

**IN
REVIEW**



**IMPLEMENTASI ALGORITMA *KNUTH MORRIS PRATT* PADA
APLIKASI MAJALAH DINDING UNIVERSITAS MERCU BUANA
BERBASIS ANDROID (MADING UMB)**

TUGAS AKHIR

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PROGRAM STUDI TEKNIK INFORMATIKA
FAKULTAS ILMU KOMPUTER
UNIVERSITAS MERCU BUANA
JAKARTA
2021

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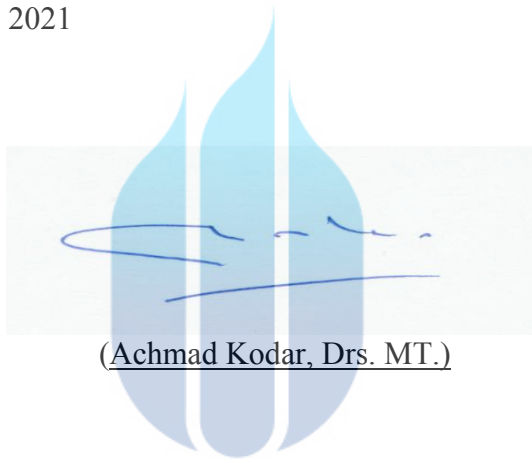
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ABSTRAK

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Universitas Mercu Buana memiliki majalah dinding yang berfungsi sebagai media penyampaian informasi kepada mahasiswanya. Sistem yang saat ini berjalan ketika siswa mencari informasi masih manual dengan mengunjungi informasi berupa poster yang ditempel di majalah dinding. Ini akan mencegah siswa mendapatkan informasi jika mereka tidak melihat majalah dinding. Dampak lainnya adalah peningkatan penggunaan kertas dan peningkatan jumlah sampah poster. Dengan membuat aplikasi Mading UMB berbasis android menggunakan algoritma Knuth Morris Pratt akan memudahkan mahasiswa dalam mencari informasi. Mesin pencari merupakan salah satu fitur bagi pengguna untuk dapat memasukkan kata kunci berdasarkan judul yang diharapkan dengan cepat. Penerapan algoritma Knuth Morris Pratt akan sangat membantu dalam kecepatan proses pencarian karena algoritma ini menggunakan pergeseran huruf dari kiri ke kanan berdasarkan pola yang diberikan oleh pengguna. Sistem ini akan membuat siswa menggunakan smartphone untuk mencari informasi yang dibutuhkan dengan cepat tanpa harus pergi ke majalah dinding dan mengurangi penggunaan kertas.

Kata kunci:

Android, Aplikasi, Majalah Dinding, Algoritma, Knuth Morris Pratt

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ABSTRACT

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Counsellor : Harni Kusniyati, M.Kom
Title : Implementation of Knuth Morris Pratt Algorithm in
Android-Based Mercu Buana University Wall
Magazine (MADING UMB)

Mercu Buana University have wall magazines which serves as a medium for delivering information to students. Current system that has been running when students look for information is still manual by visiting information in the form of posters affixed to the wall magazine. This will prevent students from getting information if they are not looking at the wall magazine. Another impact is an increase in paper use and an increase in the amount of waste from posters. By creating an Android-based Mading UMB application using Knuth Morris Pratt algorithm, it will make it easier for students to find information. The search engine is one of the features for users to be able to enter keywords based on the expected title quickly. The implementing of the Knuth Morris Prat algorithm will be very helpful in the speed of the search process because this algorithm uses a shift of letters from left to right based on a pattern given by the user. This system will make students use their smartphone to find the information they need quickly without having to go to the wall magazine and decreasing the amount of paper use.

Key words:

Android, Application, Wall Magazine, Algorithm, Knuth Morris Pratt

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KATA PENGANTAR

Puji syukur kita panjatkan kehadiran Allah SWT yang telah melimpahkan rahmat dan hidayah-Nya hingga penulis dapat menyelesaikan tugas akhir dengan judul “Implementasi Algoritma Knuth Morris Pratt Pada Aplikasi Majalah Dinding Universitas Mercu Buana (MADING UMB)”.

