

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Midterm Examination: Semester 1

Academic Year: 2012

Date: 29 July 2012

Time: 13.30-16.30 (3 hours)

Subject Number: 242-500

Room: Robot

Subject Title: Research and Development Methodologies

Exam Duration: 3 hours (180 minutes)

This paper has 15 pages (including a paper), 12 questions 134 marks (25%).

Authorised Materials:

- Writing instruments (e.g. pens, pencils).
- Textbooks, a notebook, handouts, and dictionaries are not permitted.

Instructions to Students:

- Scan all the questions before answering so that you can manage your time better.
- Write your answers in Thai only.
- Write your name and ID on every page.
- Any unreadable parts will be considered wrong.

Cheating in this examination

Lowest punishment: Failed in this subject and courses dropped for next semester.

Highest punishment: Expelled.

| NO | Time (Min) | Marks | Collected | NO | Time (Min) | Marks | Collected |
|--------------|------------|------------------------|-----------|----|------------------------|-------|-----------|
| 1 | 30 | 20 | | 7 | 10 | 8 | |
| 2 | 10 | 10 | | 8 | 10 | 6 | |
| 3 | 10 | 6 | | 9 | 5 | 5 | |
| 4 | 20 | 20 | | 10 | 10 | 8 | |
| 5 | 10 | 6 | | 11 | 5 | 3 | |
| 6 | 20 | 20 | | 12 | 25 | 22 | |
| Total | 165 | Raw Marks (134) | | | Collected (20%) | | |

Written by Pichaya Tandayya

Name _____

ID _____

Question 1

(20 marks; 30 minutes)

From the attached paper, seek for the following items.

a) Motivation/Problem Statements (6 marks)

b) Contribution (5 marks)

c) Objectives (5 marks)

d) Scopes

(4 marks)

Question 2

(10 marks; 10 minutes)

Compare the following items.

a) *Conference Proceedings and Journals*

(5 marks)

b) *Basic Research and Applied research*

(5 marks)

Question 3

(6 marks; 10 minutes)

Explain the following types of *plagiarism*.

a) The Self-Stealer

b) The Ghost Writer

c) The Potluck Paper

d) The Misinformer

e) The Resourceful Citer

f) The Perfect Crime

Question 4

(20 marks; 20 minutes)

Answer the following questions about reports.

a) List items that should appear in a *proposal*. (3 marks)

b) List chapters that should appear in a *thesis*. (3 marks)

c) What are to be in the *Front Matter* in a formal report? (4 marks)

d) What are to be in the *Back Matter* in a formal report? (3 marks)

e) How do we write a *literature survey*? (4 marks)

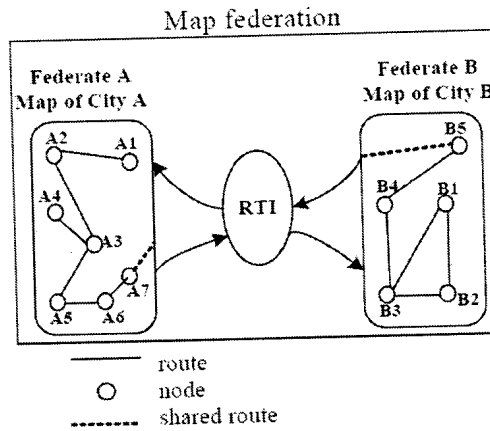
f) What will not normally contain in written academic English? (3 marks)

Question 5

(6 marks; 10 minutes)

Spot what are wrong with the following data representations. Also inform what should be changed or added.

a)



The interconnection of the city map federates

b)

| Type | Property |
|------------------------------|------------------------------------|
| All Services | 52 |
| All Data links | 152 |
| Associated BioMart services | 17 |
| Associated BioMart data link | 70 |
| BioMart Filters | 3 |
| BioMart Attributes | 22 |
| Test input | 1000 |
| Running time | 14.00.50 |
| Running results | All completed Except Gene Ontology |
| Validating time | 26.5 |

TABLE III. THE PHARMACOGENOMIC WORKFLOW TESTING RESULT

c)

