

Development of a HTML5 Photo Album Smart Application

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Abstract

With the explosive growth of Iphone and Android smartphones, there are increasing demands and requests for application developers to support both smart platforms, simultaneously. Thus, we develop HTML5 based photo album smart application which is exchangably executable for those two platforms. In addition, we propose two solutions to support and increase the degree of user experience in HTML5 applications; Frame management and pinch & spread alternative techniques. This research proposes a model for developers to imitate the pinch & spread, since we need to find a workaround technique without any violation of intellectual property due to the patent war between Apple and Samsung. It is implemented and verified by the HTML5 photo album application.

Keywords: *HTML5 smart application, photo-album, platform independence*

1. Introduction

Recently, the intellectual property(IP) war rages on between Apple and Samsung. Apple had used that patent as a key example of the proprietary IT it is trying to protect in its current case against Samsung, which also has a "pinch-to-zoom" feature in its Android mobile devices [8]. In April 2011, Apple filed for patent infringement, claiming that Samsung copied its iPhone and iPad features. One of the issues in the IP battle was the pinch & spread technique [9]. Actually, Apple had used that patent as a key example of the proprietary IT it is trying to protect in its current case against Samsung, which also has a "pinch-to-zoom" feature in its Android mobile devices. The pinch & spread enable users of smartphones and tablets to enlarge an image by touching two fingers on the screen and spreading them slightly apart. It can be used to respectively enlarge (zoom in) and shrink (zoom out) an object [1, 2].

So, we need to find an alternative technique to realize the same user experience with pinch & spread. This is because we have to imitate pinch & spread without any violation of intellectual property(IP) [3]. Therefore, we propose a workaround technique for imitating pinch & spread. We make use of the image cropping and image scaling instead of pinch & spread. Originally, image cropping refers to the removal of the outer parts of an image to improve framing, accentuate subject matter or change aspect ratio. Image scaling means that image can be scaled up and down with any specified ratio.

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In addition, we implemented a photo album application which is based on HTML5. We first take a look at the HTML5 based hybrid architecture for smart applications consisting of elements of both native and Web applications.

Especially, there are several native applications of photo album in platform of either iPhone or Android. But, there is no HTML5 based photo album application that can help us all add to our albums from a smartphone, or create an album to a group from our smart phones. Therefore we design and implement a working version of HTML5 based photo album application. In this section, we design the UI of photo album application in perspective of frame diary

The photo album application in this research presents customization feature to make a various types of album layout. For the customization we support an easy user interface (UI) such as touch, drag, and drop. The HTML5 standard describes that the features are supportable but it is not really applicable because it is quite dependent on the web browsers and platforms. Thus, it is still not perfect to use. In order to resolve this compatibility issues, we manually implemented the touch, drag, and drop interface with Javascript language in this research. As a result, this application helps to create photo album by combining and decorating photos within a smartphone in a very easy way.

The rest of this paper is organized as follows: Section 2 describes related works on this research. Section 3 focuses on the details of overall hybrid application architecture of HTML5. Section 4 describes the photo album UI design and framework. Finally, we conclude our work and present future research directions in Section 5.

2. Related Work

While successful for complicated mobile applications, such programming styles significantly differ from those used in smartphone application development, making it is difficult for smartphone developers to adopt them. In contrast, Dandelion leverages the simplicity of smartphone-centered body sensor networks and focuses on supporting in-sensor data processing tasks. With this trade-off, Dandelion is able to provide transparency in programming style.

Some systems support programming transparency with a unified OS abstraction or distributed runtime system, mostly based on a virtual-machine approach to hide ISA variances. This approach, however, proves to be inefficient on resource-constrained sensors. In contrast, Dandelion achieves transparency by limiting the senselet functions to data processing and by introducing an extra compilation phase to produce.



Figure 1. Smartphone Market Expansion

It is expected that global smartphone markets will be expanded with 9.9% of CAGR until 2013. Gartner reports that in the world cellphone markets smartphone will take up to 47% until 2014. In 2015, the market share of android mobile OS will be 40%, whereas the market share of iPhone OS will be 20%.

