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TOWARDS MOBILE DIGITAL LIBRARY VISUALIZATION

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Abstract

The online library has a huge data of digital documents, images, and videos that are becoming an integral part of it. Mobile users suffer from massive data to search and browse through a small screen of the mobile. This research developed a new algorithm and mobile app. to search, and visualize digital library contents. The researchers studied the related works, analyzed related methodologies, and documented other methodologies. The project established a hierarchy tree for the digital library content to represent research results. Using this technique enabled Mobile's users to easy browed the results in a flexible way. Experimentation is conducted and the pros and cons of the application developed were figured out.

Keywords: Book Mobile searching, Visualization Searching, Information Retrieval, Search Engine Algorithm, Hierarchical results

1.INTRODUCTION

Google Web Search engine presents a list of page results. It is a hard (especially on a Mobile) for an end-user to browse all the results looking for a particular result that fits his needs. Visualizations that show more search results are very useful at that case for several

reasons. Moreover, visualization can cluster rich data which may be meaningful. Additionally, the user will be provided with a less dense view of the classic text display.

On the other hand, Digital Library (DL) widely applies in altered groups and offers consumers with a unlimited compact of means [1][2][3][6], and [7] . Moreover, using various information technology and knowledge network platform. Digital Libraries participants are working to figure out vast amounts and complex sorts of material, the library required a visualization tools to help people to collect all resources in one vision Infovis is one kind of visualizing information [5] that characterizes a research results as visualized image. A remaining store is imbedded inside DLs to takle with problems get up from the predictable needs. Stuart et. al. analyzes Infovis [5] is one of visualized DLs that is supplying a sorting of methods and recording about how to analyze communication with visualized approach.

Most visualization systems [2] [8], and [9] choice a bag of keywords to look for the book and recorders. Formerly, they perform how many words frequency happened in this bag of words. This number of words represents the relationship between keywords and recodes. If the record has a highest frequency then the record has highest quality. The project will develop an algorithm to search and sort books based on XML article. Another algorithm will draw the visualization map of all the books.

This research studies how to develop tool to visualize digital library contents. The project aims to establish network graphs for the digital library content to represent research results as a hierarchy tree. Using this technique will enable us to easy our communication with mobile application and brows the results in flexible way.

There are some trials to present a research results as visualization graph such as xFind [10], Hotmap [11] and Wavelens [12]. xFind represents search results as a list. Wavelens [12] represents search results as a one dimension visualization technique and allows users to increase the shape of the visualization around liked parts. Hotmap [11] represents a search results as a map expending scatter plot which create a simple list.

Users can use Web search visualization using scatter plot [13] to look for a certain query and browse the results as visualized traditional list which be represented by a scatter plot along with the documents.

On the other hand, interaction techniques in the visualization system are different. The differences are represented in browsing search results. Some system use navigation xFind

[10], zooming WebSearchViz [14] and other uses selecting Wavelens [12], and scrolling Hotmap [11].

According to Rhyne [15], the front-end user interface could be the next technological breakthrough instead of the back-end search algorithm.

The purpose of this research first is to design, test and exam a prototype for a mobile application to search the DL. So the project has to answer the following questions: How easy is the e-content display via mobile? Do academic researches provide Mobile map for digital information in the library? What the usability and accessibility of it?

The contribution of this paper can be summarized as follows:

- Creating a new technique to search Web.
- Designing and develop new algorithm to sort and filter results of the digital library.
- Developing a Mobile App. To search the Web

2. MATERIALS AND METHODS

This project is to develop an Android and Apple Application to run on their operating system. We used the Android and Apple developer guides. We utilize a lot of documents to learn how to build Android and IOs apps using APIs in the Android framework and Apple Store other libraries.

We already used Android's XML vocabulary, to design UI layouts and to create a screen that contains search element, and the algorithm of searching Google Search engine. This modern project uses platform mobile Google which depends on Google API's.

Most of developers are using Google API Client Library for Java which offers mutual features for most popular Google APIs, batching, media, and Google search engine. This project used efficient XML and JSON data models.

3. SYSTEM OVERVIEW

In this research, we focus on visualization techniques rather than information retrieval methods. We will shows the visualization system based on Mobile technology and the users satisfaction of the proposed application. The integration between our Mobile App. And Google is built based on Google API to provide the required data. Figure 1 shows the architecture of KAU-Tree.