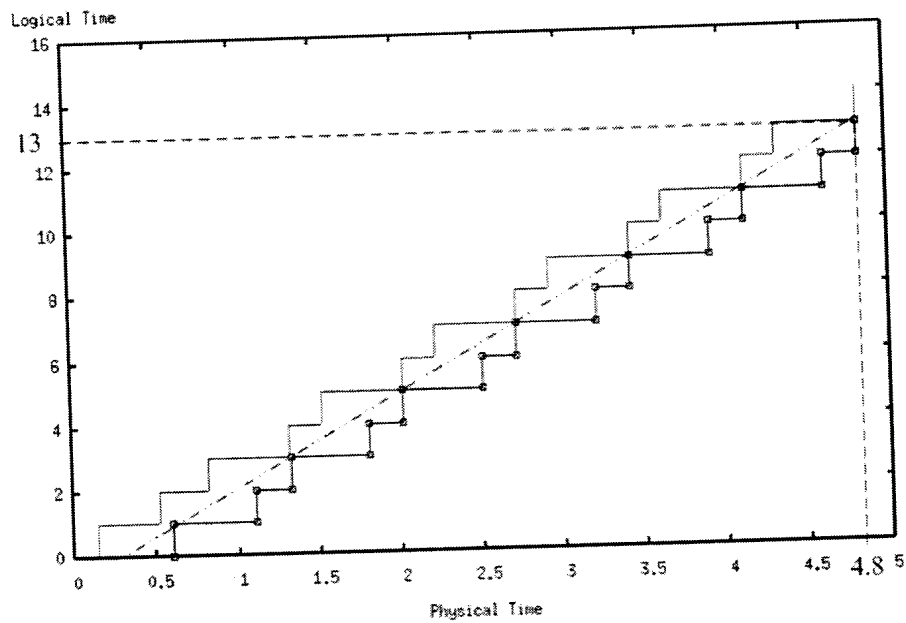


Figure 3.1 Time advancement when the delay is 100 ms

Question 6 (20 marks; 20 minutes)

Answering the following questions about postgraduate study.

a) Give at least 3 reasons why we need to do research. (3 marks)

b) Why do we need to write a semester progress report? Give at least 4 reasons. (4 marks)

c) Why do we need a logbook for research? (2 marks)

d) Why do we need to do a literature survey? Give at least 3 reasons. (3 marks)

e) What do you need to do at the meeting with your supervisor? (3 marks)

f) List 5 questions should be asked when starting a research. (5 marks)

Question 7 (8 marks; 10 minutes)
What presentation medium to use for the following types of messages?

a) figures and graphs

b) photos of complex objects

c) dynamic material, e.g. animation

d) words

e) the agenda and important points, to be stayed up all the time or a long time

f) working through something, where the process is important

g) complex tables, with lots of figures, equations,

h) anything that can't be understood in 30 seconds

Question 8

(6 marks; 10 minutes)

What are pitfalls and shortcomings for the following methods or medium?

a) Copy and Paste

b) Graphs

c) Diagrams

Question 9

(5 marks; 5 minutes)

What usage are the following types of outputs for?

a) Bar Graph

b) Circle Graph (Pie)

c) Line

d) Distributed Graph

e) Table

Question 10

(8 marks; 10 minutes)

How methodology is fit in each part of a research report?

a) Introduction

b) Literature Review

c) Method

d) Result and Discussion

Question 11

(3 marks; 5 minutes)

Answer the following questions about Chaos

a) Why do calculators sometimes give different results? (1 mark)

b) Why do repeated models give no meaning or non-sense results at a long run? (2 marks)

Name _____

ID _____

(22 marks; 25 minutes)

Question 12

Answer the following questions about Reliability

a) Give 4 ways about how can we improve Reliability in Hardware. (4 marks)

b) What are environmental factors affecting hardware reliability? (5 marks)

c) Give 4 ways about how can we improve Reliability in Software. (4 marks)

d) Is a constant failure rate a realistic assumption in practice? (1 mark)

e) Which one is more reliable between series and parallel systems? And why? (2 marks)

f) The use of diverse software requires some means to decide on the acceptability of the results obtained from the variants. Give ideas how to perform a decider task or an adjudicator? (6 marks)

