

INTUITIVE CONTENT MANAGEMENT  
SYSTEM VIA MANIPULATION AND  
DUPLICATION WITH IF-ELSE RULES  
CLASSIFICATION

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## **SUPERVISOR'S DECLARATION**

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Science

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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## ABSTRACT

A Content Management System (CMS) is a system that is used to control or manage content on a website such as text, links, image, HTML documents, and other forms of media. The fact that CMS is dynamically generated is a problem on pages loading speed which is currently used in Drupal, Joomla, WordPress, and Agility CMS. However, static websites load faster than dynamic ones, since the content is delivered as-is and can be cached by a content delivery network (CDN), and the web server does not need to perform any application logic or database queries. In order to solve this problem, an Intuitive Content Management System (ICMS) is proposed in this study. The aim of ICMS is to help non-technical users to design their website easily. Users will need to choose the content from templates, upload images directly, and fill in necessary documents to create a quick, easy, and static website which can reduce load time from dynamic website. An ICMS is a content management system that uses three main important techniques to build, such as Manipulation method, Data Mining Prediction, and Boyer-Moore Horspool algorithm. The manipulation method is a method that can easily generate a website and store the information precisely in a correct order with buffering method. A buffering method will be implemented after the generation of website, in order to transform dynamic website into static website. Therefore, a static website is created which load faster than dynamic website. An ICMS needs to use data mining classification to accurately classify stored data while predicting the user's database information to give the best preferences and suitable template chosen for an end user to select. The time consumed for choosing a template will decrease as an example of giving the user 5 templates to choose from out of 100. As a result, it can minimize the workload of choosing a template and the time consumed which come from preferences of 5 recommendation which are 20 times faster than before. Boyer-Moore Horspool algorithm is adapted in ICMS which is mainly for faster searching result. As a result, ICMS can transform dynamic websites into static websites with faster load speed using manipulation method mixed with data mining classification prediction and Boyer-Moore Horspool algorithm which can be classified, edited, adjustable and searched more precisely. An ICMS makes things easy for any small business or personal business to create, manage, and publish interactive observations to interpret their own websites, which also support mobile platform browsers.

## ABSTRAK

Sistem Pengurusan Kandungan (CMS) merupakan satu sistem yang digunakan untuk mengawal atau mengurus kandungan di laman web seperti teks, pautan, imej, dokumen HTML, dan bentuk media lain. Apabila CMS dihasilkan secara dinamik, ia merupakan satu masalah dalam kelajuan memuat turun laman web seperti Drupal, Joomla, WordPress, dan Agility CMS. Walau bagaimanapun, laman web statik memuat lebih pantas daripada yang dinamik, ia kerana kandungan boleh dihantarkan sebagai cache dalam bentuk content delivery network (CDN). Ini boleh menyebabkan laman web tidak perlu melakukan sebarang pertanyaan logik aplikasi atau pangkalan data. Sebagai penyelesaian masalah ini, Sistem Pengurusan Kandungan Secara Intuitif (ICMS) dicadangkan dalam kajian ini. Tujuan ICMS ini adalah untuk membantu pengguna bukan teknikal untuk mereka bentuk laman web mereka dengan lebih mudah. Pengguna-pengguna hanya perlu memilih kandungan dari templat, memuat naikan gambar secara langsung, dan mengisi dokumen yang diperlukan untuk membuat laman web yang cepat, mudah, dan secara statik boleh mengurangkan masa memuat turun lebih pantas dari laman web dinamik. ICMS adalah sistem pengurusan kandungan yang menggunakan tiga teknik utama seperti kaedah Manipulasi, Prediksi Data Mining, dan algoritma Boyer-Moore Horspool. Kaedah manipulasi adalah satu kaedah yang dapat menjana laman web dan menyimpan maklumat dengan tepat dalam susunan yang betul dengan kaedah penimbunan. Kaedah penimbunan akan dilaksanakan selepas penubuhan laman web, untuk pengubahan laman web dinamik kepada laman web statik. Oleh itu, laman web statik melayari lebih cepat daripada laman web dinamik. ICMS perlu menggunakan klasifikasi Data Mining untuk mengklasifikasikan data yang disimpan dengan tepat dan meramalkan maklumat pangkalan data pengguna untuk memberikan pilihan terbaik dan templat yang sesuai dipilih untuk pengguna pilihan. Masa yang digunakan untuk memilih templat akan berkurangan. Sebagai contoh, ia memberi pengguna lima template untuk dipilih dari seratus. Hasilnya, ia dapat mengurangkan beban kerja memilih templat dan masa yang digunakan dari pilihan 5 cadangan menimbul 20 kali kanda lebih pantas dari sebelumnya. Algoritma Boyer-Moore Horspool disesuaikan dalam ICMS yang terutama untuk menghasilkan pencarian lebih pantas. Akibatnya, ICMS boleh mengubah laman web dinamik ke laman web statik dengan kelajuan beban lebih cepat dalam penggunaan kaedah manipulasi yang bercampur dengan ramalan klasifikasi data mining dan algoritma Boyer-Moore Horspool yang boleh diklasifikasikan, diubahsuai, diselaraskan dan carian lebih tepat. ICMS memudahkan semua perniagaan kecil atau perniagaan peribadi untuk membuat, mengurus, dan menerbitkan pemerhatian interaktif dalam pentafsir laman web mereka sendiri, dan juga menyokong pelayar platform lebih mudah alih.

