WEB-BASED PHOTO GALLERY WITH HTML5
IMAGE MANIPULATION

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requirements for the award of Bachelor of Science
(Hons.) Software Engineering

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DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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APPROVAL FOR SUBMISSION

I certify that this project report entitled **"WEB-BASED PHOTO GALLERY WITH HTML5 IMAGE MANIPULATION"** was prepared by **TAN YI LUN** has met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Science (Hons.) Software Engineering at Universiti Tunku Abdul Rahman.

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ABSTRACT

This project aims to develop a web-based photo gallery with HTML5 image manipulation. The targeted audience for this application are people who upload their photo into any social media website or blog which contains photo gallery. The main objective of this project is to provide a free and easy to use web-based image manipulating application where user is able to edit their photos on the spot before uploading them. This project focuses on developing a web-based image manipulator with most commonly used editing tools by HTML5. Commonly and frequently used editing tools like the RGB saturation, HSL adjustment, brightness and contrast, sepia, black & white, image mirroring, image sharpening will be developed in this project. This project targets to be as user friendly as possible. User will be able to manipulate and enhance their image by playing around with the slider bar, and clicks of button will do the work. The main developing tools that will be used for the development of this application are Notepad ++ Version 6.2, Google Chrome and WAMP Server.

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LIST OF SYMBOLS / ABBREVIATIONS

HTML – Hyper Text Markup Language

W3C – World Wide Web Consortium5

USD – United Stated Dollar

RM – Ringgit Malaysia

UI – User Interface

JAI – Java Advanced Imaging

API – Application Programming Interface

RIA – Rich Internet Applications

JAD – Joint Application Development

RAD – Rapid Application Development

RGB – Red Green Blue

HSL – Hue Saturation Lightness

B&W – Black and White

CHAPTER 1

INTRODUCTION

1.1   Background

HTML5 is the latest technology of HTML. It contains numerous powerful and amazing features which could not be done by web technology previously. Although HTML5 is still currently being standardized by W3C (World Wide Web Consortium), and not all web browser is still able to support HTML5, it has a very great potential in the coming years. One of the fabulous potential of HTML5 is the HTML5 Canvas which is able to manipulate picture many different ways on web. Soon, more and more amazing algorithm and editing effects will be introduced and supported by HTML5 canvas. Hence, this is definitely a great opportunity to develop a web-based HTML5 image manipulation application.

1.2   Aims and Objectives

The objective of this project is to develop an image editing / manipulation application which will be:

- ➢ Developed using HTML5 canvas
- ➢ Able to integrate to websites
- ➢ Free of charge
- ➢ User Friendly

➢ **Developed using HTML5 canvas**

This project will utilize the technology of HTML5 to manipulate images. HTML5 features a canvas which is used to draw graphics, on the fly, on a web page (http://www.w3schools.com/html/html5_canvas.asp). The canvas technology is able to retrieve and render every pixels of the image, and manipulate it. The author shall utilize the technology of HTML5 canvas to manipulate the images, for example brighten image, sharpen image, manipulate hue and saturation and also edit background effect. This shall produce a livelier and more attractive image.

➢ **Able to integrate to websites**

During the development of this project, maintaining the coding style to maximize portability is essential. This is to ensure that the application is able to integrate into any website featuring a photo gallery with minimum or no modification on code structure.

➢ **Free of Charge**

On the 21st Century, social media has become a very common platform for teenagers to socialize. Almost everyone today owns a Facebook account. According to a statistics performed on 11/12/2012, 98% of teenagers aged 18-24 have used social media (http://www.statisticbrain.com/social-networking-statistics). Almost every social media platform features image gallery or photo album which allows user to share their daily pictures taken, hence image editing application plays an extremely important role to manipulate any necessary images. However, most of the teenagers aged below 24 are either unable to afford a few hundred dollar image editing software, or unwilling to pay a large sum of money for a license. Therefore, the application developed will be free of charge. Users do not have to pay any amount to enjoy this image manipulating feature.

Product Name	Price
PIXELMATOR	USD 59.99 (RM 186.51)
Adobe Photoshop Extended	USD 999 (RM 3105.89)
ACDSee Pro 6	USD 99.99 (RM 310.87)
Corel PaintShop Pro X5	USD 59.99 (RM 186.51)
CyberLink PhotoDirector 4	USD 99.99 (RM 310.87)

Table 1.1 : Price difference between Image Editing Software

➢ **User Friendly**

Image editing software usually contains numerous amounts of features, algorithms and functions. For instance, the most commonly used image editing software which is the Adobe Photoshop, allows user to manipulate their image in many different ways. The software is extremely advanced and contains many graphs, slide bars, buttons which may be too complex and confusing for a basic user. User may find the software less user-friendly, and most of the time unable to fully utilize all the features provided by the software. Therefore, developing a user-friendly and easy to use application is extremely important, especially when the user have none or little experience in using image editing software. It is of utmost importance to keep the application as user friendly, easy to learn, and easy to use as possible. Users are able to manipulate their images by just clicking on a few buttons. Despite being easy to use, this application should fulfill most of the photo editing effect required by users, for instance sharpen image, brighten image and even manipulating the background effect.
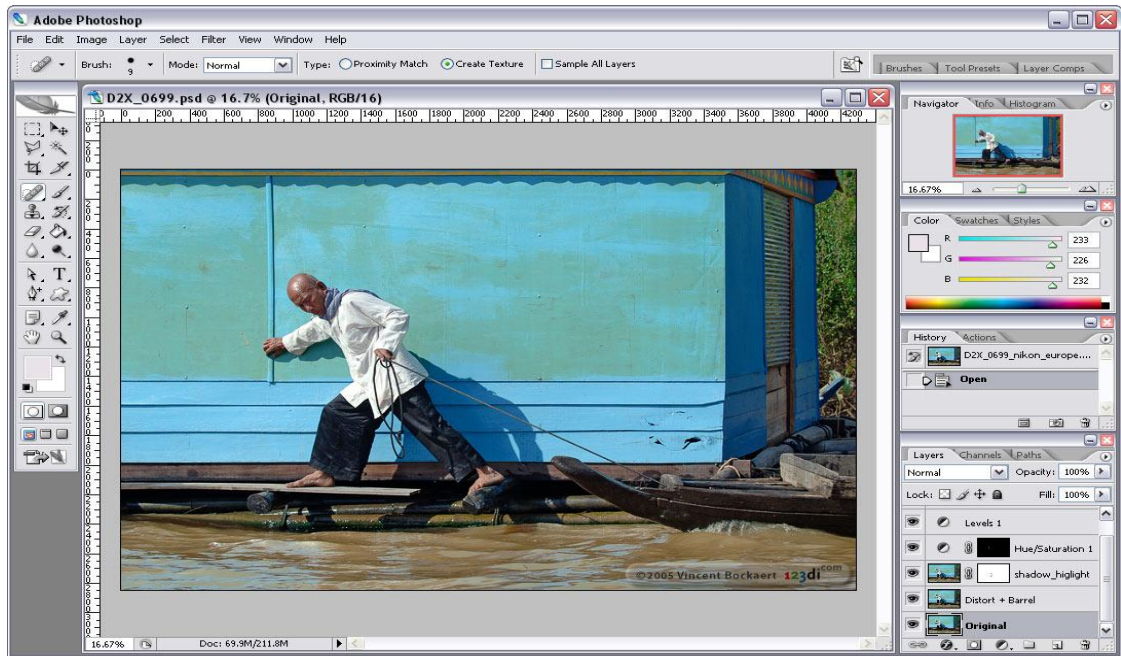
Figure 1.1 : The UI of Adobe Photoshop may be too complex for certain

users.