A New Web Interface for the Visually Impaired to Access Facebook

Kamonwan Pakdeechote
Management Information System Program,
Faculty of Engineering, Prince of Songkla University,
Hat Yai, Songkhla 90112
+66-897-394-406
5310121003@email.psu.ac.th

Pichaya Tandayya
Department of Computer Engineering,
Faculty of Engineering, Prince of Songkla University,
Hat Yai, Songkhla 90112
+66 -840-205-499
pichaya@coe.psu.ac.th

ABSTRACT

Similar to other social networking sites, Facebook was not designed for being used by the visually impaired. In research concerning about Facebook's interface, there were many problems the visually impaired using the site via a screen reader. The main issues were about web accessibility and usability. These two major issues impact on travelling through the web site by the visually impaired. This study proposes solutions to the problems by including a new interface design, and implementation of the interface applying most used Facebook's features in order to help the visually impaired surf data or information on Facebook via our new and independent middleware interface.

Categories and Subject Descriptors

H.5.2 [Information Interfaces and Presentation]: User Interfaces - Interaction styles, Screen design. K.4.2 [Computers and Society]: Social Issues - Assistive technologies for persons with disabilities.

General Terms

Design, Human Factors

Keywords

Social Networking Site, Visually Impaired, Facebook, Web Accessibility, Usability, Blind People

1. INTRODUCTION

The number of worldwide visually impaired people from World Health Organization (WHO) is about 285 million people. There are 39 million blind people and 246 million people with low vision [1]. The development of Internet has changed people's way to access information. The Hyper Text Markup Language (HTML) format of documents enables various presentations of information, according to the type of data. However, it is troublesome usually designed for visually impaired to access information at web site

for sighted people.

The visually impaired people can access the site content by using screen reader software. However, it is difficult for the visually impaired to access web sites that are not properly and specially designed for them. Most web sites are designed without sufficient technologies and techniques to help the visually impaired to conveniently surf web sites like normal sighted people [2]. So are the social network sites.

Social networking sites are very popular among groups of Internet users. They provide a new way to communicate with people around the world. They disseminate news and information, advertise products, and enable chatting with friends and groups of interest. Many organizations have turned to public their information via social network sites.

Facebook.com is one of many social networking sites that users can do various activities as mentioned above and it is very popular around the world. It provides many activities such as chatting; sharing information, photos, songs and videos; reading news; searching for information; discussion on posts; finding friends; advertising products, services and companies; and so on. However, to the visually impaired, it still is not user-friendly enough and difficult to use. It is hard to change the existing social network site as the layout is rather rigid.

Most Facebook designs are for normal sighted people. Therefore, are many problems for the visually impaired, especially blind people, using Facebook's features. These problems include losing focus for what they do, difficult to find or locate some features; wall post, current friends posts, and buttons [5][6]. Other problems are poor web site layout, insufficient navigation keys or shortcut keys to help the visually impaired people to travel through the web site, no skipping options, difficult to locate all Facebook' features, only HTML codes detected by the screen reader and issues about web accessibility guideline [5][6]. Moreover, implementation problems in a dynamic web site such as using JavaScript and AJAX usually causes problems for a screen reader [5].

These works aims to redesign the user interface and proposes a suitable and implement an exemplar middleware web site for accessing information from a social network site via a screen reader. Due to its popularity, we have chosen Facebook as our case study and suggest a new design for interface and data structure for supporting the visually impaired users. The new interface will solve problems about the web site layout, provide

easy access to Facebook's features and apply the web accessibility guideline to make the site more accessible for a screen reader.

This paper focuses on the development of a new web interface for Facebook that allows the visually impaired to access information on the social network site via a new and independent middleware site. This middleware site has been developed using the concept of web accessibility [3] and usability [4].

2. THE CASE STUDY

This paper focuses at Facebook.com which is the largest community for Internet users. Facebook is the most popular social network site and it provides various activities and features for users such as post status, chat, comments, group discussion, information and multimedia sharing, photo and video upload, games, and so on.

