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**TOWARDS AN EFFECTIVE RECOGNITION GRAPHICAL  
PASSWORD MECHANISM BASED ON  
CULTURAL FAMILIARITY**



**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)  
UNIVERSITI UTARA MALAYSIA  
2017**

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## Abstrak

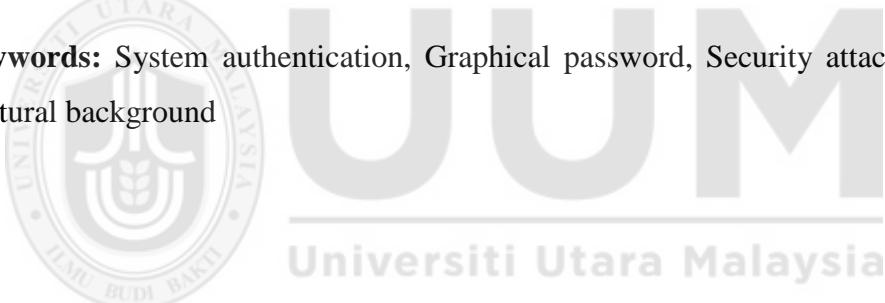
Kata laluan berasaskan teks untuk pengesahan adalah terdedah kepada serangan kamus kerana pengguna cenderung untuk mencipta kata laluan yang lemah supaya mudah diingat. Apabila berurusan dengan pengesahan pengguna, gambar adalah lebih mudah diingati berbanding dengan perkataan. Oleh itu, kajian ini bertujuan menentukan jenis gambar yang mungkin dipilih berdasarkan latar belakang kebudayaan pengguna. Ia juga mengkaji hubungan antara pilihan kata laluan dan kebiasaan budaya serta juga kesan Kata Laluan Grafik (GP) terhadap keselamatan dan kebolehgunaan. Seramai 40 orang pelajar telah mengambil bahagian untuk membina pangkalan data GP. Kemudian, penilaian telah dijalankan untuk mengkaji kebiasaan dan keupayaan pengguna mengenali gambar dari pangkalan data dengan menggunakan 30 responden yang lain. Kadar login yang Berjaya adalah 79.51% dan ini menunjukkan bahawa GP berdasarkan kebudayaan telah meningkatkan kebiasaan responden dengan menggalakkan daya ingatan mereka. Responden yang memilih GP biasa mempunyai kadar cubaan meneka yang lebih tinggi berbanding responden yang memilih gambar yang tidak biasa. Kesimpulannya, sebanyak 8 garis panduan telah di bentuk berdasarkan aspek pilihan pengguna untuk memilih dan memproses GP. Garis panduan ini boleh digunakan oleh pereka sistem GP untuk membangunkan sistem GP yang berkesan..

**Kata kunci :** Pengesahan sistem, Kata laluan grafik, Serangan keselamatan, Kebolehgunaan, Latar belakang kebudayaan

## Abstract

Text-based passwords for authentication are exposed to the dictionary attack as users tend to create weak passwords for easy memorability. When dealing with user's authentication, pictures are more likely to be simply remembered in comparison with words. Hence, this study aimed to determine the types of pictures in accordance to users' cultural background. It also investigated the relationship between the choices of password and the cultural familiarity along with the effect of Graphical Password (GP) on security and usability. A list of guidelines was proposed for the recognition of graphical passwords. This is believed to increase the security as well as usability. A total of 40 students were recruited to build a GP database. Further, an evaluation was conducted to investigate users' familiarity and recognition of the GP from the database using 30 other respondents. The results showed that the 30 participants positively responded to the familiar pictures in accordance to their cultures. The result of successful login rate was 79.51% which indicates that cultural-based GP has increased the respondents' familiarity by promoting their memorability. Further, the respondents who chose familiar GP had higher guessing attack rate than the unfamiliar GP. Finally, a total of 8 guidelines were established based on the aspects that correspond to the users' preferences for choosing and processing GP. These guidelines can be used by graphical password system designers to develop effective GP systems.