CHAPTER 2

LITERATURE REVIEW

2.1 Global Internet User Statistics

Ever since year 1995, the world population is experiencing a dramatic change called "The Internet Booming Era". Ever since, the internet is becoming more main stream. The amount of internet users across the world has been experiencing a very steep grow since 1995 until today. Based on a research performed by Internet World Stats, the amount of internet users have grown very unbelievably. A 15031% growth of internet users across the world has been observed from December 1995 to June 2012. The amount of internet user is set at 16 million users at December 1995 and 2,405 million users at June 2012. The graph below illustrates the growth of internet users globally by time.

Growth of Internet Users Globally (Milliions)
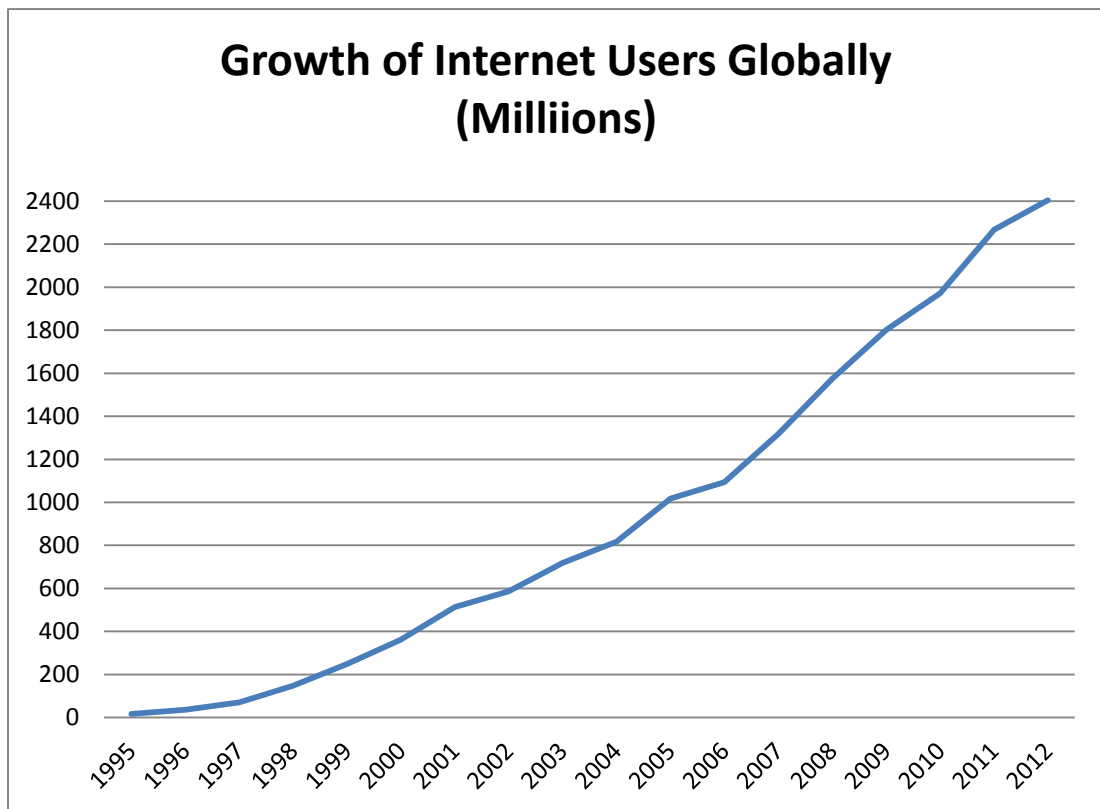
Figure 2.1 : The graphs illustrates the growth of internet users from 1995 to 2012

2.2   Global Social Networking Statistics

Subject to the humongous growth of internet users, social networking has also becoming very common to ease the communication between internet users. Besides communication, more and more people are relying on social networking to venture businesses and small enterprise. Based on a statistic performed by PewInternet.org, amount of social networking users have been growing very steeply since the year 2005, despite the age range.

Social Networking Site Use by Age Group, 2005-2012
% of internet users in each age group who use social networking sites
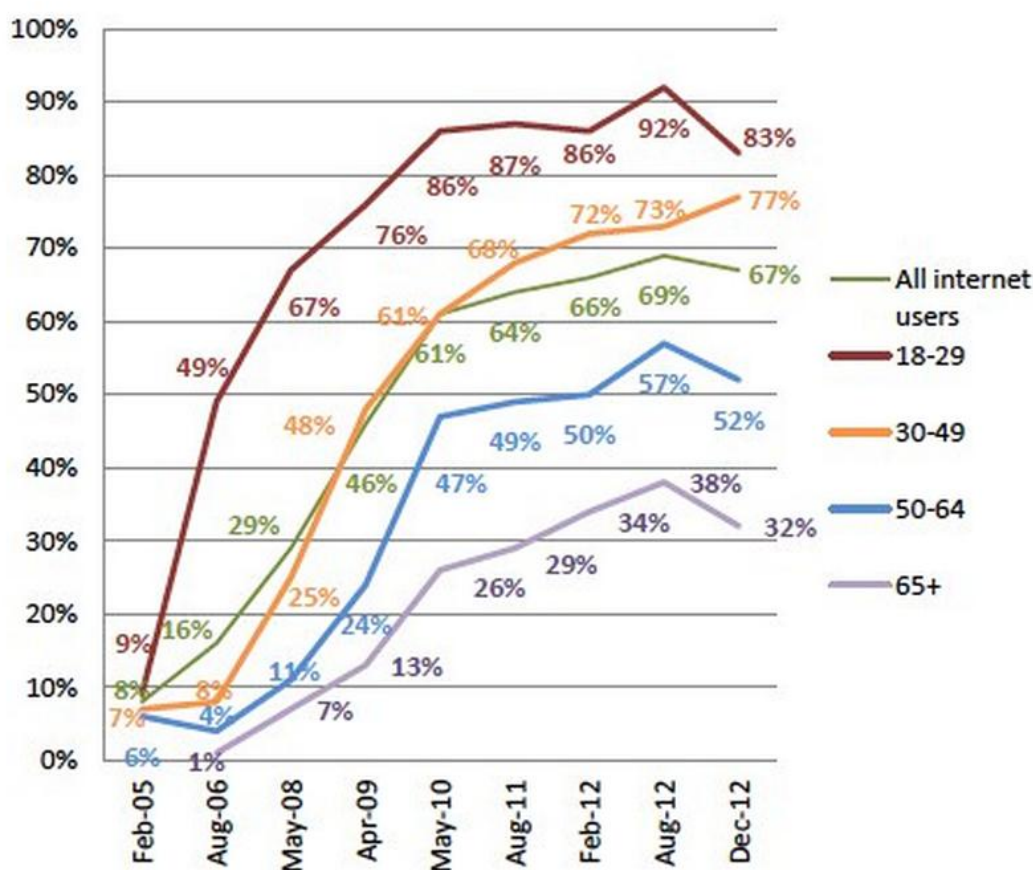
Source: Pew Research Center's Internet & American Life Project surveys, 2005-2012