Oleh karena itu, penulis mengucapkan terima kasih kepada:

1. Orang tua saya yang selalu mendoakan dan mendukung sampai saya dapat menyelesaikan tugas akhir saya.
2. Ibu Harni Kusniyati M.Kom selaku Dosen Pembimbing Tugas Akhir yang telah bersedia meluangkan waktu untuk membantu dan membimbing dalam penulisan tugas akhir hingga selesainya tugas akhir ini.
3. Ibu Dr. Ir. Eliyani selaku Dosen Pembimbing Akademik yang selalu membimbing dan menasehati pencapaian akademik saya selama kuliah.
4. Ibu Dr. Devi Fitriana selaku Dosen Mata Kuliah Metodologi Penelitian saya yang telah memberikan ilmu terkait dengan penelitian yang saya lakukan.

Akhir kata, penulis berharap penelitian ini menjadi ilmu yang bermanfaat bagi kita semua serta saran dan kritiknya untuk pengembangan aplikasi ini selanjutnya.

Jakarta, 27 Januari 2021

Dimas Muhammad Daffa

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NASKAH JURNAL

Implementation of Knuth Morris Pratt Algorithm in Android-Based Mercu Buana University Wall Magazine (Mading UMB)

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Article Info	ABSTRACT
<p>Article history:</p> <p>Received January 29, 2021 Revised February 25, 2021 -</p> <hr/> <p>Keywords:</p> <p>Android Application Wall Magazine Algorithm Knuth Morris Pratt</p>	<p>Mercu Buana University has wall magazines that serves as a medium for delivering information to students. The current system that has been running when students look for information is still manual by visiting information in the form of posters affixed to the wall magazine. This will prevent students from getting information if they are not looking at the wall magazine. Another impact is an increase in paper use and an increase in the amount of waste from posters. By creating an Android-based Mading UMB application using Knuth Morris Pratt algorithm, it will make it easier for students to find information. The search engine is one of the features for users to be able to enter keywords based on the expected title quickly. The implementation of the Knuth Morris Prat algorithm will be very helpful in the speed of the search process because this algorithm uses a shift of letters from left to right based on a pattern given by the user. This system will make students use their smartphones to find the information they need quickly without having to go to the wall magazine and decreasing the amount of paper use.</p>
<hr/> <p>Corresponding Author:</p> <p>Dimas Muhammad Daffa, Faculty of Computer Science, Mercu Buana University, Jl. Meruya Selatan NO.1, RT.4/RW.1, Meruya Selatan, Kembangan, Jakarta Barat, Indonesia Email: 41517010023@student.mercubuana.ac.id</p> <hr/>	

1. INTRODUCTION

Changes in the world are now entering the era of the industrial revolution 4.0 or the fourth world industrial revolution in which information technology has become the basis of human life [1]. Along with the times and the era of globalization which is marked by the rapid use of products and the use of technology, these technological developments have made it easier for humans to carry out all their daily activities [2]. Current technological developments also occur in smartphones which are increasingly sophisticated and now many people are using smartphones [3]. The massive use of android in everyday life can be used to help disseminate and provide information to students. This also can be one of the useful facilities to provide and convey important information quickly that is given by campus.

Android is a software platform as well as a kernel-based operating system Linux. The first time this platform was developed by Android Inc. founded by Andy Rubin. Initially, the company developed an operating system for digital cameras, before realizing that the digital camera market

was not very large, and eventually switched its operating system to smartphones. Currently, Android is developed by Google and the Open Handset Alliance with the Android Open Source Project (AOSP). Its open-source nature makes Android flexible to be developed by developers from all over the world [4].

Mercu Buana University is one of the universities in Indonesia which has several branches, namely Meruya, Menteng, Depok, Bekasi, and Yogyakarta. Mercu Buana University which is located in *Meruya* is the center of the University. Mercu Buana University is one of the best universities in Indonesia. From this predicate, one of the supporting factors is the activeness of students in carrying out activities from campus. This activity can be obtained from the information provided by the campus and organizations to students, one of which is the media poster posted on the wall magazine.