In the past decade, there are several applications similar to photo album on smartphones. Frame Artist helps to create photo arts by combining and decorating photos in a very easy way, and share them via Facebook, Instagram, Twitter, Flickr, Picasa, Tumblr, email and messengers [4, 10]. Since PicFrame Artist has no limits on layout, we can create whatever design we imagine and save them as own design templates for reuse. It also provides 9~12 ready-to-use templates for convenience. Furthermore, lots of stickers, speech balloons, background colors and patterns, filters, cell customizing options are supported to decorate photos in various way. The design space of Frame Artist is unlimited. For example, post card, party invitations, wedding invitations, calendars, magazines, newspapers, diary, comics, time table, business cards, recipes, and whatever.



Figure 2. Frame Artist Photo Album

Smilebox makes photographs, and the events and moments they capture, to become precious album [5, 11]. It helps to share the photos in truly memorable and personal ways. Photo albums are the perfect way to share just about any experience, from baby's first bath to a tropical honeymoon.



Figure 3. Smilebox Photo Album

Summarizing the features of the above photo album applications, they commonly allow users to personally add every embellishment, word, sparkle and paper pattern. When using those applications the following features should be provided: 1) project templates, 2) a photo editor (optional) 3) an album organizer, 4) photo embellishments, 5) a book-style preview, 6) varying text options. These features add customization and personalization to user photo album that offline album services do not provide [6, 7].

3. Overall Architecture: A Hybrid Application

Current smart application development approach is tightly dependent on each mobile framework such as android or iPhone. Once a smart application is developed, it only runs onto the platform. This limitation results in wasting the development cost because one source multi use is not allowed. We have to develop or compile the same applications for each platforms. However, future trend for smart application developments is platform independent. This is because device fragmentations exists even within an android platform. For example, there are numerous number of android devices in the markets.

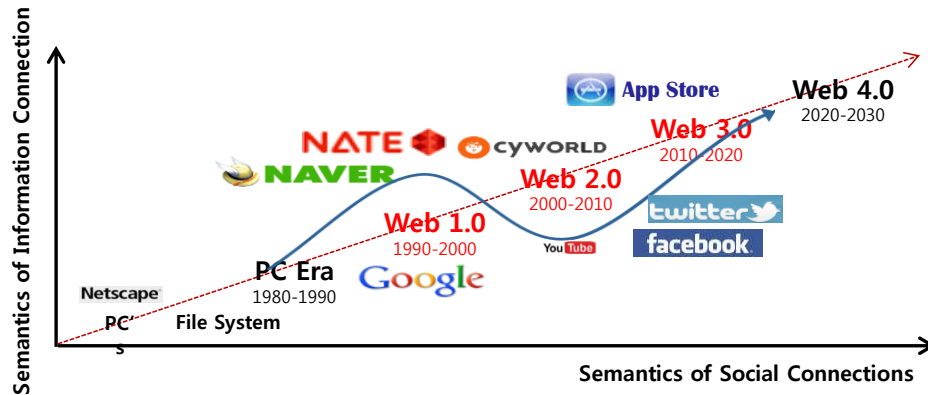


Figure 4. Web User Paradigm with the App Store and Community Portals

Figure 2 shows the paradigm shift of smart IT applications. In the initial era, the left side of Figure 2 is used for almost all developers. We're beginning to see Web 3.0 technology in our smartphones. While this is all great for consumers (apart from perhaps giving them a sense that Big Brother really is looking over their shoulders), one of the big questions lies in how Web 3.0 technologies will be made available to businesses and how businesses will then be able to embrace them. If you're just looking at the technology, you see where it has the potential to level the playing field.