Figure 2.2 : Growth of Social Networking Users with different age range

Based on the statistics above, there are 67% of the internet users who use social networking in their daily life. If we relate both the statistics performed by Internet World Stats and PewInternet.org, there are a total of 1,611 million people who use social networking by the year 2012. Besides, based on another survey performed by PewInternet.org, as of December 2012 there are:

➢ 15% of online adults say they use Pinterest

➢ 13% of online adults say they use Instagram

➢ 6% of online adults say they use Tumblr

➢ 67% of online adults say they use Facebook

➢ 16% of online adults say they use Twitter

➢ 20% of online adults say they use LinkedIn

All of the social networking websites mentioned above features a photo gallery or photo album, allowing users to upload and share their daily photos into it. However, they do not have the functionality to allow the user to manipulate or edit their images before uploading them, except Instagram which has the mentioned functionality.

Social Networking	Features Photo Gallery/Album?	Features Image Editing?
Pinterest	✔	✖
Instagram	✔	✔
Tumblr	✔	✖
Facebook	✔	✖
Twitter	✔	✖
LinkedIn	✔	✖
Flickr	✔	✖

Table 2.1 : Comparison between different social networking

2.2.1   Photo uploaded statistics

Based on another research performed by Statistic Brain on 11th December 2012, there are on average of 3,000 pictures uploaded to Flickr per minute, whereas Flickr is a home to about 5 billion pictures in total. Besides Flickr, there are about 70 billion pieces of content shared on Facebook each month, where majority of these shares are made up of images.

Social Network Statistics	Data
Total number of Facebook users worldwide	1.2 Billion
Total percentage of 18-24 year olds who already use social media	98%
Total percentage of people on Earth who use Facebook	11%
Total amount of minutes people spend on Facebook every month	700 billion
Average amount of time a person uses Facebook per month	15 hours 33 minutes
Total amount of people who access Facebook with phone	250 million
Total amount of websites that have integrated with Facebook	2.5 million
Total pieces of content shared on Facebook each month	70 billion
Total amount of unique YouTube users per month	490 million
Total amount of YouTube page views per month	92 billion
Total amount hours spent on YouTube per month	2.9 billion
Total amount of articles hosted by Wikipedia	17 million
Average pictures uploaded to Flickr per minute	3,000
Total amount of pictures hosted by Flickr	5 billion
Average amount of tweets per day	190 million
Percent of teenagers who log on to Facebook over 10 times per day	22%
Percent of Facebook users under the age of 10	25%
Percent of teens that view social networks as unsafe	59%
Percent of Americans who aren't confident in their ability to use privacy settings	24%

Figure 2.3: Social Network Statistics performed by Statistic Brain on 11th December 2012

It is clear that Facebook is currently the dominating social networking compared to other social network like Twitter or Pinterest. According to popphoto, on 2011 December there are about 250 million photos being uploaded to Facebook every day, which is equivalent to 3,000 photos per second.

2.2.2   Statistics conclusion

From all the survey and statistics above, it is of sufficient evidence to conclude that social networking and photo plays a very important role in sharing our daily life. Majority of the social networking features a photo gallery/album but however lacks of image-manipulation feature. Users therefore do not have the option to pre-manipulate their photos before uploading them to the web-server. Therefore this may be a great opportunity to develop a web-based photo gallery with image manipulation function.

2.3　　Web-based Image Manipulation

➢ Mei Tu Xiu Xiu (美图秀秀网页版)

Mei Tu Xiu Xiu is an image editing / manipulating application developed in China. It is a cross-platform application which is available either on desktop PCs, web-based, mobile-based or tablet-based. However, the web-based version should serve as the author's main reference because the target project is to be implemented on web.
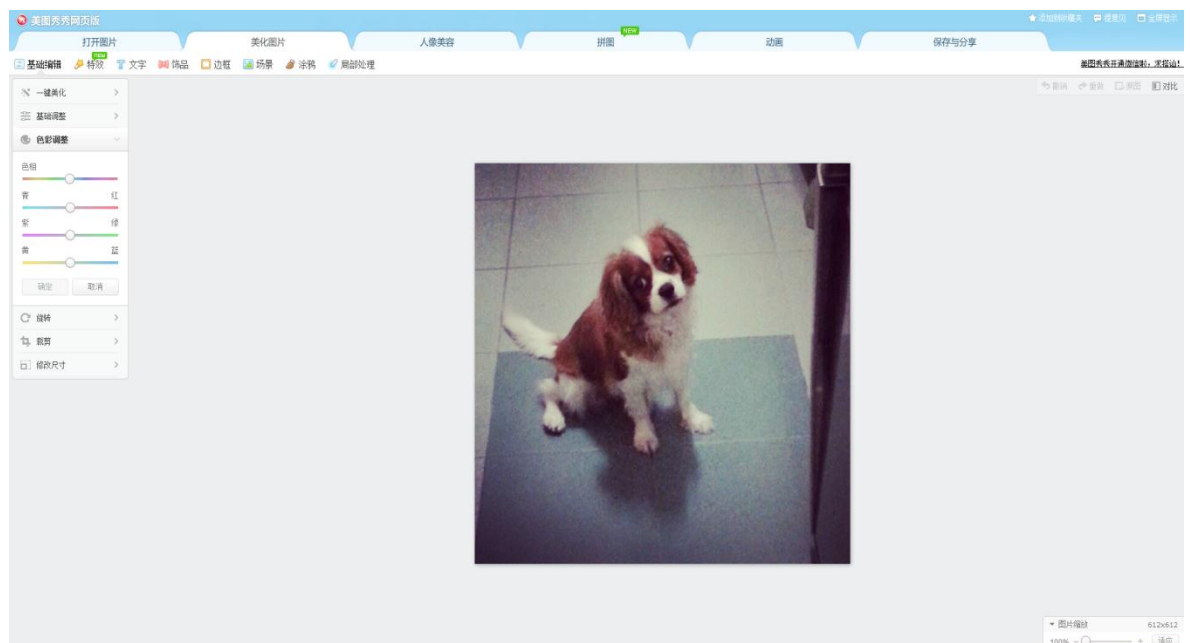
Figure 2.4: UI of China's Mei Tu Xiu Xiu Web-based Image Manipulator