## TABLE OF CONTENT

<b>DECLARATION</b>	
<b>TITLE PAGE</b>	
<b>ACKNOWLEDGEMENTS</b>	<b>ii</b>
<b>ABSTRACT</b>	<b>iii</b>
<b>ABSTRAK</b>	<b>iv</b>
<b>TABLE OF CONTENT</b>	<b>v</b>
<b>LIST OF TABLES</b>	<b>x</b>
<b>LIST OF FIGURES</b>	<b>xi</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xii</b>
<b>CHAPTER 1 INTRODUCTION</b>	<b>1</b>
1.1 Overview	1
1.2 Background of Problem	1
1.3 Problem Definition	2
1.4 Objective of Research	3
1.5 Scope of Research	3
1.6 Thesis Organization	3
<b>CHAPTER 2 LITERATURE REVIEW</b>	<b>5</b>
2.1 Review of Present CMS Services	5
2.1.1 Introduction	5
2.1.2 Drupal	5
2.1.3 Overview of Drupal	6
2.1.4 Advantages of Drupal	7



2.1.5	Limitations of Drupal	8
2.1.6	Joomla	8
2.1.7	Overview of Joomla	9
2.1.8	Advantages of Joomla	9
2.1.9	Limitations of Joomla	10
2.1.10	WordPress	10
2.1.11	Overview of WordPress	11
2.1.12	Advantages of WordPress	11
2.1.13	Limitation of WordPress	12
2.1.14	Cloud Based CMS	12
2.1.15	WIX (Web Index)	13
2.1.16	Introduction of WIX	13
2.1.17	Generation of WIX	13
2.1.18	Advantages of WIX	14
2.1.19	Disadvantages of WIX	14
2.1.20	Conclusion of WIX	14
2.1.21	Software as a Service (SaaS)	15
2.1.22	Shopify	15
2.1.23	Overview of Shopify	15
2.1.24	Advantages of Shopify	16
2.1.25	Limitation of Shopify	17
2.1.26	Agility CMS	18
2.1.27	Overview of Agility CMS	18
2.1.28	Generation of Agility CMS	19
2.1.29	Advantages of Agility CMS	19
2.1.30	Limitation of Agility CMS	19

2.1.31	Comparison of Joomla, Drupal, WordPress, Shopify, Agility CMS, WIX, Research CMS	20
2.2	Data Mining	22
2.2.1	Introduction	22
2.2.2	Advantages of Data Mining	22
2.2.3	Data Mining Classification	23
2.2.4	Rule Prediction	23
2.2.5	Neural Network	24
2.2.6	Ant Colony	25
2.2.7	Clustering Data Mining	26
2.2.8	Introduction of Clustering Data Mining	26
2.2.9	Clustering Methods Overview	26
2.2.10	Possible Applications	27
2.2.11	Classification VS Clustering	27
2.3	Searching Algorithms	28
2.3.1	Introduction of Searching Algorithms	28
2.3.2	Boyer-Moore Algorithm	29
2.3.3	Brute-Force Algorithm	30
2.3.4	Boyer-Moore Horspool Algorithm	30
2.3.5	Knuth-Morris-Pratt Algorithm (KMP)	30
2.3.6	Rabin-Karp Algorithm (RK)	31
2.3.7	Comparison Graph of Fast Searching Algorithm	32
2.3.8	Pros and Cons of Fast Searching Method	33
2.3.9	Conclusion of Searching Method	34
	<b>CHAPTER 3 METHODOLOGY</b>	<b>36</b>