Wall magazine is one of the communication media as well as written mass information, the presentation of which is usually displayed on wall media or the like [5]. It is called a wall magazine because it is presented on the wall. The visual presentation of wall magazine can be seen in a form of written, picture, or the combination of both [6]. This system provides information about academic and non-academic activities related to campus which are considered less efficient and effective. This is due to the laziness of students in viewing and reading information on wall magazines. In addition, this system also results in excessive paper use and an increase in the amount of waste caused by posters falling from wall magazines.

Seeing the above phenomenon, the idea was created to create an Android-Based wall magazine application. MADING UMB was made to make it easier for students to get information from smartphones. One of the search engine features in the application helps students find the information they need quickly. Using the Knuth Morris Pratt algorithm on this search engine will make searches faster and more effective. The KMP algorithm is a search algorithm developed from the Brute Force search algorithm. This algorithm has the advantage of finding matches on large files. The KMP algorithm searches for text based on the order from left to right at the beginning of the text then shifts the word order to the end of the text [7]. Unlike the Brute Force algorithm which performs string matching with shifts one by one character, the KMP algorithm is able to perform better shift matching [8]. Therefore, in this study, the researcher tried to use the Knuth-Morris-Pratt (KMP) algorithm to analyze how the resulting string matching process was generated and to compare the extent to which the similarity value of several of the same and similar titles could provide effective information for students [9].

2. METHOD

This study is using Knuth Morris Pratt algorithm for its search engine. We can see the process flow in Figure 1. In this study, the data collection was taken from many posters at wall magazines on campus and announcements from social media. Knuth Morris Pratt algorithm is used to assist the title search process using a shift of letters from left to right based on a pattern given by the user. The Knuth-Morris-Pratt algorithm is done by first calculating the fringe function of the pattern, then a comparison will be made between the pattern and the first sentence element, if it is not suitable then the comparison will not be made on the second element, but depends on the value that will be issued by the function [10]. The more data collected, the search process will be more effective.

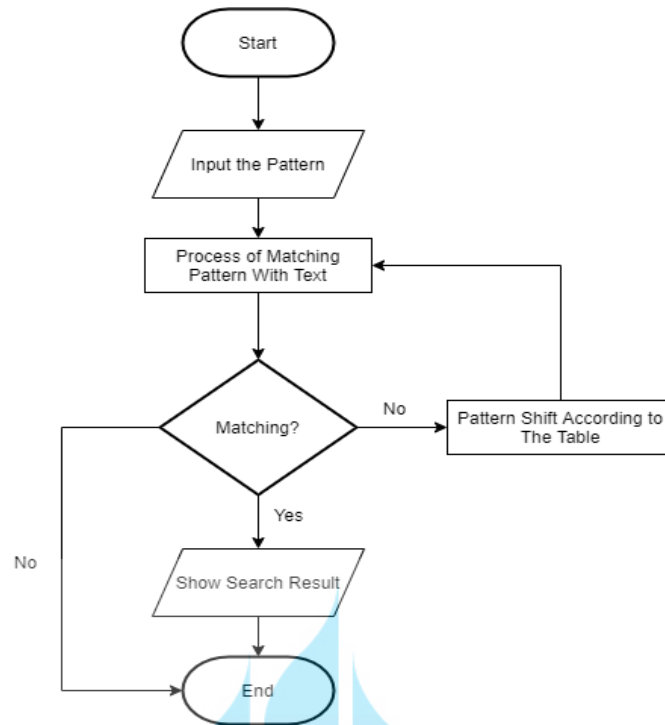


Figure 1. Flowchart of Algorithm

Figure 1 is a process flow of the Knuth Morris Pratt algorithm. This process begins by entering the pattern to be searched for. The pattern will do the matching pattern processing with text. If the pattern matches with the text, then the process will show the result. If the pattern does not match with the text, then the pattern will shift according to the table. The process will not show the result if the pattern does not match with the text and cannot shift the letters. In this case, the pattern does not exist.