➢ Pixlr

Pixlr is also an image editing/manipulating application developed by the Swedish. It is available on 3 different platforms: Web-based, Android and Apple iOS. It is categorized into 3 versions, the Advanced, Efficient and Playful. These 3 versions differ in functionality, and all of them are free to use.
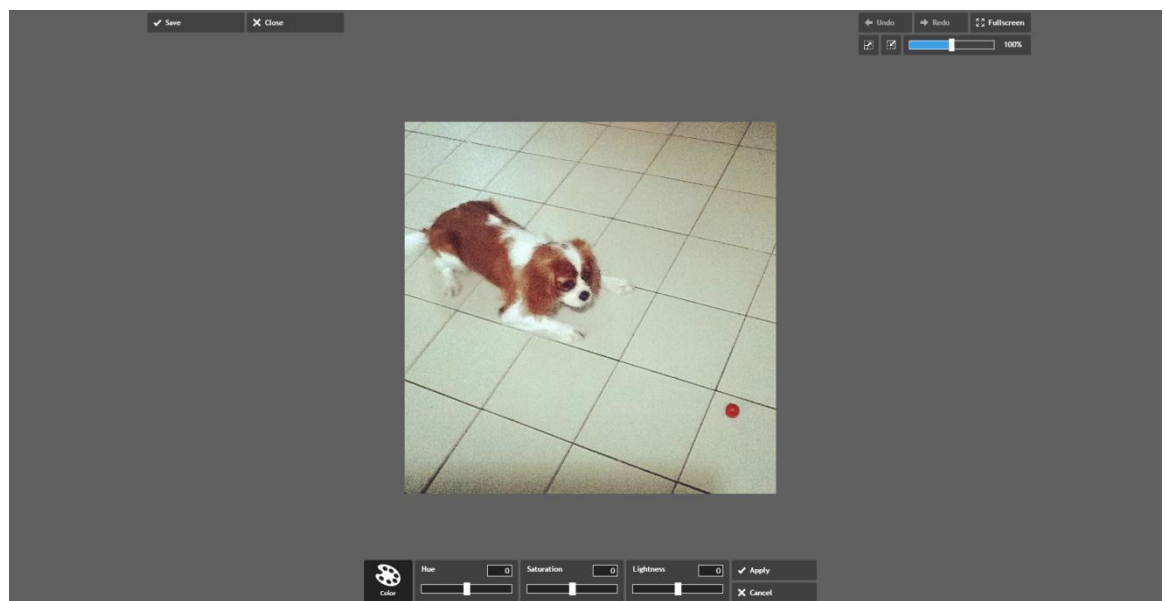
Figure 2.5: UI of Pixlr Efficient Web-based Image Manipulator

➢ FotoFlexer

FotoFlexer is a web-based image manipulator developed using Flash. It provides its photo editing service to PhotoBucket and MySpace. However, it does not support cross-platform and is only available as a web-based application. It is developed by a team in California, USA.
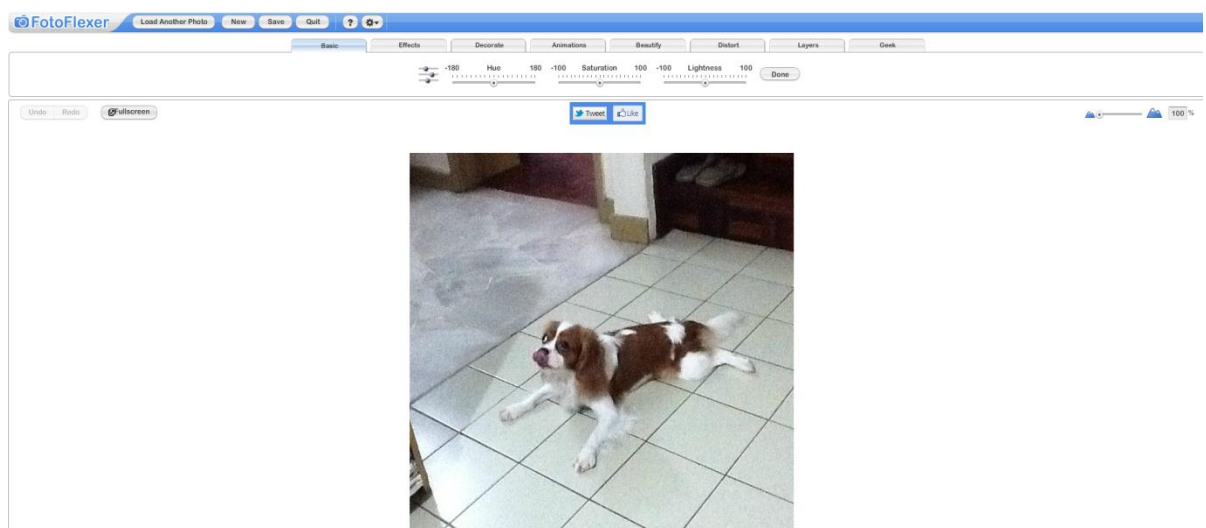
Figure 2.6 : UI of FotoFlexer Web-based Image Manipulator

2.3.1   Comparison of features available

The 3 web-based image manipulators: MeiTuXiuXiu, Pixlr and FotoFlexer will serve as the main reference in this project. Features available in each of the manipulator will be illustrated in the table below.

Functionality	MeiTuXiuXiu	Pixlr	FotoFlexer
Hue, Saturation & Lightness	✔	✔	✔
Colour Balancing	✔	✔	✔
Rotate Picture	✔	✔	✔
Crop Picture	✔	✔	✔
Picture Resizing	✔	✔	✔
Red Eye Correction	✖	✔	✔
Brightness & Contrast adjust	✔	✔	✔
Noise Removal	✖	✔	✖
Edit Background Effects	✔	✔	✔
Add Text	✔	✔	✔
Sharpen Image	✖	✔	✖
Background / facial auto beauty	✔	✖	✖
White Teeth	✖	✔	✖
One Click Greyscale	✖	✖	✖

Table2.2 : Comparison of functionality between 3 different Image Editor

From the table above, it comes into a conclusion that these 3 web-based image manipulators are able to perform the most general and common functionality used by most people, for instance the Hue, Saturation & Lightness adjust, Rotate Picture, Crop Picture, Picture Resizing, adjust Brightness and also Edit Background Effects. However, an important tool like the One-Click Greyscale is not available on any of the manipulator, whilst Sharpen Image is available only on Pixlr. Noise Removal is also essential in reducing image distortion but however is not supported by MeiTuXiuXiu and FotoFlexer.

2.3.2   Comparison of UI & Technology

The following section will discuss about the User Interface and Technology used by the mentioned image manipulator.