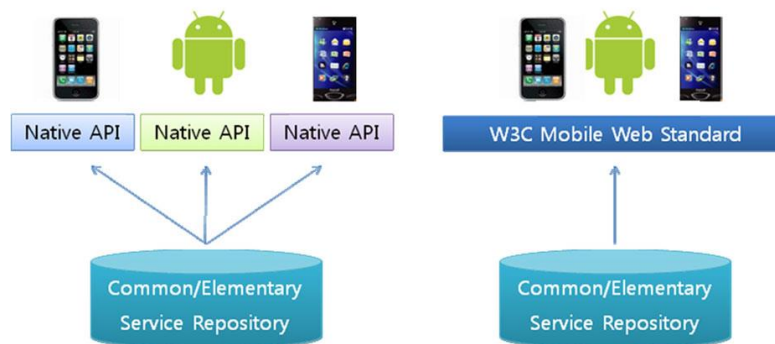


Figure 5. Smartphone Application Development Architecture

This is because the core technology of our framework is based on web service and SOAP protocol through HTTP 80 port. We are targeting on OS-independent smartphone application development platform. The OS-independent platform means that the structure is not depending on smartphone platform. It consists of web service and mobile web (HTML5 like) device API standard. By running complex task on cloud as a web service it is possible to reduce computation time and battery power. Likewise, complex business logics and computations will be offloaded by cloud computing platforms. The left side of Figure 3 shows current smartphone application development platform including Android, iPhone, and Windows Mobile. Each platform has its own applications development environment and they are not compatible to others. If you want to use an iPhone application, you must have iPhone. Similarly, if you want to enjoy some Blackberry applications you have to have Blackberry.

On the other hand, the right side of Figure 3 represents platform-independent smartphone application development environment. With this mobile cloud computing framework you will be able to enjoy all such applications only if you can access web through your cell phone. This framework provides a commonly accessible layer which is platform independent, for example W3C mobile web standard. Likewise, our proposed approach makes use of web service architecture through the W3C mobile web standard layer.

In this section, we show an overall architecture of our photo album application. First we take a look at the HTML5 based hybrid architecture for smart applications. A hybrid application (hybrid app) is one that combines elements of both native and Web applications. Native applications are developed for a specific platform and installed on a computing device. Web applications are generalized for multiple platforms and not installed locally but made available over the Internet through a browser. Hybrid apps are often mentioned in the context of mobile computing. Hybrid application has the following features: 1) Can function whether or not the device is connected, 2) Integration with a device's file system, 3) Integration with Web-based services, 4) An embedded browser to improve access to dynamic online content. Most applications could be considered hybrid apps. Web apps, such as online banking services, typically store some content locally; locally stored native apps, such as Microsoft Word, also interface to the Internet.

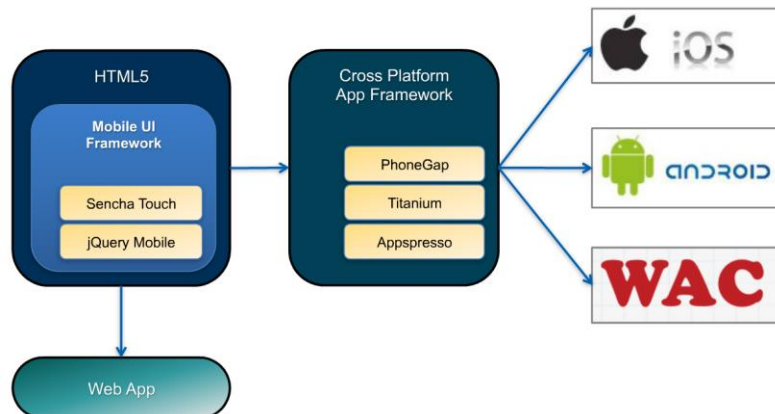


Figure 6. Architecture of Our Photo Album Hybrid Application

Figure 6 shows the architecture of our photo album application. Model-view-controller (MVC) is a software architecture pattern which separates the representation of information from the user's interaction with it. The model consists of application data, business rules, logic, and functions. A view can be any output representation of data, such as a chart or a diagram. Multiple views of the same data are possible, such as a bar chart for management and a tabular view for accountants. The controller mediates input, converting it to commands for the model or view. The central ideas behind MVC are code reusability and separation of concerns.