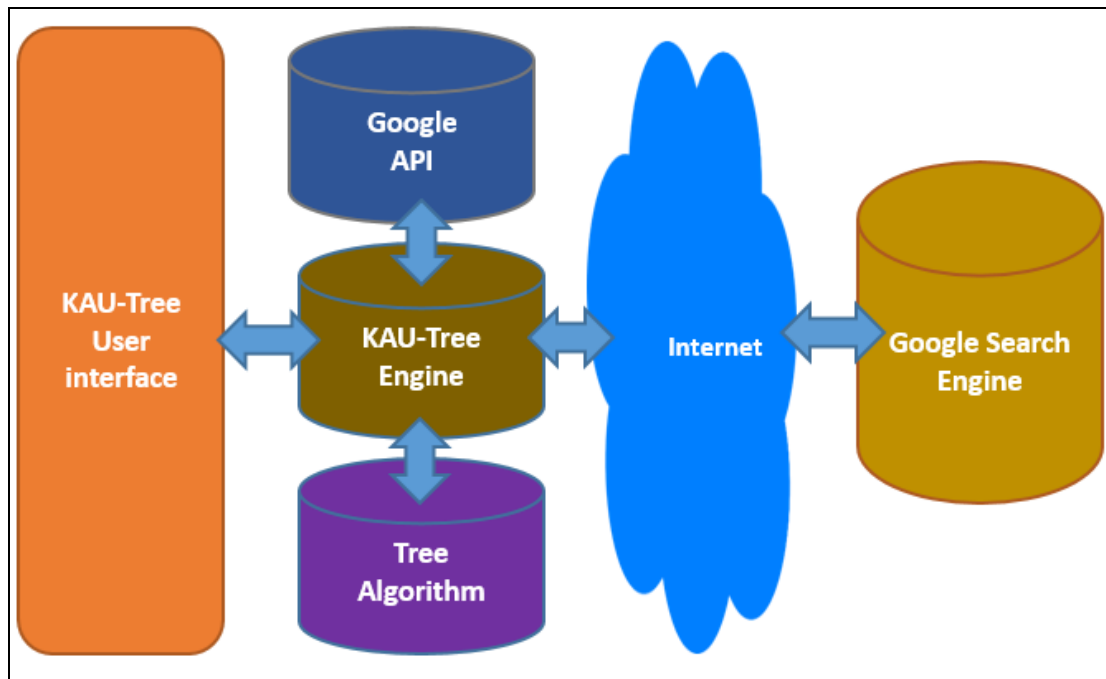


Figure 1 KAU-Tree Architecture

It is challenging to retrieve and present large amounts of Web data. The proposed system contains three parts: searching Google, data retrieving, constructing tree. In searching Google, KAU-tree user interface receives a query from a user, and passes it to KAU-tree engine. The proposed system relies on Google APIs. Google APIs allows KAU-tree engine to communicate with Google Search engine and to retrieve the results for the search query. After retrieving the results, Tree algorithm assigns a weighting to each result based on its significance. The system shows the results as a tree, where leaves represent results, and the edge of the branch represents its significance. Based on the value of each results, the algorithm assign a weight for each edge.

As shown in Figure 2 show the user interface of KAU-tree application, where the end-user can write a keyword in the title of the book he looks for.