Features	MeiTuXiuXiu	Pixlr	FotoFlexer
User Friendly UI	Yes	Yes	Yes
Beautiful / Attractive UI	Average	Yes	No
Language	Mandarin	English	Multiple
Technology Used	Flash	Flash	Flash
Platform	Web, PC, Android, iOS	Web, Android, iOS	Web only

Table2.3 : Comparison of features between 3 different application

All the stated Image Manipulator above are developed using Flash technology. However Flash is beginning to lose its support in Android-based smartphones, whilst iOS have no support against flash since the beginning. According to an article by Jon Gold from Network World, Android is marking a further shift of momentum toward the alternative HTML5 standard. This is because Adobe has stated a policy in 2011 that it would be abandoning its efforts in the

smartphone and tablet market, in order to focus on the development of HTML5 – an open standard touted as the future of rich Web content.

2.3.3   Technology Conclusion

Due to the abandonment of flash support in Android and iOS, which is currently the dominator of smart phone market platform, all the application developed using Flash might be greatly influenced. Therefore this is absolutely a great opportunity to venture into HTML5 technology based development.

2.4   Language & Technology Research

The following section will discuss about different technology and language in terms of image processing / manipulating ability.

2.4.1   Java Applet & JAI (Java Advanced Imaging)

Java Applet is a small internet-based program written using Java. It is commonly used to provide interactive features to web-based application which could not be achieved by HTML alone. It is able to response to user inputs like mouse clicks, selection, check boxes choice etc. In response to the user action, the Java Applet is able to change the provided graphic content for instance, images. This unique feature has made the Java Applet possible to perform image manipulation. However, the Java Applet still requires an API to perform proper image manipulation, which is the JAI API.

JAI (Java Advanced Imaging) is a Java platform extension API that provides a set of object-oriented interfaces which allows developers to perform image manipulation easily. One of the web-based image editing application developed using Java Applet is the JHLabs Java Image Editor. It is developed using Java Applet with JAI API.
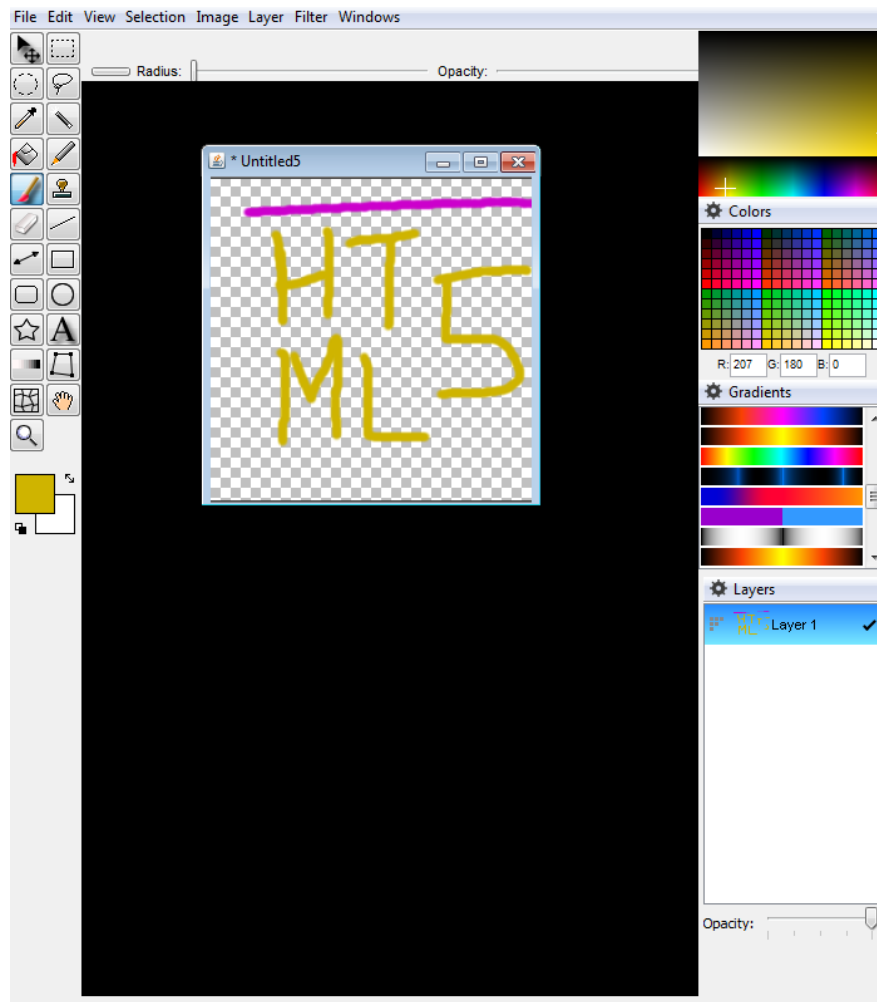
Figure 2.7 : UI of JHLabs Java Image Editor (Web Based)

However, a Java Applet based image manipulator requires the web browser to pre-install a Java plugin. It could cause unnecessary troubles if the plugin was not installed to the web browser.
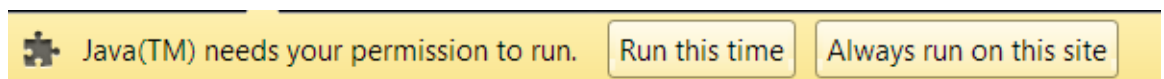
Figure 2.8 : Prompt to install / run Java Plug-In in web browser

Besides, the features and image manipulation ability of JAI is very limited. Most of its technology is considered obsolete and is unable to perform advanced image manipulation functionality, for instance the Hue & Saturation adjustment. Other than that, it has very little resource and tutorials available online.

2.4.2   Flash

Flash is a multimedia and software platform used for authoring of vector graphics, animation, games and Rich Internet Applications (RIA). Flash is able to manipulate vector and raster graphics to provide animation of text, drawings and still images. Most importantly, Flash has the ability to perform many kinds of image manipulation. Majority of the web-based image editing application currently are developed using Flash technology. For instance, one of the most popular web-based image editors is the Pixlr.

However, the later versions of Android have ditched the support of Flash in their mobile platforms, whereas Apple iOS do not support Flash at all. Since 2011, Adobe has also begun to cease their development of Flash support in Android and shifted their direction and attention towards the upcoming HTML5. Besides, web-based image editor developed using Flash also requires the web browser to install Flash plug-in. Application will cease operation if the Flash plug-in stops operating unexpectedly.

Android Version	Flash Support
Android 2.2 Froyo	✔
Android 2.3 – 2.3.7 Gingerbread	✔
Android 3.0 Honeycomb	✔
Android 3.1 Honeycomb	✔
Android 3.2 – 3.2.6 Honeycomb	✔
Android 4.0 – 4.0.3 Ice Cream Sandwich	✔
Android 4.0.4 Ice Cream Sandwich	✖
Android 4.1 – 4.1.2 Jelly Bean	✖
Android 4.2 – 4.2.2 Jelly Bean	✖
Android 5.0 Key Lime Pie	✖

Table2.4: Version of Android which support Flash

2.4.3   HTML5

HTML5 is the fifth revision of the HTML version. The first version is created in 1990, while HTML4 is standardized in 1997. HTML5 is considered a huge leap forward from HMTL4 in terms of features and functionality.