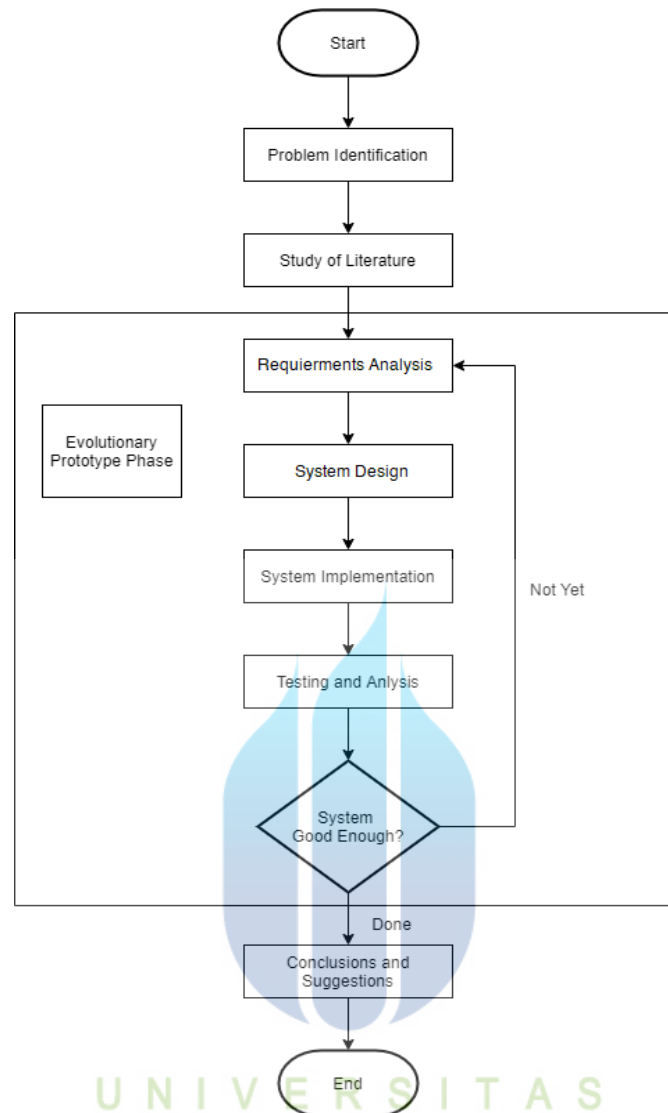


Figure 2. Research Procedure using Evolutionary Prototype

The prototype is a system development technique that uses a prototype to describe the system so that the user or system owner has an overview of the system development that will be carried out. This technique is commonly used when the system owner does not really control the system you are developing, so you need an overview of the system you are developing [11]. Figure 2 shows the flowchart that describes the research procedure using the evolutionary prototype.

The research procedure will begin with the process of problem identification. This first phase will identify the problems within the scope of the case study, namely Mercu Buana University. From the identification results, there are several problems are focused on one problem. Then these problems will be the basis for looking for needs in developing software. The second phase is the study of literature that is used to find references to support research related to evolutionary prototypes and the Knuth Morris Pratt Algorithm. The third phase is the evolutionary prototype. The third phase is the phase where the application begins to be developed in accordance with the evolutionary prototype approach used. All of these stages will repeat if stakeholders have new desires during system development, as follows : [12]

1. Requirements Analysis, is the phase of extracting requirements in accordance with the scope of the problems that have been identified. Requirements analysis can be done over and over in accordance with the development of the prototype system. The results will be obtained identification and specification of requirements.

2. System Design, is carried out after requirements are obtained and this phase can be repeated according to additions or changes to requirements.
3. System implementation, can be done in conjunction with the design and can also be done after the design is complete. This phase will repeat if the design changes.
4. Testing and analysis, the results of the implementation are tested and the results are analyzed. The completed prototype system is then shown to stakeholders for further evaluation and discussion for additional functional development, but if there are no functional additions or changes, the prototype system can be called a system.

The last phase in this research is making conclusions and suggestions. This phase is the last phase where conclusions and suggestions will be drawn that will be useful in considering further developments [12].

