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# **Tree-mapping Based App Access System for iOS Platform**

## **Project Report**

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# 1. Introduction

## 1.1 Overview

In recent years, with rapid use of smart phone, Apple iOS and Android systems touch many aspects of daily life. A mobile operating system (mobile OS) is the operating system that controls a smartphone, tablet, PDA, or other mobile device. Modern mobile operating systems combine the features of a personal computer operating system with touchscreen, cellular, Bluetooth, WiFi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, Near field communication, personal digital assistant (PDA), and other features. The user interface of iOS is based on the concept of direct manipulation, using multi-touch gestures. Interface control elements consist of sliders, switches, and buttons. The response to user input is immediate and provides a fluid interface.

The project develops an app access system which designs a new user interface different from old 'page by page' approach. The program is based on tree-mapping algorithm which displays hierarchical (tree-structured) data as a set of nested rectangles.

From this point of view, the system create a new user interface for iOS platform which can help solve the problem about paging over and choosing the exact app when there are lots of apps installed on the device.

## 1.2 Objectives

The project need different scope skills not only about the programming, math model, but also the user interface and user experience.

- The project based on iOS requires me extra time for programming.
- The study of tree-mapping algorithm is base of the whole project.
- The research of the new user interface which can help improve user experience are also very important.
- The design of the final app requires different skills not only color theory but also typeset theory.

## 2. Background

### 2.1 iOS SDK

The iOS SDK (Software Development Kit) (formerly iPhone SDK) is a software development kit developed by Apple Inc. and released in February 2008 to develop native applications for iOS. Along with the Xcode toolchain, the SDK contains the iPhone Simulator, a program used to emulate the look and feel of the iPhone on the developer's desktop.

### 2.2 UI and UX

The user interface, in the industrial design field of human-machine interaction, is the space where interaction between humans and machines occurs. The goal of interaction between a human and a machine at the user interface is effective operation and control of the machine, and feedback from the machine which aids the operator in making operational decisions.

User experience (UX) is the way a person feels about using a product, system or service. User experience highlights the experiential, affective, meaningful and valuable aspects of human-machine interaction and product ownership, but it also includes a person's perceptions of the practical aspects such as utility, ease of use and efficiency of the system. User experience is subjective in nature, because it is about an individual's feelings and thoughts about the system. User experience is dynamic, because it changes over time as the circumstances change.

### 2.3 Tree-mapping

As tree-mapping is a two-dimensional visualization for quickly analyzing large, hierarchical data sets. Each branch of the tree is given a rectangle, which is then tiled with smaller rectangles representing sub-branches. A leaf node's rectangle has an area proportional to a specified dimension on the data. Often the leaf nodes are colored to show a separate dimension of the data.

When the color and size dimensions are correlated in some way with the tree structure, one can often easily see patterns that would be difficult to spot in other ways, such as if a certain color is particularly relevant. A second advantage of tree-maps is that, by construction, they make efficient use of space. As a result, they can legibly display thousands of items on the screen simultaneously.

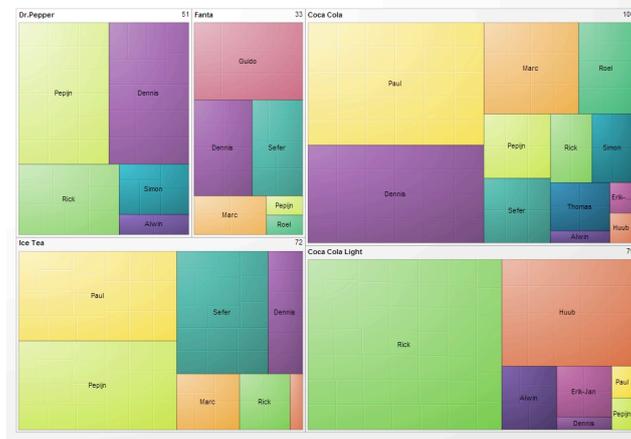


Figure 1 The general idea of tree mapping from wikipedia

## 3. Usage Modeling

### 3.1 Introduction

The project also need design a user interface based on the usage modeling system, user experience and other design theories. The project also need simulate the new user interface different from old ' page by page' approach.