One of the interesting features of HTML5 is the Canvas element. The HTML5 Canvas allows dynamic, scriptable rendering of 2D shapes and bitmap images. This feature has made the Canvas element being able to manipulate images in many different amazing ways. HTML5 Canvas has introduced a lot of amazing image manipulation and algorithm to the Canvas. W3C (World Wide Web Consortium) claims that in the future, the Canvas element is able to perform every single manipulation available on the PhotoShop on a web.
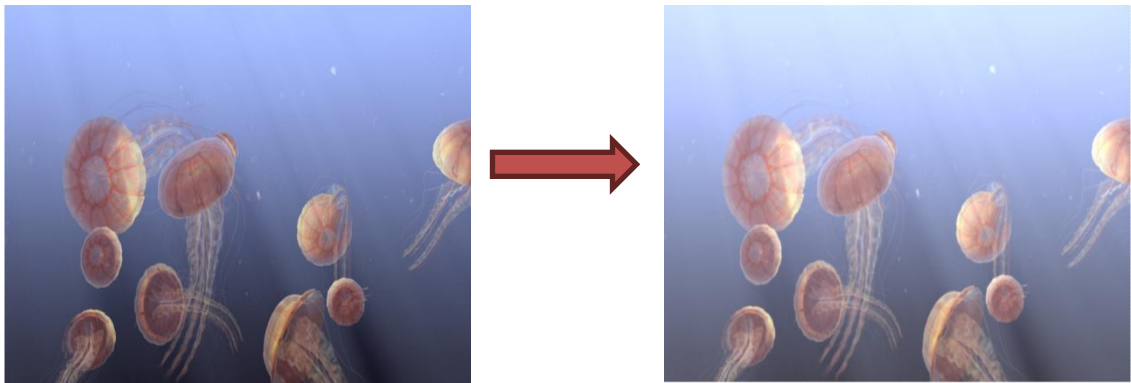
Figure 2.9 : Example of Image Brightening performed using HTML5 canvas
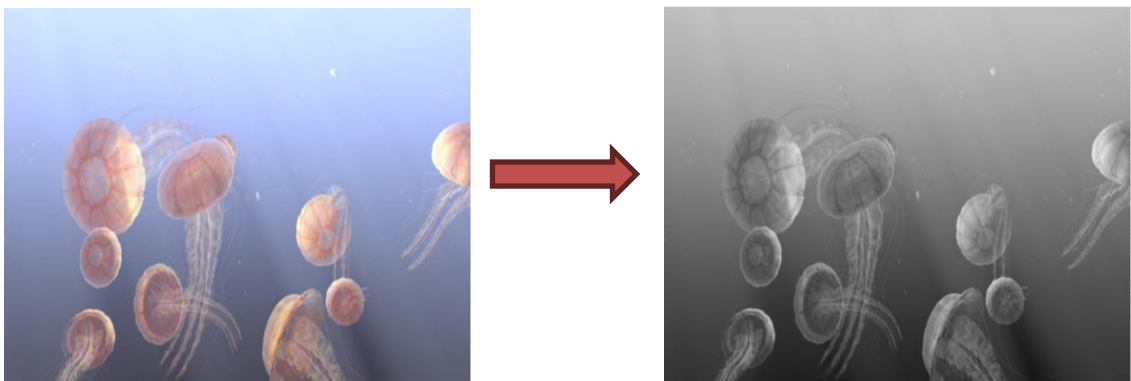
Figure 2.10 : Example of Image Grayscaling performed using HTML5 canvas

Besides having numerous amount of interesting image manipulation features, HTML5 is also gaining popularity and support from Mobile-based platform like Android and Apple iOS. More and more platforms are migrating their technology towards HTML5 based. Nevertheless, there are numerous amounts of HTML5 Canvas resource and online tutorial available on the web. Support for HTML5 development like forums and voluntary developers could be found online as well. Lastly, HTML5 does not require plug-in to operate on a web browser

2.4.4 Verdict & Conclusion

Features	HTML5	Flash	Java Applets
Requires Plug-in?	No	Yes	Yes
Technology	Very New	New	Slightly Obsolete
Image Manipulating Ability	Numerous	Numerous	Average
Online Resource Availability	Numerous	Fair	Little
Support Availability	Many	Many	Moderate
Popularity	High	High	Average
Android / Apple iOS support	Yes, increasing	Yes, reducing	No

Table 2.5: Comparison between HTML5, Flash and Java Applets

From the table illustrated above, it is of sufficient facts and evidence to conclude that using HTML5 for image editor development has more advantage compared to Flash and Java Applets. Most importantly, HTML5 is gaining popularity in the market, and will continue to gain popularity in mobile-platform. After research and analysis on different technology, the author has decided to accomplish the project using HTML5.

CHAPTER 3

METHODOLOGY

3.1   Description of Project

The main concern in this project is to develop a web-based HTML5 image manipulation application which is able to integrate to any website which features a photo gallery. Every user is able to manipulate the images they have uploaded to their desired gallery.

Firstly, the user will click on the "Upload Photos" button on the website. By clicking the button, the OS will then launch a window for the user to select their desired photos which will be uploaded to the server. The user is now able to select either one or many photos to be uploaded. After selecting the desired photos, the user will then click on the "Open" button on the window. By clicking on the "Open" button, the web browser will now load the pictures to the client side and display them to the user.
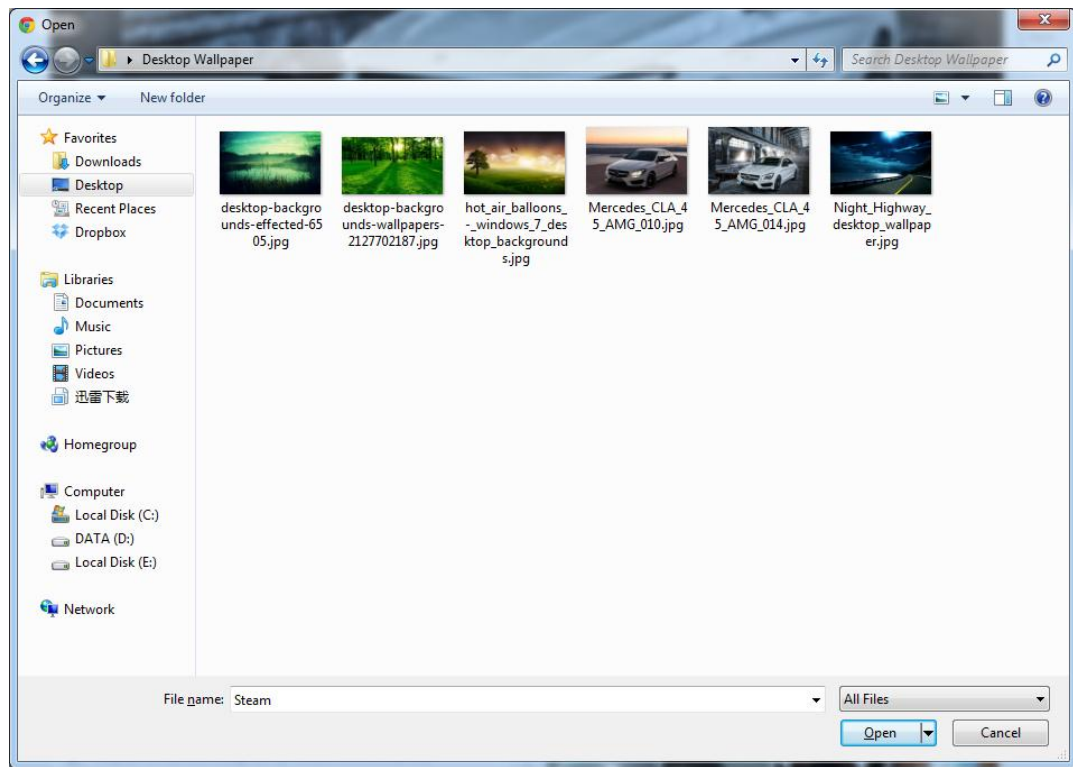
Figure 3.1 : Window for the user to select their desired photos