3. RESULTS AND DISCUSSION

Mercu Buana University wall magazine application is designed like a wall magazine in general that we can get on an android smartphone. The design will be done using Android Studio and Firebase as the database. An adding an algorithm by Knuth Morris Pratt. This algorithm will be used as an alternative to get relevant results in accordance with the title of the wall magazine.

Android studio is an IDE (Integrated Development Environment) official for Android application development and is open source or free. This Android Studio launch was announced by Google on May 16, 2013 on Google I / O Conference event for 2013. Since then, Android Studio has replaced Eclipse as the official IDE for developing applications Android [13]. Android Studio is used as a means of annihilation with a written script Knuth Morris Pratt algorithm in the search process data.

Firebase is considered a web application platform. It helps developers create high-quality apps. It stores data in JavaScript Object Notation (JSON) Format which requests don't use to enter, update, delete or add data to it. This backend of the system is used as a database to store data [14].

3.1. Implementing Knuth Morris Pratt Algorithm

Mercu Buana University wall magazine application was designed using the Knuth Morris Pratt algorithm to assist the search for wall magazine titles. In this Mercu Buana University wall magazine application, there will be a lot of news delivered by the campus and from students who make the news unable to display all of them because of the limitations of the screens of mobile devices such as smartphones.

Therefore, in this Mercu Buana University wall magazine application, it is hoped that the Knuth Morris Pratt algorithm can solve this problem. The word search process by applying the algorithm used is important in making the Mercu Buana University wall magazine application because the process is an important part of using the Mercu Buana University wall magazine application.

Shift calculation in the Knuth Morris Prat algorithm is as follows, if there is a mismatch when the pattern is parallel to the text, then you can assume the first mismatch occurs between the text and the pattern. Then continue shifting to the right of one of the characters so that the pattern is aligned with the text [15].

Example

Text: JADWAL PENGAMBILAN JAKET ALMAMATER

Pattern: PENGAMBILAN

Solution:

Phase 1																																			
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R	
Pattern	P	E	N	G	A	M	B	I	L	A	N																								
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	

Explanation 1: Pattern 1 does not match Text 0, it will be shift one character to the right to the next index.

Phase 2																																			
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R	
Pattern		P	E	N	G	A	M	B	I	L	A	N																							
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	

Explanation 2: Pattern 1 does not match Text 1, it will be shift one character to the right to the next index.

Phase 3																																			
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R	
Pattern			P	E	N	G	A	M	B	I	L	A	N																						
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	

Explanation 3: Pattern 1 does not match Text 2, it will be shift one character to the right to the next index.

Phase 4																																				
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R		
Pattern				P	E	N	G	A	M	B	I	L	A	N																						
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33		

Explanation 4: Pattern 1 does not match Text 3, it will be shift one character to the right to the next index.

Phase 5																																				
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R		
Pattern					P	E	N	G	A	M	B	I	L	A	N																					
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33		

Explanation 5: Pattern 1 does not match Text 4, it will be shift one character to the right to the next index.

Phase 6																																					
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R			
Pattern						P	E	N	G	A	M	B	I	L	A	N																					
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			

Explanation 6: Pattern 1 does not match Text 5, it will be shift one character to the right to the next index.

Phase 7																																					
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R			
Pattern							P	E	N	G	A	M	B	I	L	A	N																				
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			

Explanation 7: Pattern 1 does not match Text 6, it will be shift one character to the right to the next index.

Phase 8																																					
Text	J	A	D	W	A	L		P	E	N	G	A	M	B	I	L	A	N		J	A	K	E	T		A	L	M	A	M	A	T	E	R			
Pattern								P	E	N	G	A	M	B	I	L	A	N																			
Index	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			

Explanation 8: Pattern 1 to Pattern 11 matches Text 7 to Text 17. Found pattern at index 7 and there is no more shifting character.

3.2. Program Implementation

Following are the results of the implementation of the program that has been designed:

1. Home Menu

This menu displays a list of wall magazines that have been added by previous users. To display the list, Recyclerview and Cardview are used as displays. The figure for the home menu display can be seen in Figure 3.