2.1 Literature Review

Today, Facebook is popular in among of Internet users. Not only Internet users, but also many groups such as companies, celebrities, web sites, organizations, groups of interest, universities, schools, product brands, and more have their own Facebook's page for public relation, advertisement and more activities. Therefore, information, advertisements, activities, and discussions are on Facebook. This changes the way of using web sites for many people, from travelling through many sites to only one site visit.

Denise Leahy and Ultan Ó Broin summarized the result from their survey that 80% of the visually impaired used social network site for looking for information, and 72% preferred reading comments, feedbacks, and ratings [7].

Discussions on the accessibility of Facebook used by disable people including blind students are as follows [5][6].

Maria and Marina Buzzy, Barbara Leporini, and Fahim Akhter criticized that Facebook's environment is difficult for the visually impaired by testing some of Facebook's basic features such as sign up, write post, accept friend's invitation, invite friends, and comment on friend post [5].

The recent survey of Brain Wentz and Jonathan Lazar on screen reader usage by WebAIM indicated that Facebook is a web site avoided by the majority of users of screen readers. Some visually impaired users mentioned that Facebook for mobile phones are more usable [6].

Similar to sighted people, the visually impaired also are Internet users who desire to search for information and be part of interested groups [7]. Many research about web accessibility and usability of Facebook, showed that Facebook has a difficult environment and lacks of functions to help the visually impaired surf through the site via screen reader [5][6][7][9]. The Facebook mobile version has a simpler interface but still misses some issues listed on the web accessibility guideline such as no skipping option, no navigation keys, no heading for skipping operations, current location indication, and so on to help the visually impaired to access information and do activities on Facebook [8].

2.2 Facebook Interface

After logging into Facebook.com, data of multi-layers will be displayed for normal sighted people. However, the visually

impaired including the blind and people with low vision see the data through voice by a screen reader. Therefore, it is rather difficult for the visually impaired users to easily navigate through to the location of features they desire to visit. The shortcut keys that Facebook provides to locate a position as an assistive tool [8] do not cover all features in the Facebook page.

Facebook's interface composes of four major parts. The first one is the header part that includes Facebook logo, notification, search box, and user account. The second part is about managing Facebook's data. The third part contains a number of activity notifications, friends, applications, suggestions and advertisements. The last part includes posting zone and timeline display, the user's friends, and other information, etc.

2.3 Facebook Interface Summaries

Experienced users can exactly navigate through Facebook via a screen reader as they remember how to use the keyboard to find or do activities. However, new users repeatedly use the Tab button on the keyboard to travel or explore web site which can be a very tedious work.

Figure 1 shows that the user will have to press the tab button at least 16 times or more to travel from the Facebook's logo (Point A) to the post status (Point B) passing and listening to many features so that it can be annoying. Facebook does not provide a function or a short-cut key to help the user explore or skip through the page quickly.

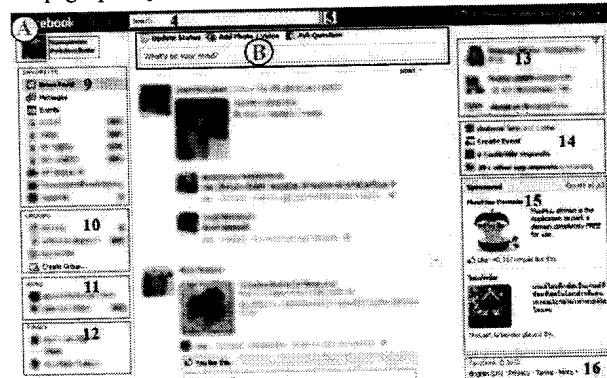


Figure 1. User's travelling path the Facebook page through from A to B

2.4 More Facebook's Interface Problems

In addition, Facebook has more design problems according to the web accessibility guideline as follows:

2.4.1 Menu's organization (Layout)

The menu shown on the header of Facebook does not cover all Facebook's features as it has limited space. Most used features such as wall post and timeline are not placed on the first level of the web site.