### 3.2 Design

The main idea of tree-mapping user interface design have three parts:

#### 3.2.1.Tap rate

Every single app has a counter for calculating the tap rate in the system.

#### 3.2.2.Group and Tree-mapping

Group apps as show in tree-mapping theory. In consideration of the user experience about right-hand phone, we need some changes.

In tree-mapping, larger cells are placed towards the top left, and smaller cells are placed at the bottom right. Because we use the right thumb most in phone screen, so larger cells are placed towards the bottom right, and smaller cells are placed at the top left.



Figure 2 User experience about right-hand phone

Tree-mapping cell arrangement, size, and color are each mapped to an attribute of that element. Because we need find the easiest way to access my app, so the class we use to identify different kind of apps will be the attribute.

### 3.2.3.Exchange

The 'operating system' exchanges the apps after tapping and rearranges the whole user interface with calculating the tap rate. By tap, it will be simple to get apps we want.

## 3.3 Implementation

Three fundamental activity classes are involved:

### 3.3.1.changeGreeting:

To exchange apps which in a array for calculating tap rate and rearranging apps.

### 3.3.2.returnToFirstPage:

Get back to the main user window of the 'operating system' after adding the tap rate, rearranging apps and finishing using the application.



Figure 3 Get back after adding and rearranging

### 3.3.3.addNewApp:

To add a new app from App Store in the specific space of the main user window.

## 4. UI Designing

### 4.1 Introduction

The user interface and user experience of the program which help users feel the 'operating system'. The user interface in the project we plan to develop will include the apps group, more apps window and new app space. With the help of using lots of different application, the user experience of the project we design will as simple as possible.

### 4.2 Design

The whole user interface of tree-mapping have three parts:

#### 4.2.1.Apps group

Because the application mainly display the whole process of tree-mapping user interface, the apps group is the most important part of the new 'operating system'. The show part should as big as possible and the contrast should as clear as possible.

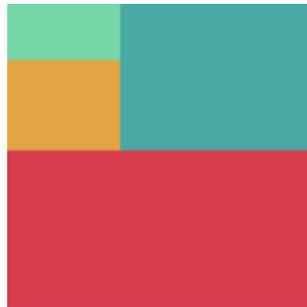


Figure 4 Different groups use different colors

#### 4.2.2.More Apps window

The main window just can contain 13 mostly used apps. So we need use a list window to show more apps which are not often used.

#### 4.2.3.New app space

New app space is for downloading new apps which the user maybe want to tap mostly. Putting on a specific space is the best way for showing the new app.

### 4.3 Implementation

MainStoryboard\_iPhone.storyboard is the most important tool for the user interface:



Figure 5 Structure of the whole project in MainStoryboard

## 5. Project Demonstration

### 5.1 Intro

At beginning, the main window as figure 6, different apps in different group show on the main window based on their tap rate.

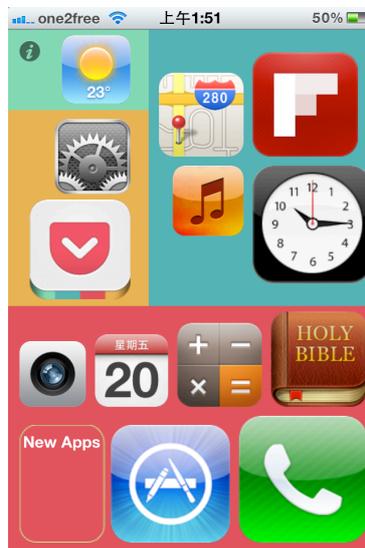


Figure 6 The startup screen of the 'operating system'