**Keywords:** System authentication, Graphical password, Security attack, Usability, Cultural background



## **Acknowledgement**

First and foremost, all praise is for Allah, Who enlightened us with faith and knowledge, and who is lightening my way throughout the completion of this thesis.

I would like to express my deep appreciation to Dr. Nur Haryani Zakaria, my supervisor, for her valuable assistance, enthusiastic encouragement and for her patient guidance to help me to achieve my goal. Without her valuable support, my thesis would not have been possible.

I would like to extend my appreciation to AP Dr. Azham and AP Hatim, for graciously reviewing this work and giving valuable suggestion and comments on my work.

I would like to express my gratitude to the greatest parents in this world. Thank you so much for everything you have done for me and I hope my prayers and good deeds will return a little from the many you gave to me. You always being everything to me thanks for every moment you spent watching over me. Thanks for the everlasting prayers, tenderness, support, and care. To both of you, I submit this work. May Allah bless you with happiness.

To my wife, I express special thanks for her valuable support, encourage and for always being everything to me. For my lovely daughters, Mariam, Elaf and Tasneem, thank you so much for your patient while I was not beside you. Without you all, this degree would have been so hard. May Allah bless my family.

Finally, I would like to thank all of my friends for their support and encouragement throughout my study.

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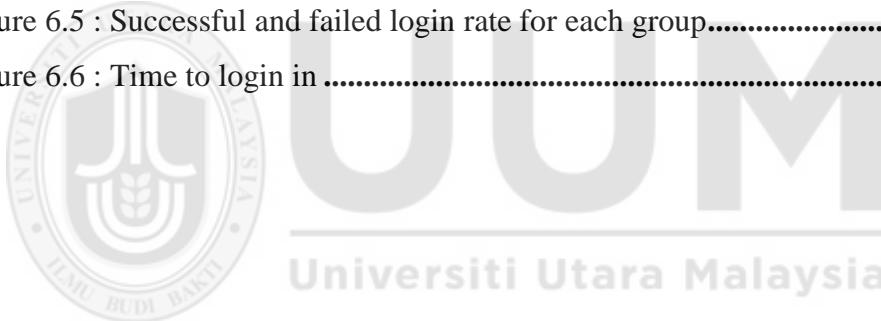
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## **List of Abbreviations**

DAS Draw A Secret

GP Graphical Password

GPG Graphical Password Guideline

GSR Guessing Success Rate

RBGP Recognition Based Graphical Password

SR Successful login Rate

TL Time Login



# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The latest advances in networked computing bring a number of advantages to the security of applications along with possible chances for becoming a target to numerous online threats. As such, the application of computer security, which is viewed as complex paradigm, is now the main area for researchers to secure and enhance its current security mechanisms for the benefit of organizations and individuals (Colella & Colombini, 2012; Vacca, 2013). This include the constant upgrades to the security services which lay behind the need for protecting end-users against theft or damage of one's electronic resources. Even with today's security parameters, it become difficult for users to attain these updates (Cavalcante et al., 2012), which, in turn, led to raising the needs for adequate and simple security features that users can easily memorize and keep.

However, the actual ubiquity regarding graphical interfaces for applications, and input devices such as touch-screen devices that permit in addition to typed input, has opened the doors for developing various graphic user authentication approaches (e.g., (Bellare, Ristenpart, & Tessaro, 2012; Khanh Dang & Tri Dang, 2013; Mihajlov & Jerman-Blažić, 2011; Salim, Reid, & Dawson, 2015)). Graphical authentication approaches were initially introduced to suit devices which do not allow typewritten input. Furthermore, current graphical authentication approaches present the possibility for offering a kind of authentication which is closely more robust than text passwords (Renaud, Mayer, Volkamer, & Maguire, 2013). These efforts were based

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