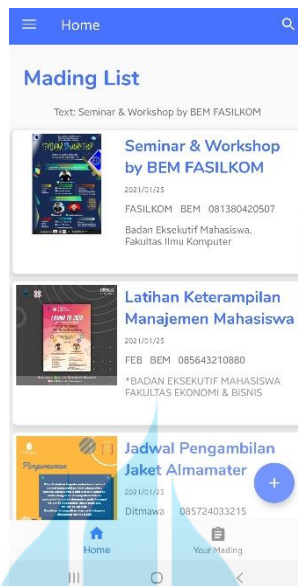


Figure 3. Home Menu

2. Search Display

This feature is used to search the title of the wall magazines that have been added by the previous user. Figure 4. displays search results with the help of the Knuth Morris Pratt algorithm. The figure for the search display can be seen in Figure 4.

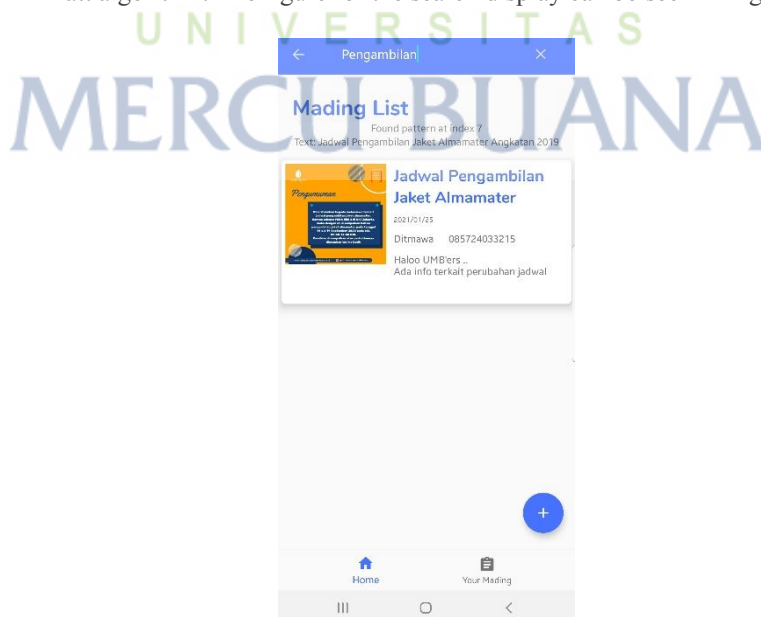


Figure 4. Search Display

3. Detail Menu

Users can open wall magazines that have been searched and view the details. This menu contains specific information from the wall magazine and can display posters added by the user. The figure for the home menu display can be seen in Figure 5.



Figure 5. Detail Menu

4. CONCLUSION

Based on these results, it can be concluded that this application can make it easier for students to get fast and actual information. This application also helps reduce the use of paper used to make posters. Knuth Morris Pratt algorithm is applied to the Mercu Buana University wall magazine application so that it can make it easier for users to find the information needed based on the title of the wall magazine.

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KERTAS KERJA

Ringkasan

Peneliti menulis penelitian yang berisi material kelengkapan dari artikel jurnal dengan judul Implementasi Algoritma Knuth Morris Pratt Pada Aplikasi Majalah Dinding Universitas Mercu Buana (MADING UMB) yang tidak dapat dimuat atau disertakan pada artikel jurnal.

Di dalam penelitian ini berisi perancangan model *Unified Modeling Language*, model pengembangan perangkat lunak yang bernama *Evolutionary Prototype*, pengujian aplikasi menggunakan *Blackbox* testing beserta penjelasannya serta hasil dari implementasi perancangan database maupun perancangan *user-interface* aplikasi berbasis android. Penulis juga menulis langkah-langkah serta eksperimen algoritma *Knuth Morris Pratt* pada aplikasi berbasis android yang dibangun yaitu Aplikasi Majalah Dinding Universitas Mercu Buana Berbasis Android (MADING UMB).