At this stage, the pictures are not uploaded to the server yet. Here, the user is able to see all the selected photos on the web browser. An "Edit" button is located below every picture which allows the user to manipulate and edit the photo. The user can either choose to edit their photos by clicking on the "Edit" button, or proceed to the upload part by clicking on the "Upload" button.

When the "Edit" button is clicked, a popup box will appear, displaying the selected pictures and also image manipulating functions. The user is now able to manipulate their photos in this popup box. Upon completion, the user may either click on the "Save" button or "Cancel" button. By clicking on the "Save" button, the manipulated photo will be loaded to the browser. While if the "Cancel" button is opted, all manipulating effects will be reverted.

3.2   Methodology Comparison

Methodology	Description
Joint Application Development (JAD)	Suitable when the development involves between a customer / user and the developer
Waterfall Model	Suitable when the flow of process is steady, rigid and development environment is not likely to have changes
Rapid Application Development (RAD)	Suitable when the development team is huge, has available technical skills and is able to develop a working application prototype in a very short time
Agile Methodology	Suitable when development environment undergoes constant change, and is able to adapt to different changes

Table 3.1 : Comparison between different methodology

3.3   Methodology Adopted

The methodology which the author has been practicing and will practice throughout the project is the Agile Methodology. Agile Methodology is a type of methodology which puts speed and agility in priority. It is an alternative methodology to traditional project management, typically the waterfall and sequential methodology.

Why Agile instead of other methodology? The main reason the author have chosen Agile Methodology is because it is able to increment and iterate through a specific project lifecycle, and is able to flexibly response to the ever-changing surrounding. Unlike the waterfall model, where developer has only one chance to get each aspect of the project right, the Agile Methodology allows the developer to reiterate or revisit a specific aspect throughout the lifecycle. This is because software development is an ever changing process. Everything has the possibility to change throughout a night. Therefore by adopting Agile Method, developer is able to revisit a certain aspect of the project even though critical change has either externally or internally affected the project.

In this case, HTML5 is still undergoing a constant change of standardization, while Web Browsers are also affected in order to support the change of HTML5. By practicing the Agile Methodology, the author is able to precede the project development without being obstructed or interfered by the change of HTML5 standard. Since HTML5 is still undergoing constant change, every research method performed during the project must also be agile to adapt all the changes made. Other than that, being able to flexibly allocate time and rearrange the schedule for the project is also important, since time is very limited throughout the project life cycle.

In conclusion, the Agile Methodology is the most suitable methodology to be practiced throughout the project. It fits best into the project's characteristics, and the author is confident that this methodology able to lead the project to success.

Figure 3.2 : The Agile Methodology

3.4 **Proposed System Architecture**

The following is the proposed system architecture for the project. The architecture can be divided into 3 parts, which are the **User**, the **Web Browser** and the **Web Server**. The User plays the role to provide photos and type of manipulation to be done on the photo. The Web Browser, which is also the "Center Person" between the User and the Web Server, is responsible in running client-side script to manipulate the photos based on the User's input. It also communicates with the Web Server by either storing data into it or retrieves data from it. Lastly, the Web Server serves as a repository for all the photos.
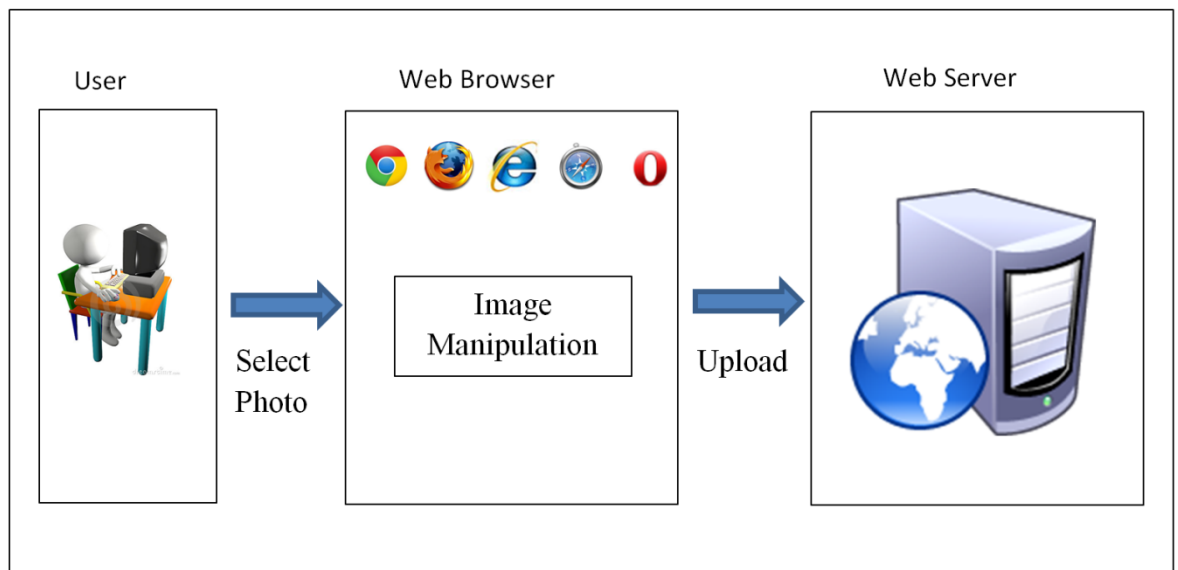
Figure 3.3: The Proposed System Architecture