3.1	Operational Framework	36
3.2	Plan, Problem Structuring	36
3.2.1	Module 1 – Problem Definition	36
3.2.2	Module 2 – Resources Gathering	37
3.2.3	Module 3 – Interview & Survey Findings	37
3.2.4	Module 4 – Developing Architecture and Structure of the System	39
3.2.5	Module 5 – Developing Structure Database	39
3.2.6	Module 6 – Projects: Experiment, Error Checking, Solving, and Executing	40
3.3	Flow Chart Explanation	40
3.3.1	Administrator Module	40
3.3.2	Entrepreneur Module	43
3.3.3	User Module	45
3.4	Use Case Diagram of System	46
3.4.1	Use Case Module and User Requirements	46
<b>CHAPTER 4 RESULTS VERIFICATION AND VALIDATION OF ICMS</b>		<b>51</b>
4.1	Verification	51
4.2	Validation	53
4.3	Process Flow of Manipulation and Duplication Process Backend	56
4.4	Preprocess of Data Mining	58
4.5	Fast Searching Comparison	62
<b>CHAPTER 5 CONCLUSION AND FUTURE WORKS</b>		<b>63</b>
5.1	Conclusion	63
5.2	Limitation	63
5.3	Future Work	64

<b>REFERENCES</b>	<b>65</b>
<b>APPENDIX A SURVEY DATA</b>	<b>72</b>
<b>APPENDIX B LIST OF PUBLICATION</b>	<b>74</b>

## LIST OF TABLES

Table 2.1	Comparison of Joomla, Drupal, Wordpress, Shopify, Agility CMS, Wix, Research CMS	21
Table 2.2	Comparison of Between Classification And Clustering	28
Table 2.3	Advantages and Disadvantages Searching Method	34
Table 4.1	Performance Comparison for existing CMs and Research ICMS	52
Table 4.2	Table of Colour Preference Template and Job Categories	58
Table 4.3	Table of Colour Preferences Template against Age	59

## LIST OF FIGURES

Figure 2.1	Drupal System	6
Figure 2.2	Drupal Dashboard	7
Figure 2.3	Rule Prediction	23
Figure 2.4	Shift in the Knuth-Morris-Pratt algorithm (v border of 'u' and 'c' neq 'b')	31
Figure 2.5	Comparison Graph of Fast Search Algorithm	33
Figure 3.1	Operation Framework for ICMS project	36
Figure 3.2	Administrator Module	42
Figure 3.3	Entrepreneur Module	44
Figure 3.4	User Module	45
Figure 3.5	Entrepreneur Information Set Up	46
Figure 3.6	Entrepreneur Functional and Template Set up	47
Figure 3.7	Entrepreneur Product Setup	47
Figure 3.8	User, Entrepreneur and Administrator	48
Figure 3.9	Use Case Diagram of System	49
Figure 4.1	Verification hypothesis	51
Figure 4.2	Validation Steps	53
Figure 4.3	Pseudocode of Manipulation Process	54
Figure 4.4	Database of Entrepreneur	55
Figure 4.5	Process Flow of Manipulation and Duplication	57
Figure 4.6	Colour Preferences Template vs Job Categories	58
Figure 4.7	Colour Preferences Template against Age	59
Figure 4.8	Pseudocode of creating preference template	60
Figure 4.9	Comparison Elapsed for Searching algorithms	61

## **LIST OF ABBREVIATIONS**

CMS	Content Management System
ICMS	Intuitive Content Management System
PHP	Hypertext Pre-processor
CSS	Cascading Style Sheets
HTML	Hypertext Mark-up Language
XHTML	Extensible Hyper Text Markup Language
URL	Universal Resource Locator
MYSQL	My Structured Query Language
POSTGRESQL	Postgres Structured Query Language
SAAS	Software as a Service

## REFERENCES

- Abdulwahid, A. A. (2015) Drupal Content Management System.
- Arumugam, J. (2016). Drupal: An Emerging Content Management System For Libraries. *Journal of Library, Information and Communication Technology*, 7(1-2), 11.
- Awad, H. A. (2014). Cloud Computing as an Operational Model for ERP Services: Definitions and Challenges. *International Journal of Innovation and Applied Studies*, 8(2), 499.
- Boyer, R. S., & Moore, J. S. (1977). A Fast String Searching Algorithm. *Communications of the ACM*, 20(10), 762-772.
- Chakrabarti, S., Ester, M., Fayyad, U., Gehrke, J., Han, J., Morishita, S., ... & Wang, W. (2006). Data Mining Curriculum: A Proposal (Version 1.0). *Intensive Working Group of ACM SIGKDD Curriculum Committee*, 140.
- Chen, J., Cai, S., Zhu, L., Guo, Y., Huang, R., Zhao, X., & Sheng Y.,(2016). An Improved String-Searching Algorithm and Its Application In Component Security Testing. *Tsinghua Science and Technology*, 21(3), 281-294.
- Clifton, C. (2017). Encyclopædia britannica: Definition of Data Mining. *Britannica.com*. Retrieved from <https://www.britannica.com/technology/data-mining>.
- Crashin, S., Usoni, R., & Chandler, A. (2015). Data Mining Methods: Strategies and Algorithms on Different Applications. *Journal of Mechatronics*, 3(1), 37-48.



