the V value, the way better the cluster value. Because there are no specific opinion data filter settings to be processed, all opinion data collected and stored in the database is immediately processed, so that the Vc, Vb, VW, and V data are uniform or similar[14].

For the Final Clustering Results in the form of test results in Figure 11, which is to pull the data, see the details of the Clustering results, it takes between 7 seconds to 2 minutes. There is no Sweet Alert feature to notify the user that the process is running[15]. In the same data, on the same number of iterations and the number of clusters, the processing time is shown not significantly different and the error value generated from the clustering process is not displayed but the data sorting feature is not found.

Home > Hasil Clustering

Daftar Hasil Clustering

No.	Nama Pengujian	Jumlah Cluster	Iterasi	Waktu	Aksi
1	Pengujian 1	2	7	0:00:57	
2	Pengujian 2	2	6	0:00:55	
3	Pengujian 3	2	6	0:00:54	
4	Pengujian 4	2	7	0:00:56	
5	Pengujian 5	2	9	0:00:54	
6	Pengujian 6	2	6	0:00:56	

Figure 11. Recap of clustering result data

While the data format displayed in the Final Clustering Results List only displays the calculated data in the form of a percentage for each keyword, but there are no conclusions related to the classification of artists and products in each cluster produced using this percentage data. The table display used is not fully responsive and user models[16][17]. have to scroll down the page without looking at the table header anymore but there is no sorting feature based on certain columns.

Home > Hasil Final Clusterin > Hasil Final Clustering

Daftar Hasil Final Clustering

Karakteristik Cluster_1

No.	Keyword	Prosentase
1	campursari	3.33 %
2	dalang	28.06 %
3	gambuh	0 %
4	jaranan	3.34 %
5	karawitan	8.25 %

……

15	teater	12.41 %
16	wayang	5.05 %

Figure 12. Recap of the final clustering result data

IV. Conclusions And Recommendations

After testing the application, here are the conclusions of the implementation of the research and recommendations given to complement the existing features of the implemented software, namely the results of clustering using an infographic display, displayed in graphical form so that the reading of the conclusions and information displayed is easy to understand. The data that appears at this time is still raw data or data that still needs to be processed again to be able to show cluster conclusions. The results of the clustering process can be downloaded by the user in the form of CSV or PDF data so that they can be used for further data processing or as reporting. Also, the conclusions in the infographics can show the classification of artists according to existing categories in the instrument form, for example, the art field occupied, the area of origin, etc. which can be used as information for further development in the art field in Malang. In the software for receiving respondent data, it is integrated directly into the application. There is no need to import from the Google Form results sheet with recommendations in the form of Filter Results data, it is necessary to display discarded words, can be used as an evaluation material, and from the list of Final Clustering Results, information can be displayed as conclusions from the classification of actors in each resulting cluster. One important recommendation is that the admin user activity history is recorded, it is necessary to provide a log module. In the Clustering Process Form, it is recommended that the process name be automatically generated by the system, for example using a combined format between date - time - and ID or serial number. Then the Clustering Process Form can display the recommended number of iterations by default or the iteration can be carried out continuously and the process can stop automatically until the resulting error value is within the specified range. In the clustering assessment results from collecting data on instruments of art performers, it is necessary to define a date or period. External factors such as economic conditions, or other external factors such as different generations in a certain period. Technically, this can also help applications run more optimally and process data that is filtered only for a certain period and the accuracy of information needs. The navigation menu is recommended to use a sub-menu that can appear continuously when it is active and on the dashboard/home page, infographics can be displayed related to instrument data filled in by art actors, for example, the area of origin, branches of artistic skills, positions and special skills of the arts.

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