2.4.2 No skipping option

Facebook has neither any skipping option to help visually impaired users to quickly travel through the web site nor any provision of individual layout, for example in the cases of menu, timeline, and advertisement. Users that input via only keyboard have to press the Tab key many times in order to go to their target

2.4.3 Not all Facebook's features have shortcut keys

In case of people who use Facebook with a screen reader or other assistive tools provided in the Facebook help center, Facebook provides shortcut keys for people who use only keyboard input [8]. However, many features do not provide shortcut keys. Additionally, there is no shortcut key to help users to easily travel through the timeline or to go to other parts of the site.

2.4.4 Web Accessibility Issues

Following the web accessibility guideline, there are many issues for assisting disable people to easily surf through a site via a screen reader or other assistive technology. In Facebook, these issues have not been paid much enough attention to. For example, there is neither any function nor any key to control new timeline's loading. When reach the bottom of timeline, a new timeline will automatically be loaded for the user. That usually makes the users lose the focus on their task and it is difficult to step back to the last friend's status or climb to the top of the timeline.

2.4.5 Other issues in using Facebook

Some complaints on using Facebook by blind users are about losing focus on their task, difficulty in locating targeted features, confusing with too much information on a friend's timeline, pressing the Tab key too many times, losing focus and being distracted from the goal due to other information, especially Timeline, and so on.

2.5 Analysis of Facebook Interface According to Web Accessibility

Table 1 analyzes Facebook's interface according to the web accessibility guideline that involves with issues for the visually impaired in order to propose our middleware interface web specially designed for the visually impaired.

Table 1. Analysis of Facebook Interface According to Web Accessibility

| Web Accessibility's Item | Provision | | |
|--|-----------|----|--------|
| | Yes | No | Partly |
| 1. Shortcut key for faster access to the web site's components | | | / |
| 2. Helper in discovering the web site's overall structure | | / | |
| 3. Helper in controlling the dynamic web site | | / | |
| 4. Photo description (If not described by the owner) | | / | |
| 5. Categorization for guiding to components on the web site | | / | |
| 6. Support for the HTML format (For mobile phones) | / | | |
| 7. Content skipping | | / | |
| 8. Return to previous points | | / | |
| 9. Current location indication | | / | |
| 10. Warning for changes | | / | |
| 11. Helps for context building | | / | |
| 12. Language indication | | / | |
| 13. Component and feature description | / | | |
| 14. Action confirmation | | / | |

3. RESEARCH METHODOLOGY

The required concept of web accessibility and usability in order to design an interface and develop a system is that the web site can be accessed by a screen reader. Using these two concepts will help visually impaired people use our new interface to access data from Facebook.com via screen reader software as compatibly as do normal sighted people.

3.1 Web Accessibility Issue

The guideline of web accessibility and covers all kinds of disability defines how to design a web site that is suitable for people with

disability. The guideline for visually impaired people listed below summarizes the issues applied in our new interface [3].

- Give descriptions of pictures or graphics that are not text.
- Select suitable markup text for the web site.
- Support people who use screen to access data.
- The user can control the movement in the web site.
- Design functions or options for an individual use.
- Using technology and guideline that follow the recommendation of W3C
- Create a suitable structure of the web site

Using the web accessibility guideline to design the web site can help visually impaired people use the middleware web site to access the information in Facebook via a screen reader together with other suitable functions or methods such as shortcut keys.

3.2 Usability

Usability presents the concept of satisfaction of use, simplicity, and efficiency [4][9]. Our work focuses on two issues. First is to use the usability concept to adopt a suitable web site structure for helping the visually impaired navigate and interact with all functions or technologies on the web site. Second is to define elements and most used functions that are important for the visually impaired to use on a social networking site such as Facebook. This concept will help users interact and navigate through the web site with full ability via a screen reader.

4. DESIGN AND DEVELOPMENT

The new interface in forms of a pull-down menu that is easily accessed via keyboard has been designed to reduce the steps and travelling time to access the information for the visually impaired as in the case of Facebook's various items originally designed to mainly access via mouse. It reduces the need to press the Tab key on the keyboard and reorganizes the web structure into a new interface form in order to ease the users. It will also reduce confusion.

We also arrange the priority for levels in the site structure. The menu items are reorganized and placed according to the following criteria: importance, necessity, and frequency of use. The overall interface has been developed to reduce the average distance to the desired location. Reducing the number of the hierarchical structure and the number of key presses helps in coordinating with other features such as keyboard shortcuts, etc. later and also makes it possible to work with screen readers. Our middleware interface is shown in Figure 2.