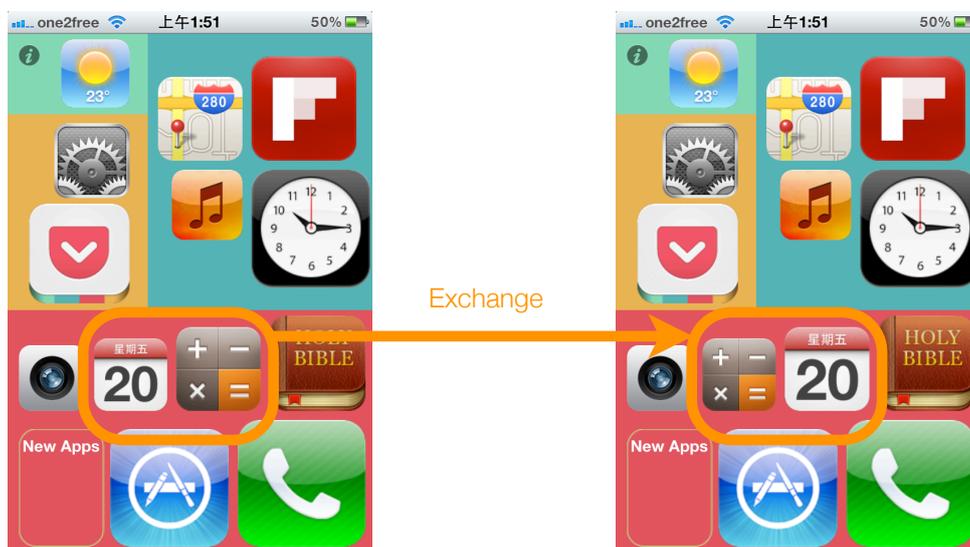


Figure 7 Tree-mapping and rearranging apps

## 5.2 Tree-mapping

Tap an app, Calendar for example, and go back, the 'operating system' rearrange apps in main window as figure 7.

## 5.3 More Apps

Tap info button, tap Message App, if its tap rate higher than the last one on main screen, we change as figure 8.



Figure 8 More apps and rearranging apps between screen and list

## 5.4 Download New App

Press App Store, install Facebook App, and go back, the 'operating system' add the icon to the specific space as figure 9.

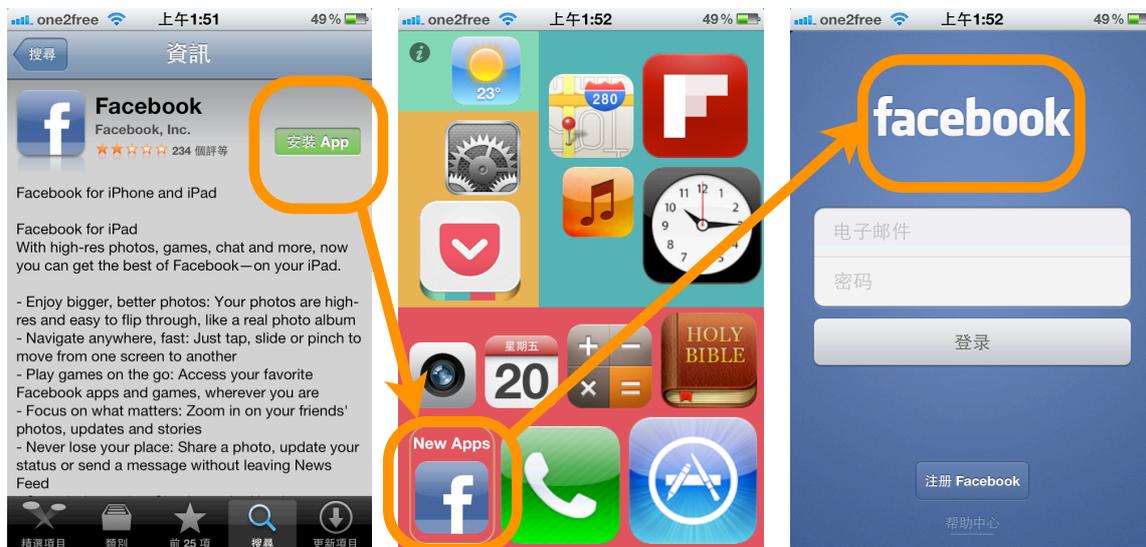


Figure 9 Download Facebook App

## 6. Further development

Since limited time, the basic structure of the tree-mapping user interface is done and there are many possibilities for further development and improvement, such as:

### 6.1 More functions

- 1.The user interface can have different levels.
- 2.User can custom their group to arrange the apps.
- 3.Changeable app icon based on the tap rate.