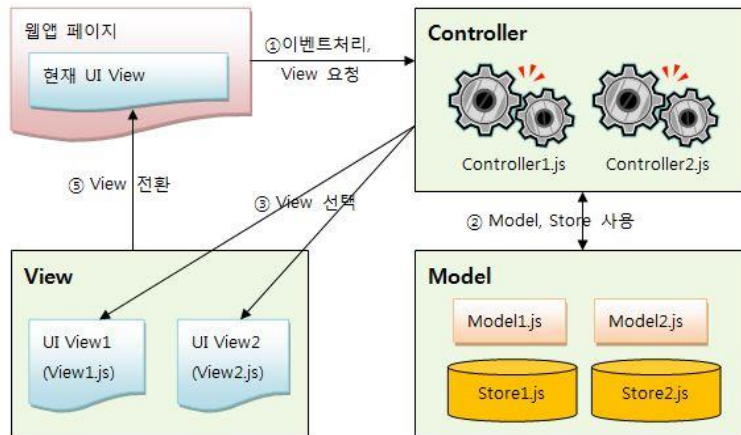


Figure 7. HTML5 MVC Application Framework

In addition to dividing the application into three kinds of components, the MVC design defines the interactions between them. As shown in Figure 7, a controller can send commands to its associated view to change the view's presentation of the model (e.g., by scrolling through a document). It can also send commands to the model to update the model's state (e.g., editing a document). A model notifies its associated views and controllers when there has been a change in its state. This notification allows the views to produce updated output, and the controllers to change the available set of commands. A passive implementation of MVC omits these notifications, because the application does not require them or the software platform does not support them. A view requests from the model the information that it needs to generate an output representation to the user.

4. UI Design of Photo Album Application

Up to now, people post photos many times from their iPhones or android like smartphones. We have not discovered an HTML5 based application or a way either starting an album on this group or adding to an existing album. Instead it goes into the photo gallery (or on the wall). Then the person has a hard time keeping track of their photo. Thus most want albums and have found that we can create an album easily, as well as continue to add to it. There are several native applications of photo album in platform of either iPhone or Android. But, there is not enough HTML5 based photo album application that can help us all add to our albums from a smartphone, or create an album to a group from our smart phones. Therefore we designed and implemented a working version of HTML5 based photo album application. In this section, we design the UI of photo album application in perspective of frame diary

4.1. Easy Diary: Frame Management

Frame management of easy diary provides a whole host of gorgeous designs you can apply to photos such as background image (theme), layouts, frames, balloon sicker, patterns, and so more. Our photo album affords virtually limitless customization that is available to its layouts, so you can edit and frame to whatever you desire. We call a diary maker of our photo album application as easy diary because we can easily choose a layout among various samples. Afterwards, we can add photos to our album from a smartphone gallery and create an album to a group from our smartphones