- Dorigo, M., Maniezzom V., and Colorni, A. (1996). Ant System: Optimization by a Colony of Cooperating Agents. *IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics)*, 26(1), 29-41.
- Fayyad, U., Piatetsky-Shapiro, G., & Smyth, P. (1996). From Data Mining to Knowledge Discovery in Databases. *AI Magazine*, 17(3), 37.
- Fitzpatrick, C. (2010). Improving Product-Market Fit by Engaging an Open Source Community. *Open Source Business Resource*, July 2010.
- George, N. (2015). Beginning Django CMS: Your Blog Website: Templates, *Apress*, 45-49.
- Han, J., & Kamber, M. (2000). Data Mining: Concepts and Techniques. *The Morgan Kaufmann Series in data management systems*, 327-400.
- Han, J., Pei, J., & Kamber, M. (2011). Data Mining: Concepts and Techniques. *Elsevier*, 327-450.
- Hastie, T., Tibshirani, R., & Friedman, J. (2009). Unsupervised Learning: In The Elements of Statistical Learning. *Springer New York*, 485-585.
- Itani, W.; Kayssi, A.; Chehab, A., (2009) Privacy as a Service: Privacy-Aware Data Storage and Processing in Cloud Computing Architectures in Dependable, Autonomic and Secure Computing. *Proceedings of the 8th IEEE International Conference on Dependable, Autonomic and Secure Computing, Dec 2009*, 711-716.
- Jabeen, H., & Baig, A. R. (2013). Two-stage Learning for Multi-Class Classification Using Genetic Programming. *Neurocomputing*, 116, 311-316.

- Jacobson, L., & Kanber, B. (2015). Introduction In Genetic Algorithms in Java Basics. *Apress*, 1-19.
- John, S. (2014). 55+ Best Responsive Blogger Templates for 2015. *Designssave.com*. Retrieved from <https://designssave.com/best-responsive-blogger-templates.html>.
- Karp, R. M., & Rabin, M. O. (1987). Efficient Randomized Pattern-Matching Algorithms. *IBM Journal of Research and Development*, 31(2), 249-260.
- Kozielski, M., Doetsch, P., & Ney, H. (2013). Improvements in RWTH's System for Off-line Handwriting Recognition. *Proceedings of the 12th International Conference on Document Analysis and Recognition (ICDAR), 2013*, 935-939.
- Kriegel, Hans-Peter; Kröger, Peer; Sander, Jörg & Zimek, Arthur (2011). Density-Based Clustering. *WIREs Data Mining and Knowledge Discovery*. 1(3): 231–240.
- Kulekci, M. O. (2007). Tara: An Algorithm for Fast Searching of Multiple Patterns on Text Files. *Computer and Information Sciences, 2007, 22nd International Symposium on IEEE*, 1-6.
- Langdon, W. B., & Poli, R. (2013). Foundations of Genetic Programming. *Springer Science & Business Media*.
- Larkin, M. (2014). Getting Started with Shopify. *Shopify Application Development Build Highly Effective Shopify Apps Using the Powerful Ruby on Rails Framework*, 6.
- Larose, D. T. (2014). Discovering Knowledge in Data: An Introduction to Data Mining. *John Wiley & Sons*, 10-15.
- Lynn Beighley, Seamus Bellamy (2011). *Drupal For Dummies, 2nd Edition*, 02, 5-8.

- Mandumula, K. K. (2011). Knuth-Morris-Pratt Algorithm. *Poslední zmena*, 18.
- Martynov, M., & Novikov, B. (1996). An Indexing Algorithm for Text Retrieval. *ADBIS*, 171-175.
- Moh'd Mhashi, M., & Alwakeel, M. (2010). New Enhanced Exact String Searching Algorithm. *Proceeding of the 1st International Journal of Computer Science and Network Security (IJCSNS)*, 10(4), 193.
- Mohammad, A., Saleh, O., & Abdeen, R. A. (2006). Occurrences Algorithm for String Searching Based on Brute-force Algorithm. *Journal of Computer Science*, 2(1), 82-85.
- Nathalie Japkowicz and Mohak Shah. (2011). Evaluating Learning Algorithms: A Classification Perspective. *Cambridge University Press, New York, NY, USA*, 191-195.
- Nickerson, R. C., Varshney, U., & Muntermann, J. (2013). A Method for Taxonomy Development and its Application in Information Systems. *European Journal of Information Systems*, 22(3), 336-359.
- Niraj Singhal, Tanmeya Mohan, Subham Sarkar (2009). A Comparative Study Based On Open Source Content Management Systems. *Indian Journal of Computer Science and Engineering*, 1(4), 267-276.
- Niraj Singhal, Tanmeya Mohan, Subham Sarkar (2009). A Comparative Study Based On Open Source Content Management Systems. *Indian Journal of Computer Science and Engineering*, 1(4), 267-276.
- Nood.org Team (2009). Basic Content Management in Drupal. *Nood.org Team*. Retrieved from <http://nood.org/sites/noodorg/files/page/basic-content-management-in-drupal-noodorg.pdf>, 1-15.