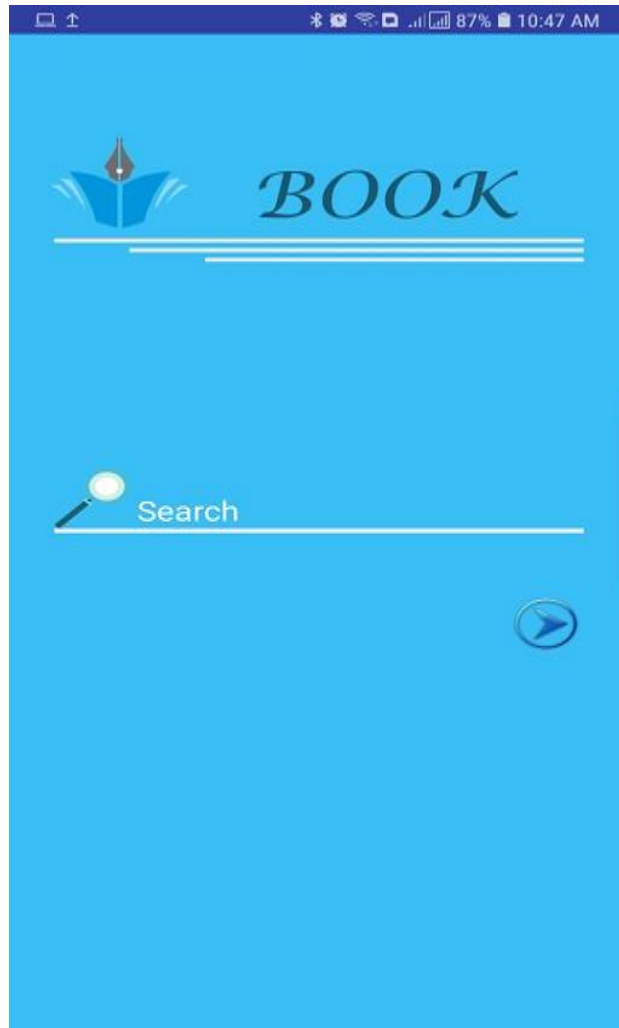


Figure 2 User interface of KAU-Tree Application

Figure 3, show an example of the search results where each leaf represents a one result and the number on the node represents the weight of this result.



Figure 3, an example of a search results.

4. RESULTS AND DISCUSSION

This part deals with the statistical analysis procedures and the methods used in achieving the research objectives. He begins by defining the procedures and methods of statistical analysis used by the researcher in descriptive statistics and analytical statistics. The descriptive statistical analyzes also deal with weighted arithmetic averages, standard deviation, In order to determine the characteristics of the vocabulary of the research sample in terms of the satisfaction of the second year students Faculty of Physical Education Al-Azhar University on the KAU-Tree program. The methods of correlation coefficient Spearman is used to

measure the strength and direction of the relationship between the dimensions of the study and finally the Cronbach's Alpha test to measure the stability and validity of the questionnaire content of the study.

The participants were 174 students, second level faculty of physical, Al-Azhar University. The survey was designed using Google Form, and submitted to the participants through their WhatsApp accounts. The also invited to download and install the KAU-tree application from Google store. As shown in Figure 4, most of the student were using Android Mobile with 94% and only 4 % who were using iPhone.

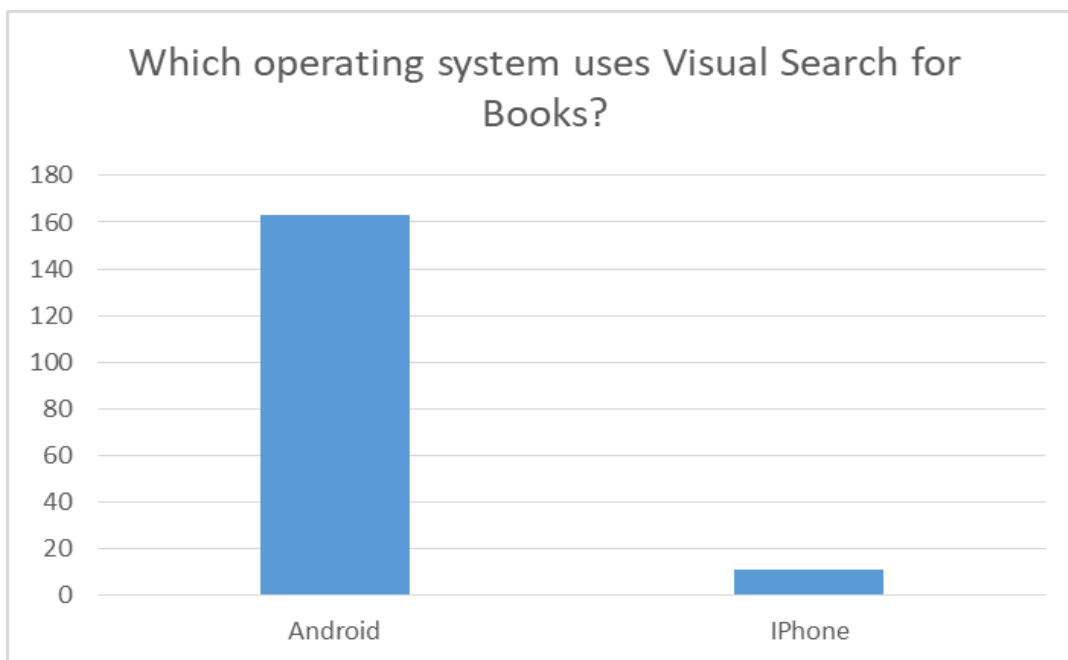


Figure 4 Mobile platforms

This results reflects that the most of student prefers using Android Smartphone than using iPhone.