### 6.2 Better UI/UX

- 1.The interface of the application can be improved to make it become more friendly and effectively.
- 2.The user experience of the application can have more instruction and can use the nature language for a person's perceptions of the practical aspects.

## 7. Conclusion

The successful deployment of tree-mapping marks the creative goal of the project has been accomplished. With the aid of the iOS SDK, I managed to develop an application that demonstrate the main idea of tree-mapping user interface. The users can enjoy the different user experience not only old 'page by page' way.

During the progress of the development, as a multimedia student, I tackled some challenges, such as modeling the system of tree-mapping in iOS and change the screen between different apps, etc. Although the application is simple and the effect is not attractive enough, with the successful deployment of the application, it means I have already implemented the idea and the project reflects an efficient method to achieve my multimedia knowledge.

## 8. Appendix

### Minutes of the 1st Project Meeting

**Date:** 20th February 2012 (Monday)

**Time:** 10:00 AM

**Place:** Rm. 3512

**Attending:** Prof. Rossiter, WANG Xiao

**Absent:** None

**Recorder:** WANG Xiao

#### 1. Approval of minutes

This is first formal group meeting, so there were no minutes to approve.

#### 2. Report on Progress

Since this is the first meeting, there is no progress to be reported.

#### 3. Discussion Items Things to do

- Scope of the project
- Predesign for the project
- Build the user interface

#### 4. Meeting adjournment and next meeting

The meeting was adjourned at 10:30 AM. The next meeting will be held in 12th March 2012 (Monday).

## **Minutes of the 2nd Project Meeting**

**Date:** 12th March 2012 (Monday)

**Time:** 10:15 AM

**Place:** Rm. 3512

**Attending:** Prof. Rossiter, WANG Xiao

**Absent:** None

**Recorder:** WANG Xiao

### **1. Approval of minutes**

The minutes of the last meeting were approved without amendment.

### **2. Report on Progress**

WANG Xiao have finished a simple demo of tree-mapping for the project and have built a first version of the user interface.

### **3. Discussion Items Things to do**

- Build the construction of the project
- Finish the usage modeling about the whole processing of tree-mapping
- Add More button and Download button

### **4. Meeting adjournment and next meeting**

The meeting was adjourned at 10:45 AM. The next meeting will be held in 26th March 2012 (Monday).

## **Minutes of the 3rd Project Meeting**

**Date:** 26th March 2012 (Monday)

**Time:** 10:15 AM

**Place:** Rm. 3512

**Attending:** Prof. Rossiter, WANG Xiao

**Absent:** None

**Recorder:** WANG Xiao

### **1. Approval of minutes**

The minutes of the last meeting were approved without amendment.

### **2. Report on Progress**

WANG Xiao have finished the usage modeling about the whole processing of tree-mapping, have added More button and Download button.

### **3. Discussion Items Things to do**

- Finish programming the frame and functions using the usage modeling in iOS
- Designing the user interface for tapping, grouping, adding and rearranging apps
- Add animation effect of the project

### **4. Meeting adjournment and next meeting**

The meeting was adjourned at 10:45 AM. The next meeting will be held in 23rd April 2012 (Monday).

## **Minutes of the 4th Project Meeting**

**Date:** 23rd April 2012 (Monday)

**Time:** 10:25 AM

**Place:** Rm. 3512

**Attending:** Prof. Rossiter, WANG Xiao

**Absent:** None

**Recorder:** WANG Xiao

### **1. Approval of minutes**

The minutes of the last meeting were approved without amendment.

### **2. Report on Progress**

WANG Xiao have finished programming the frame and functions and designing the user interface

### **3. Discussion Items Things to do**

- Finish the final program
- Finish the final project report
- Make a instruction video

### **4. Meeting adjournment and next meeting**

The meeting was adjourned at 10:55 AM.