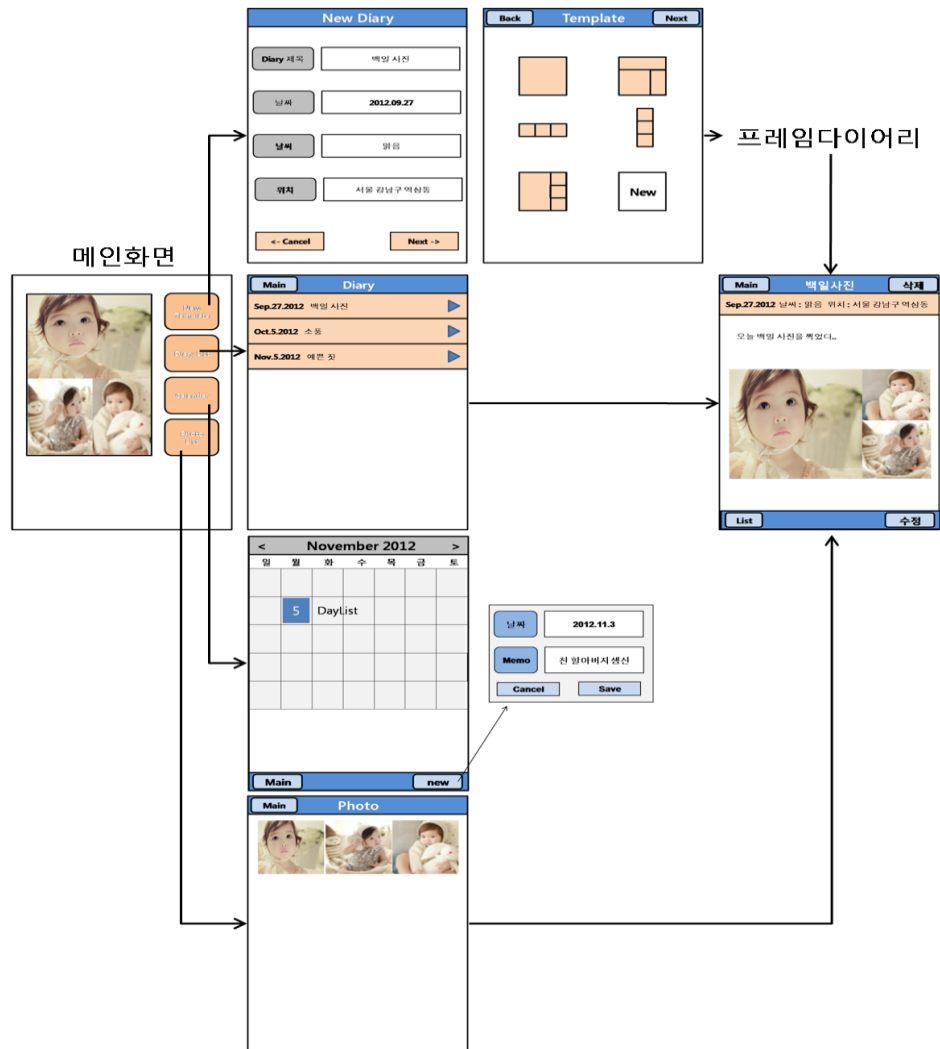


Figure 8. Storyboard of HTML5 photo album

Figure 8 shows the storyboard of our HTML5 photo album application. We begin with the main screen at leftmost side of the Figure 8. There are 4 buttons to start four different functions : creating a new diary (at this stage we call as easy diary), searching a diary from diary database, showing a diary as a calendar view, and showing photos as a grid view. If we choose the easy diary among these functions, we see the template chooser panel (template library) as shown in the upmost of the Figure 8. From the template library we can choose any type of layouts in which photos will be put in. When there is nothing that user want to use in the template library, the user can choose to new diary that is not based on any template. We say this feature as frame diary. The reason why our photo album affords virtually limitless customization that is available to its layouts is because of the frame diary. Using the frame diary, we can edit frame to whatever the user desires.

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Figure 9. Frame Management (Merge, Placement, and so on)

Actually, Figure 9 shows the customization phase of making a layout that there is any limitation. This is because we provide many set of small grid panels which are merged and separated into various forms. For this customization we support touch, drag, and drop interface. The HTML5 standard says that the drag and drop feature is supportable but it is very dependent on the web browsers and platforms. Thus, it is still not perfect to use. So, we manually implemented the touch, drag, and drop interface with Javascript language in our photo album application so that it is compatible on any smart devices.

4.2. Pinch & Spread by Image Cropping and Image Scaling

Pinch & Spread enable users of smartphones and tablets to enlarge an image by touching two fingers on the screen and spreading them slightly apart. It can be used to respectively enlarge (zoom in) and shrink (zoom out) an object. It works with content that can be zoomed in on, like a web page, map, or especially here in our project an image.

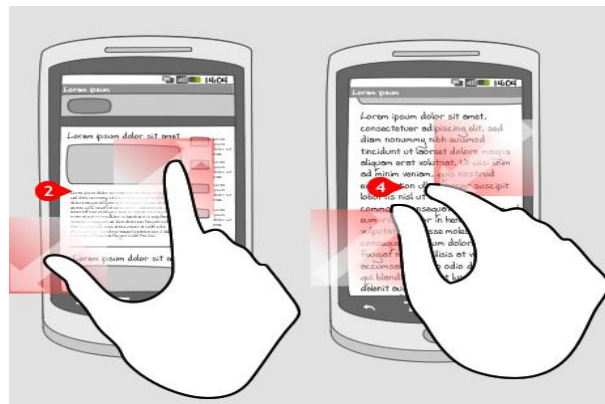


Figure 10. Pinch & Spread [9]

As shown in Figure 10, a user can touch the screen with two fingers and spread the fingers to magnify a specific target assuming the content is usually displayed full screen. The level of magnification is stepless and depends on how far the fingers are spread. However, Apple had used that patent as a key example of the proprietary IT it is trying to protect in its current case against Samsung, which also has a "pinch-to-zoom" feature in its Android mobile devices.