The researcher performed the following procedures to complete the statistical analysis of the research:

- Review the questionnaire form to ensure completeness and validity of data entry and statistical analysis where cases that do not meet the necessary conditions are excluded,

- Coding the variables and data and then unloading the computer according to the Statistical Package for Social Sciences (SPSS) Statistical Package for Social Sciences in which the variables were configured for the students' academic level, independent variables: including the phases of use of the program KAU-Tree: the interface of the program: Search results, search results display, and dependent variable: ease of use, accuracy of results.

Likert Scale

Most studies refer to the weighted average categories according to the Likert Scale approval and disapproval criteria used in this research as follows:

- 1.00-1.79 Responses tend to (Strongly disagree)
- 1.80-2.59 Responses tend to (disagree)
- 2.60-3.39 Responses to (neutral)
- 3.40-4.19 The responses tend to be "Agree"
- 4.20-5.00 The answers tend to be " Strongly agree "

(D) Stability and validity of the content of the research variables:

The Cronbach's alpha stability coefficient is to measure the consistency of content and the internal consistency of the total dimensions of the questionnaire questions. In this test it is reached (0.873), which indicates the high stability of the sample and the validity of its content. The research identified some of the characteristics of the vocabulary of the research ample using descriptive statistics, as mentioned previously, as follows: It is clear from the figure that the distribution of the sample of the research sample according to the user's mobile type indicates that the Android mobile has a percentage (94%), compared to (6%) for users of iPhone.

Descriptive statistics of research variables

The descriptive statistics of the independent research variables are presented in the table. The data of the tables for these variables show the highest scores for the approval and the lowest approval or non-approval according to the responses of the sample of the research sample, as shown on Table 1.

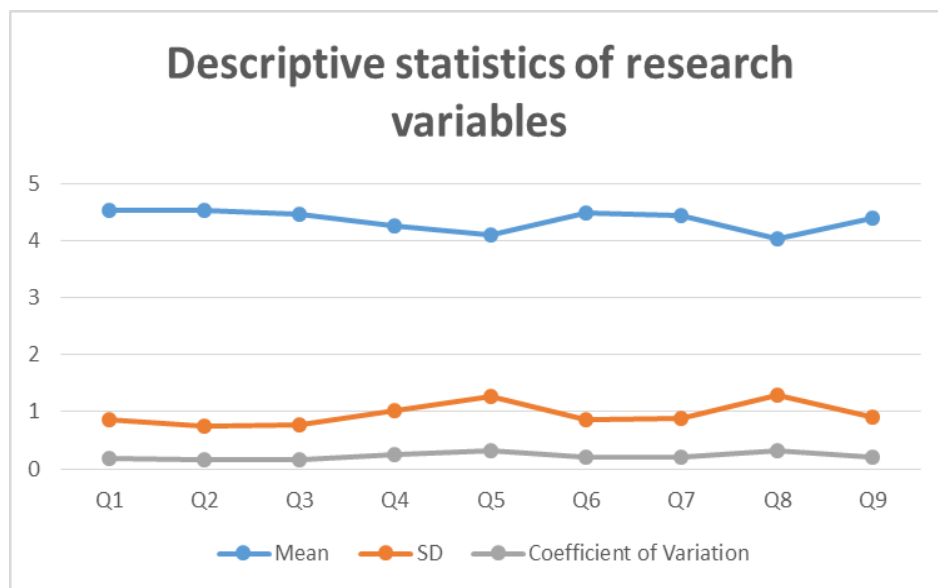
Table 1 Coefficient of Variations

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Mean	4.52	4.52	4.47	4.25	4.11	4.48	4.45	4.04	4.39
SD	0.86	0.75	0.76	1.02	1.27	0.87	0.89	1.28	0.90
Coefficient of Variation	19%	17%	17%	24%	31%	20%	20%	32%	21%

It is clear from the table that the dispersion rate in the sample is simple. The lowest dispersion is for questions 6 and 7 by 20% and the largest dispersion of question number 8 is 32%. Figure 5, shows that the trends in the sample of the research sample showed a general trend towards approving the importance of the program for students in mobile research, with an average calculation of 4.36 and a difference coefficient of (96%). (32%), (31%), (24%), (21%), (20%), (20%), (19%), (17%), and (17%), respectively.

The researcher concentrates on a major imposition test, in order to address the different dimensions of the research problem and its objectives, as follows: The main research hypothesis states "There is a positive effect of the KAU-tree system on the speed of access to the information and displays a suitable search results".