- Omar, M., Soliman, M., Ghany, A. A., & Bendary, F. (2013). Optimal Tuning of PID Controllers for Hydrothermal Load Frequency Control Using Ant Colony Optimization. *International Journal on Electrical Engineering and Informatics*, 5(3), 348.
- Panda, M. K. (2013, May). Empirical Testing Of The Neural Network Application Using Feedforward Testing Method. *International Journal of Engineering Research and Technology*, ESRSA Publications, 2(6), 163-175.
- Patel, S.K.; Rathod, V.R.; Parikh, S., (2011). Joomla, Drupal and WordPress - a Statistical Comparison of Open Source CMS. *Trendz in Information Sciences and Computing (TISC), 2011 3rd International Conference*, 182-187.
- Priefer, D. (2014). Model-Driven Development of Content Management Systems Based on Joomla. *Proceedings of the 29th ACM/IEEE International Conference on Automated Software Engineering, ACM*, 911-914.
- Quadri, S. A. (2011). Developing, Managing and Maintaining Web Applications with Content Management Systems: Drupal and Joomla as Case Study. *HAAGA-HELIA University of Applied Sciences*, 12-15.
- Quinlan, J. R. (2014). C4.5: Programs for Machine Learning. *Morgan Kaufmann*, 200.
- Reese, G. (2008). Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. *Cloud Computing*, 1(1), 1-2.
- Rokach, L. & Oded, M. (2005). Clustering Methods: Data Mining and Knowledge Discovery Handbook. *Springer US*, 321-352.
- Saha, S., & Bandyopadhyay, S. (2013). A Generalized Automatic Clustering Algorithm in a Multiobjective Framework. *Applied Soft Computing*, 13(1), 89-108.

- Sakusa, T., & Toyama, M. (2015). Supporting Web Content Development Using Web Index. *Proceedings of the 19th International Database Engineering & Applications Symposium, ACM*, 204-205.
- Seifert, J. W. (2004). Data Mining: An Overview. *CRS Report for Congress. Order Code RL31798*, 3-12.
- Sfetcu, N. (2015). Small Business Management for Online Business. *Raleigh, North Carolina: Lulu Press, Inc*, 192-198.
- Siong, K. C., (2015) What Are the Advantage/Disadvantages of Using Shopify to Build an E-commerce Website? *Quora.com*, Retrieved from <https://www.quora.com/What-are-the-advantage-disadvantages-of-using-Shopify-to-build-an-e-commerce-website>.
- Smith, J. W., & McGuffee, J. W. (2015). Data and Content Management: A Master's Level Course. *Journal of Computing Sciences in Colleges*, 31(1), 70-79.
- Squier, L. (2001). What is Data Mining? Reston, VA: Data Management Association National Capital Region, 7-12.
- Sun, R. (2004). Desiderata for Cognitive Architectures. *Philos, Psychol.* 17, 341–373.
- Tummalapalli, S., & Rao Machavarapu, V. (2016). Managing Mysql Cluster Data Using Cloudera Impala. *Procedia Computer Science*, 85, 463-474.
- Vazirani, V. V. (2013). Approximation Algorithms. *Springer Science & Business Media*, 77-86.
- Wakode, B.V. & Chaudhari, D.N. (2013). Study of Content Management Systems Joomla and Drupal. *International Journal of Research in Engineering and Technology*, 2(12), 7.

Web Services, Amazon. (2017). Hosting Static Websites on AWS. *Awsstatic.com*.

Retrieved from

<https://d0.awsstatic.com/whitepapers/Building%20Static%20Websites%20on%20AWS.pdf>

Xhaferi, G., Memeti, A., & Imeri, F. (2015). Comparison of Several Algorithms for Searching Data's in a Learning Management System. *Proceeding of the 4th Mediterranean Conference on 2015 IEEE Embedded Computing (MECO)*, 272-275.