So, we need to find an alternative technique to realize the same user experience of pinch & spread without any violation of intellectual property. Therefore, we propose a workaround

technique for imitating pinch & spread. That is realized by using both image cropping and image scaling. Originally, image cropping refers to the removal of the outer parts of an image to improve framing, accentuate subject matter or change aspect ratio. Depending on the application, this may be performed on a physical photograph, artwork or film footage, or achieved digitally using image editing software. The term is common to the film, broadcasting, photographic, graphic design and printing industries. In this work, we take this technique to show application users to see that like a Pinch & Spread. There are surely some libraries to support image cropping: Jcrop. Actually, Jcrop is a quick and easy way to add image cropping functionality to your web application. It combines the ease-of-use of a typical jQuery plugin with a powerful cross-platform DHTML cropping engine that is faithful to familiar desktop graphics applications. But, we were not able to use the jCrop library because it is based on the jQuery library. Since we are working with Sencha Touch as HTML5 UI Framework, we decided to develop the image cropping functionality from scratch.



Figure 11. Pinch & Spread Implementation on This Research

Figure 10 shows our implementation of image cropping in the photo album application. It has been designed for developers to easily integrate an advanced image cropping functionality directly into any web-based application without sacrificing power and flexibility (or the weeks of coding, testing and debugging).

In this work, we can add six additional arguments to image data structure to crop an image using HTML5 Canvas, sourceX, sourceY, sourceWidth, sourceHeight, destWidth and destHeight. These arguments define the location and size of a rectangle that we want to cut out of an image. From Table 1 to Table 3 we show the source code for image cropping functionality.

Table 1. Source Code for Image Cropping 1

```
id : 'scrollpanelview',  
xtype: 'panel',  
left: 0,  
top: 0,  
width: 400,  
height: 300,  
    contentEl: 'content',  
    styleHtmlContent: true,  
    centered: true,  
scrollable: {  
    direction: 'both',  
    directionLock: false  
},
```

In Table 2Table , the scrollable panel contains the following image data that is initialized to the size of 400 by 400. But, the height and width will be adjusted by each panel size that might be larger or smaller depending on whether it is merged with others or not.

Table 2. Source Code for Image Cropping 2

```
items: [                                {  
    id : 'imgdata',  
    xtype: 'image',  
    src : 'images/15.jpg',  
    height : 400,  
    width : 400,  
    cls: 'styCropImg',  
    },  
]
```

In Table 2, the cls property represents the class definition in cascading style sheet (CSS) file. CSS is used to control the style and layout of Web pages. CSS3 is the latest standard for CSS. The CSS is a style sheet language used for describing the presentation semantics (the look and formatting) of a document written in a markup language. CSS is designed primarily to enable the separation of document content (written in HTML or a similar markup language) from document presentation, including elements such as the layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple pages to share formatting, and reduce complexity and repetition in the structural content. That means we can easily change and affect values of objects in the HTML5 web page at any time by just setting the value to a property.

Table 3. Source Code for Image Cropping 3

```
var scroller = Ext.getScrollable().getScroller();  
  
scrollx = scroller.position.x;  
scrolly = scroller.position.y;  
  
this.fireEvent("easyDiaryViewCommand", this.scrollx, this.scrolly,  
this);
```

In Table 3Table , by assigning the value to the property scrollx and scrolly of scroll panel view component, we can implement the image cropping. This is because a portion of the original image is shown in the scrollable panel area.

6. Concluding Remarks

We developed HTML5 based photo album smart application which is exchangeably executable for those two platforms. To this end, we proposed two solutions to support and increase the degree of user experience in HTML5 applications; Frame management and pinch & spread alternative implementation technique. This research proposed a model for developers to imitate the pinch & spread. This is because we have to find a workaround technique without any violation of intellectual property. It is implemented and verified by applying into a HTML5 photo album application.

Acknowledgements

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