Figure 5, Descriptive statistics values



We use Coefficient of Determination (R^2) measure the impact of the effect of the hypothesis which is represented by the percentage of independent variables that occur in the values of the dependent variable. It has an influence impact for the regression model as its value approximates the correct one. In this context, we find that the coefficient of selection between the first question and the other questions in the order is 0.34, 0.42, 0.25, 0.32, 0.27, 0.39, 0.20, 0.12, and 0.49 respectively.

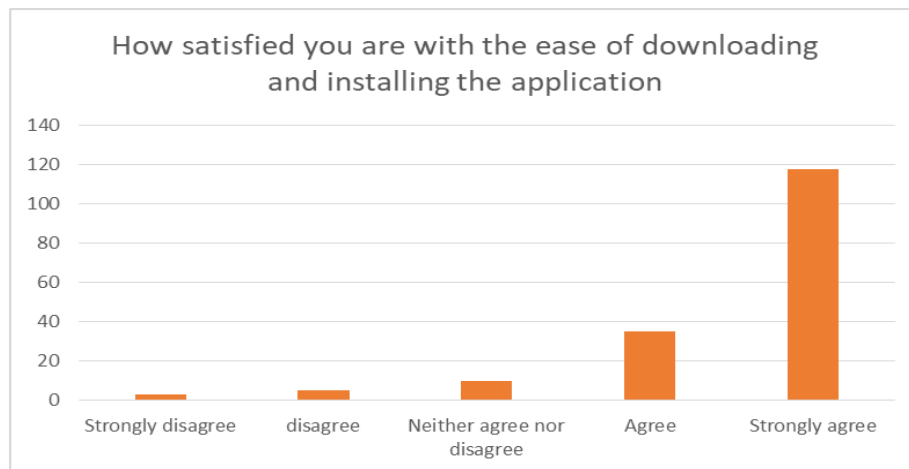


Figure 6 Downloading and installing the application

As shown in Figure 6, we can find that 69% of participants are strongly satisfied with the ease of downloading and installing the application, where around 5 % who were disagree.

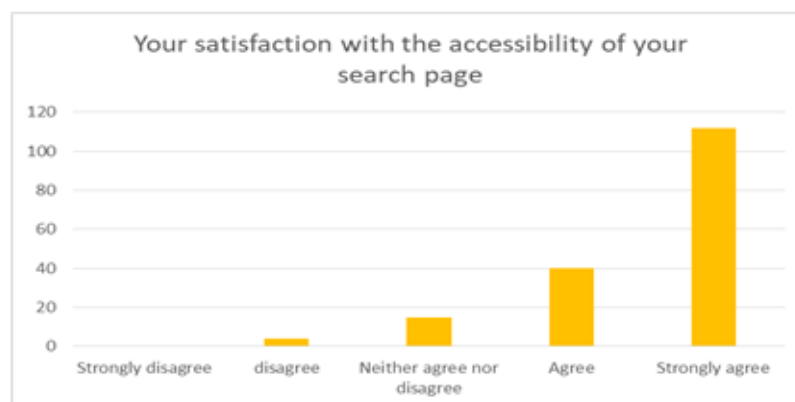


Figure 7 the accessibility of KAU-Tree

Figure 7, presents the satisfaction of participants to access the search page. Around 88% agree to they can access the search page at the KAU-Tree. Only 11% couldn't access the search page.