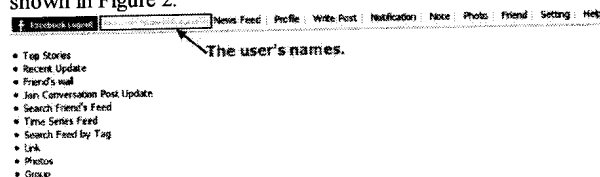


Figure 2. New interface design for our middleware web

5. DISCUSSION

Since many researches about Facebook's accessibility and usability had been published, Facebook recently has a lot of design changes and updates. Many issues about accessibility have resolved such as the problem about Rich Internet Application that enable the web site to support real-time interaction with users solved by applying WAI-ARIA as seen in the page's source code.

[5][10]. Also, many features crossed over by the Tab key have been resolved such as notifications next to Facebook logo.

However, many issues about the site structure, layout, task's focus; skipping link or option, shortcut keys, navigation keys, and so on to help the visually impaired travelling through the web site should be designed as part of the main web site. It is important to have a standard web site that supports every type of users. It enables the visually impaired to equally do all activities and have the opportunity to access to all information like normal sighted people do.

Our new interface and site structure have been designed following the web accessibility guideline. Table 2 analyzes our middleware's interface and Facebook's interface according to accessibility as follows. This table compares the length and depth of menus between Facebook and our middleware site when pressing the keyboard in order to go to the user's destination feature.

Table 2. Analysis of Accessibility to Features and Components between Facebook's Interface and our New Middleware Interface

| List | Facebook | | | | | | Our Middleware | | | | | |
|--------------------|----------|---|---|----------|---|---|----------------|---|---|----------|---|---|
| | Issue I | | | Issue II | | | Issue I | | | Issue II | | |
| | E | M | H | N | M | F | E | M | H | N | M | F |
| Timeline | | | / | / | | / | | | | | / | |
| Profile/Wall | | | / | / | | / | | | | | / | |
| News Feed and Home | | | / | / | | / | | | | | / | |
| Groups | | / | | | | / | | | | | / | |
| Pages | | / | | | | / | | | | | / | |
| Photos | | | / | | | / | | | | | / | |
| Search | / | | | / | | | | | | | / | |
| Notes | | / | | | / | | | / | | | | |
| Questions | | | / | | | / | | | / | | | |
| Notifications | / | | | / | | | / | | | / | | |
| Help | / | | | / | | | / | | | / | | |

*Note: Features and components highlighted in grey background are not yet available in our middleware site. Issue I = Access to the Feature (Number of Keys Pressed), A1 = Easy (10), A2 = Medium (20+), A3 = Hard (> 20+). Issue II = Menu's Depth (Number of Layers), N = Near (1-2), M = Medium (3-5), F = Far (6+).

6. CONCLUSION AND FUTURE WORK

This work proposes a new form of interface that will allow the visually impaired to access the social networking site: Facebook and to help the visually impaired access the activities faster when using the Tab key on keyboard. The priorities of positions on the web site structure have been arranged to be faster and more relevant. News feed has more appropriate navigation for information access and allow the visually impaired to more easily and clearly track movements on their news feeds. A new interface has also been developed for travelling through more easily and efficiently.

Although our middleware is designed for visually impaired, the sighted people can use it for faster text surfing, graphic presentation is not provided. Our middleware uses Facebook's API (Application Programming Interface) to develop the web site that gets data from the user's Facebook page and presents it in a text style with a suitable site structure for visually impaired. We design the site structure and sort some Facebook features that locate separately to be in the same level of menu in our site. The

same level menu on our site helps the visually impaired to quickly know what are on the site.

Future work will be addressed to testing the new interface and complete the system that contains most used features among Thai visually impaired users. Thus, the testing data will be collected for providing information updates, suitable interface and more possible options to help users surf their Facebook via this middleware site. Furthermore, Facebook buy-in services will also be and interesting future work.

7. Acknowledgement

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8. REFERENCES

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