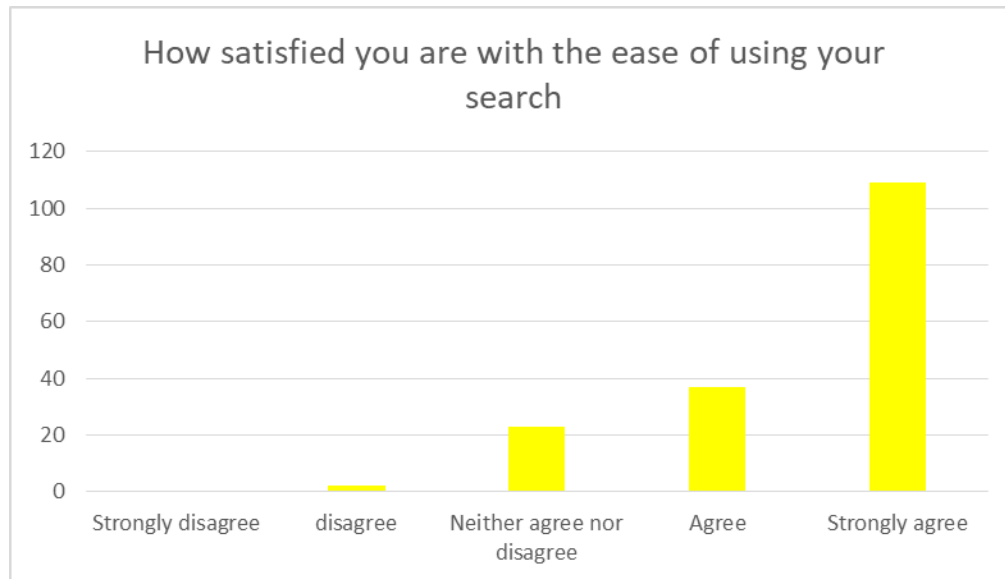


Figure 8 using Search at KAU-Tree

Around 86% of participants find that they can use the search item at KAU –tree easily, and around 1% they disagreed as shown in Figure 8.

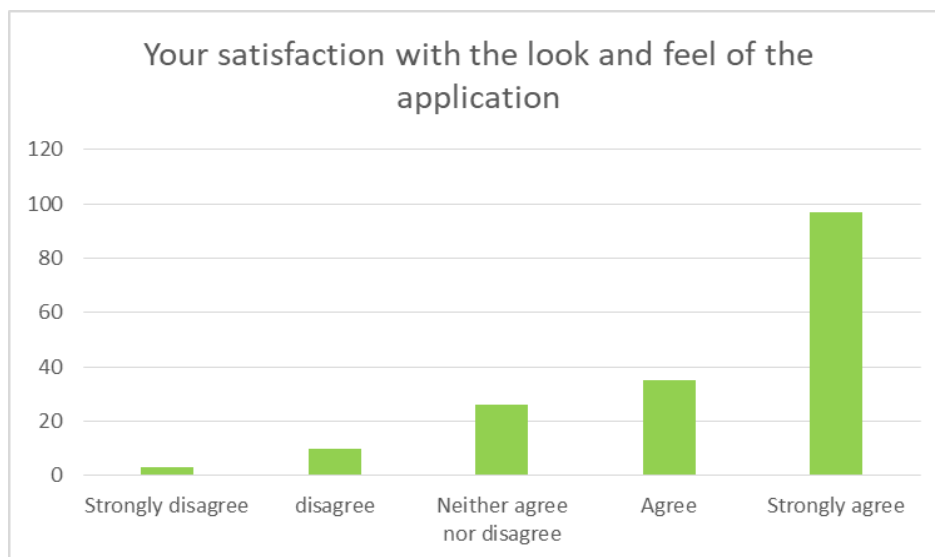


Figure 9 Look and file

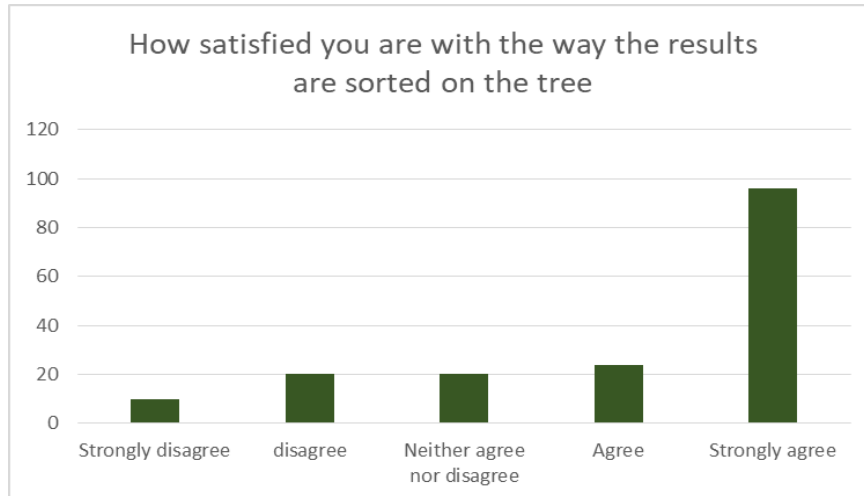


Figure 10 displaying the results

In Figure 10, most of the participants agree that they are satisfied with the look and feel of the application, however, around 8% who were not like the look of the application.

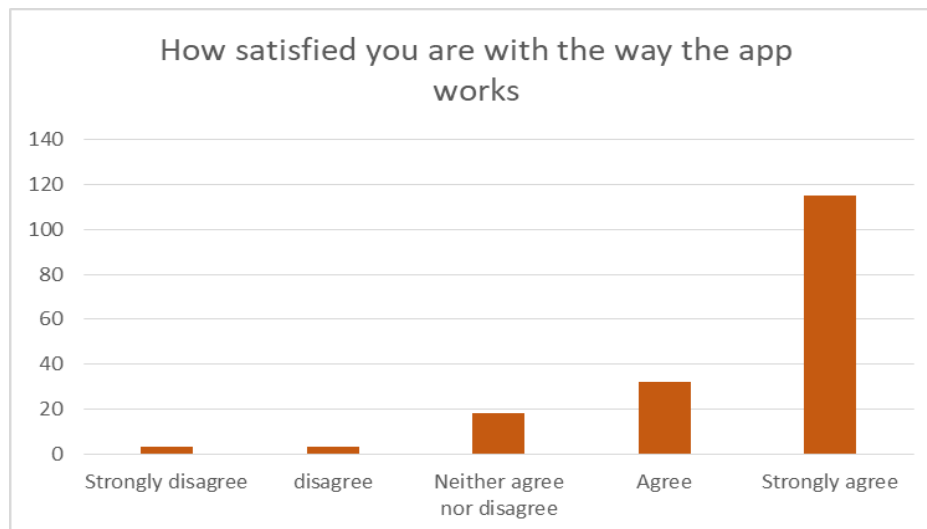


Figure 11 Satisfaction with KAU-tree methodology

In Figure 11, around 71% who have tested the search item were satisfied with the idea of displaying the results as a tree, however, results 14% of students were not satisfied.

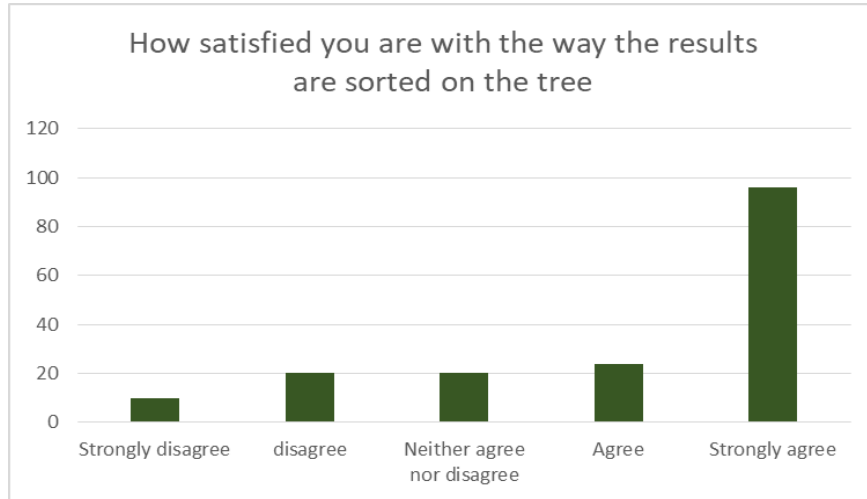


Figure 12 Sorting Results at KAU-Tree

As shown in Figure 12, 4 % only who are not satisfied with the methodology of KAU-Tree, and 86 % are satisfied. The total that agree for having a satisfaction with the KAU-tree is around is up to 70% and only 18% who were disagree.

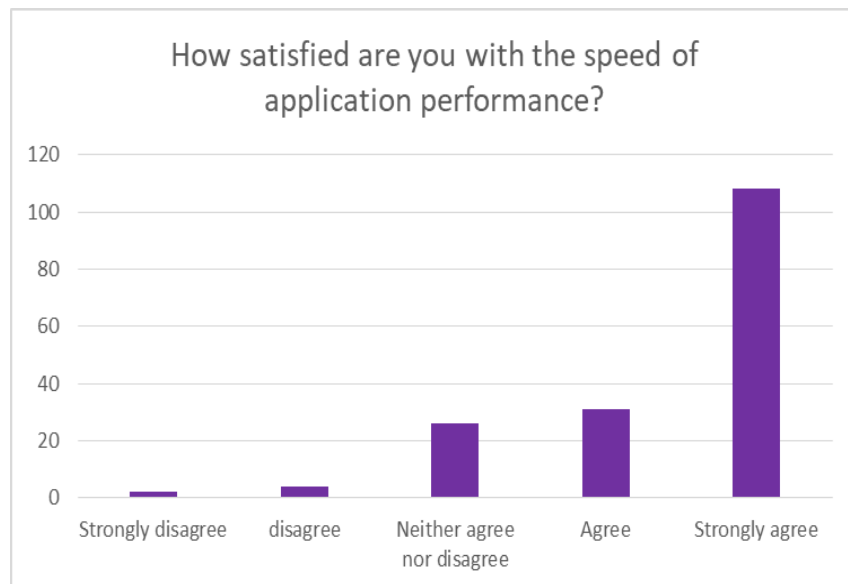


Figure 13 the performance of the application

As shown in Figure 13, around 71% who have tested the application were satisfied with its performance, however, 3% only who were not satisfied.

CONCLUSIONS AND RECOMMENDATION

In this research we present and develop tool to visualize digital library contents. The proposed system developed is called KAU-Tree which build network graphs a hierarchy tree to display the digital library content to represent research results. This technique enable students to easy search the internet with mobile limitations. Most of the participants see that the application has a good response with to display results, does not take up space on your phone, and allows access to different books in a simple way. They mentioned that the application is very nice and they enjoy it in their field, and also they get more book for other areas. They also mentioned that it is a mobile library with which you can access anytime, anywhere, and they like results displaying method as a tree.

However, some of the participants like the tree to presents the results, Most of them likes to modify the shape of the tree to overlap the result of the search results. They also asked to get an Arabic version the application so they can easily access it. In general, around 86% of participants find that they can use KAU-tree easily, and around 3% they disagreed. This results means that the application is satisfied what the student needs to search the Web looking for a book in their area.

References

1. Jin Jin; Gu Ming. XML based semantic knowledge presentation and intelligent searching engine. *Computer Engineering and Design*, 2007,(03): 668-709 8.
2. Kamada, T. Kawai, S. An Algorithm for Drawing General Undirected Graph [J]. *Information Processing Letter*, 1989, 31(1): 7-15
3. Li Hailiang; Wang Tao. Research and Implementation on Data Exchanging Models of XML Document and Relational Database . *Science Technology and Engineering*, 2008,8(16): 4522-4526 7.
4. Qiu Junping. On the Establishment of Knowledge Management Science. *The Journal of The Library Science In China*, 2005(3): 11-16
5. Stuart K. Card, Jock D. Mackinlay, and Ben Shneiderman. *Readings in information visualization: using vision to think*. Morgan Kaufmann Publishers Inc., 1999.

6. Wang Mingliang. Digital Library and Digital Study, Knowledge Management——Also Discuss the Design Ideal of “China Knowledge Resources Integral Databases” & “CNKI Grid Resources Sharing Platform”, “China Knowledge Network”. *New Technology of Library and Information Service*, 2004, (12): 1-6.
7. Zhou Ning, Gu Hongqun. Study on Full Text Retrieval Mechanism Based on Lucene/XML. *Knowledge of Library and Information Science*, 2005 (6): 75-77
8. Bertini E., Catarci T., Di Bello L., Kimani S. (2005) Visualization in Digital Libraries. In: Hemmje M., Niederée C., Risse T. (eds) *From Integrated Publication and Information Systems to Information and Knowledge Environments. Lecture Notes in Computer Science*, vol 3379. Springer, Berlin, Heidelberg.
9. Mayank Yuvaraj, (2017) "Infographics: tools for designing, visualizing data and storytelling in libraries", *Library Hi Tech News*, Vol. 34 Issue: 5, pp.6-9, <https://doi.org/10.1108/LHTN-01-2017-0004>.
10. Andrews K., Gutl C., Moser J., and Sabol V. Search result visualization with xFind, In *Proceedings of the International Workshop on User Interfaces to Data Intensive Systems* pages 50-58, 2001.
11. Hoeber O. and Yang X. D., The visual exploration of Web search results using HotMap, In *Proceedings of the International Conference on Information Visualization*, pages 157-165, 2006.
12. Paek T., Dumais S., and Logan R. WaveLens: A new view onto internet search results, In *Proceedings of the ACM Conference on Human Factors in Computing Systems*, pages 727-734, 2004.
13. Nizamee R. , Shojib A., visualizing the web search results with web search visualization using scatter plot. 978-1-4244-6359-6/10/\$26.00 ©2010 IEEE.
14. Nguyen T. N. and Zhang J. A novel visualization model for Web search results, *Journal of the IEEE Visualization and Computer Graphics*, 12(5), pages 981-988, 2006.
15. Theresa-Marie Rhyne, Adding a Visualization Feature to Web Search Engines: It’s Time, *IEEE Computer Graphics and Applications*, Published by the IEEE Computer Society 0272-1716/08, 2008