3.5 **Database Design**

In this system, the database will contain 2 tables which are the Album table and the Photo table. Each album can contain 0 or more photos, whilst each photo can be included in 1 or more photo album. The primary key for the respective table are their ID.
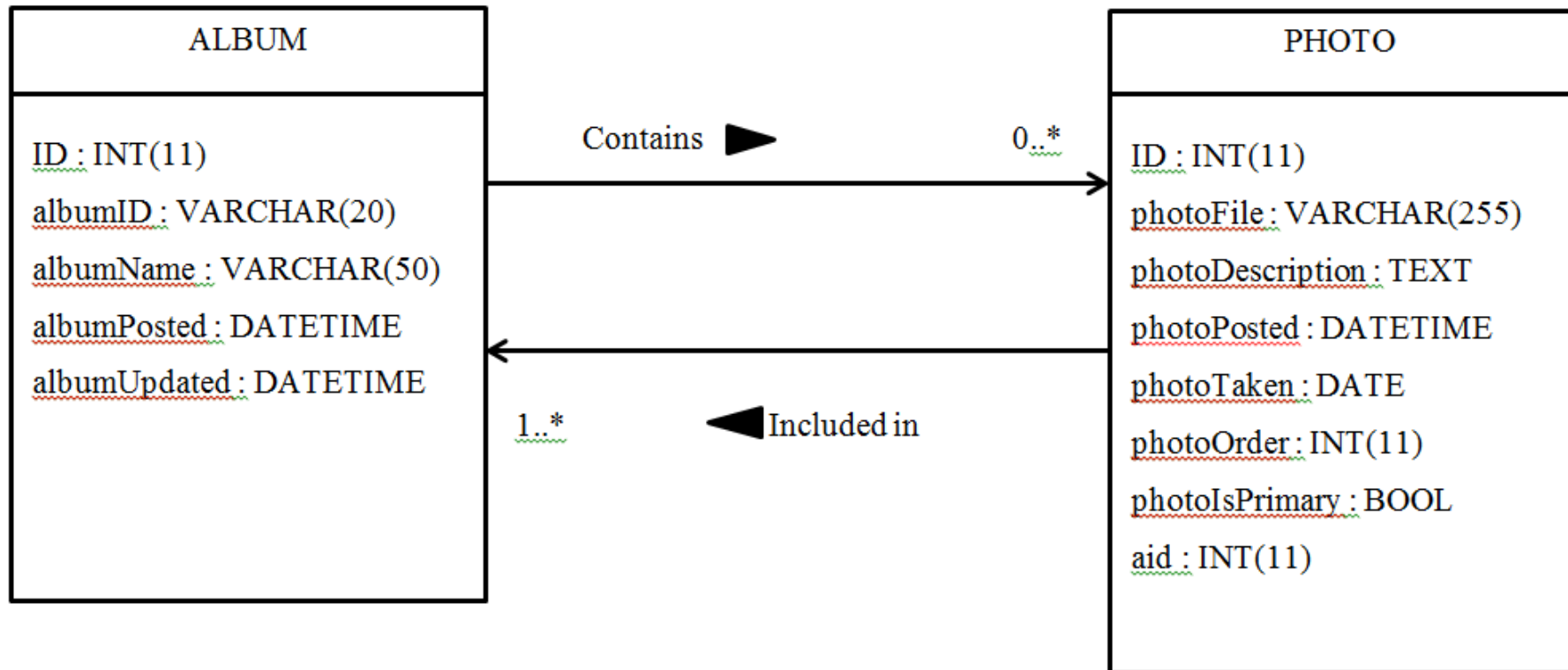
Figure 3.4: The entity-relationship diagram for the system

3.6   Development Tools

The development tools which will be used throughout the project development are as follows:

➢ Notepad++ Version 6.2

Notepad++ is neither a compiler nor an IDE. It is an open-source platform for user to edit their text or source code. For this project development, the author will utilize Notepad++ to develop the image manipulation application. Since HTML5 canvas is based on JavaScript, and JavaScript does not need any robust and advanced development platform, therefore Notepad++ has been chosen as the code development platform.

➢ Google Chrome

Currently the web browser which has one of the widest HTML5 support is the Google Chrome (Scoring 468 points out of 500). Therefore I have chosen Google Chrome as my project's testing platform.

➢ WAMP Server

WAMP server is a package consisting of Apache, MySQL and PHP (MySQL for database storage, Apache for local hosting and PHP for the server side scripting). The author will be using Apache to host the project's website during development and testing stage, MySQL for database storage and PHPMyAdmin for any backend implementation.

CHAPTER 4

MODELLING

4.1 Class Diagram

ALBUM
ID : INT(11)
albumID : VARCHAR(20)
albumName : VARCHAR(50)
albumPosted : DATETIME
albumUpdated : DATETIME
addPhotos()
editAlbum()
deleteAlbum()

PHOTO
ID : INT(11)
photoFile : VARCHAR(255)
photoDescription : TEXT
photoPosted : DATETIME
photoTaken : DATE
photoOrder : INT(11)
photoIsPrimary : BOOL
aid : INT(11)
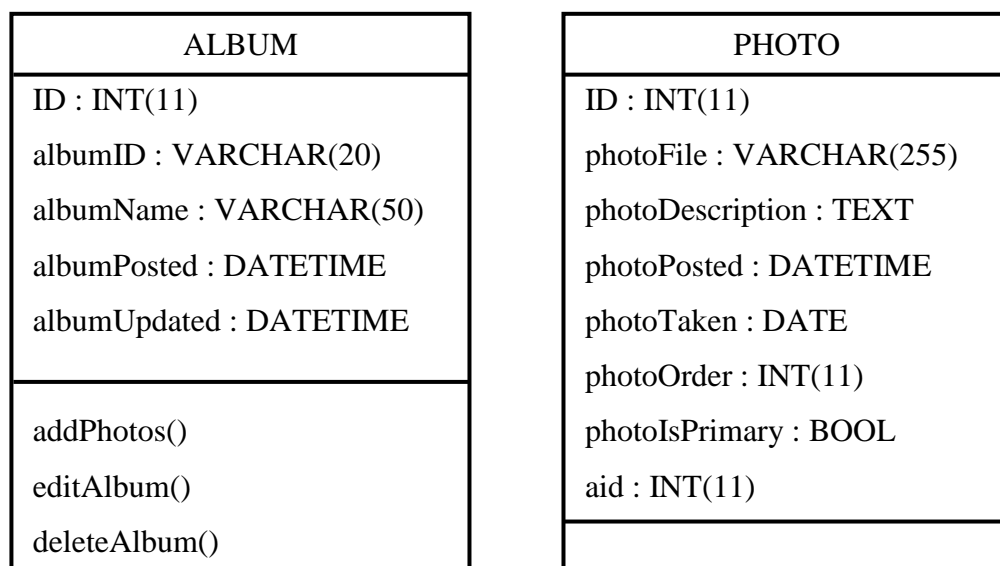
4.1.1 Class Diagram Description

The Album table has ID, albumID, albumName, albumPosted and albumUpdated as its attribute. The available related actions are adding photos to album, edit album details, and delete album.

The Photo table has ID, photoFile, photoDescription, photoPosted, photoTaken, photoOrder, photoIsPrimary and aid as its attribute. There are no available actions related to the photo table.

4.2   Use-Case Diagram
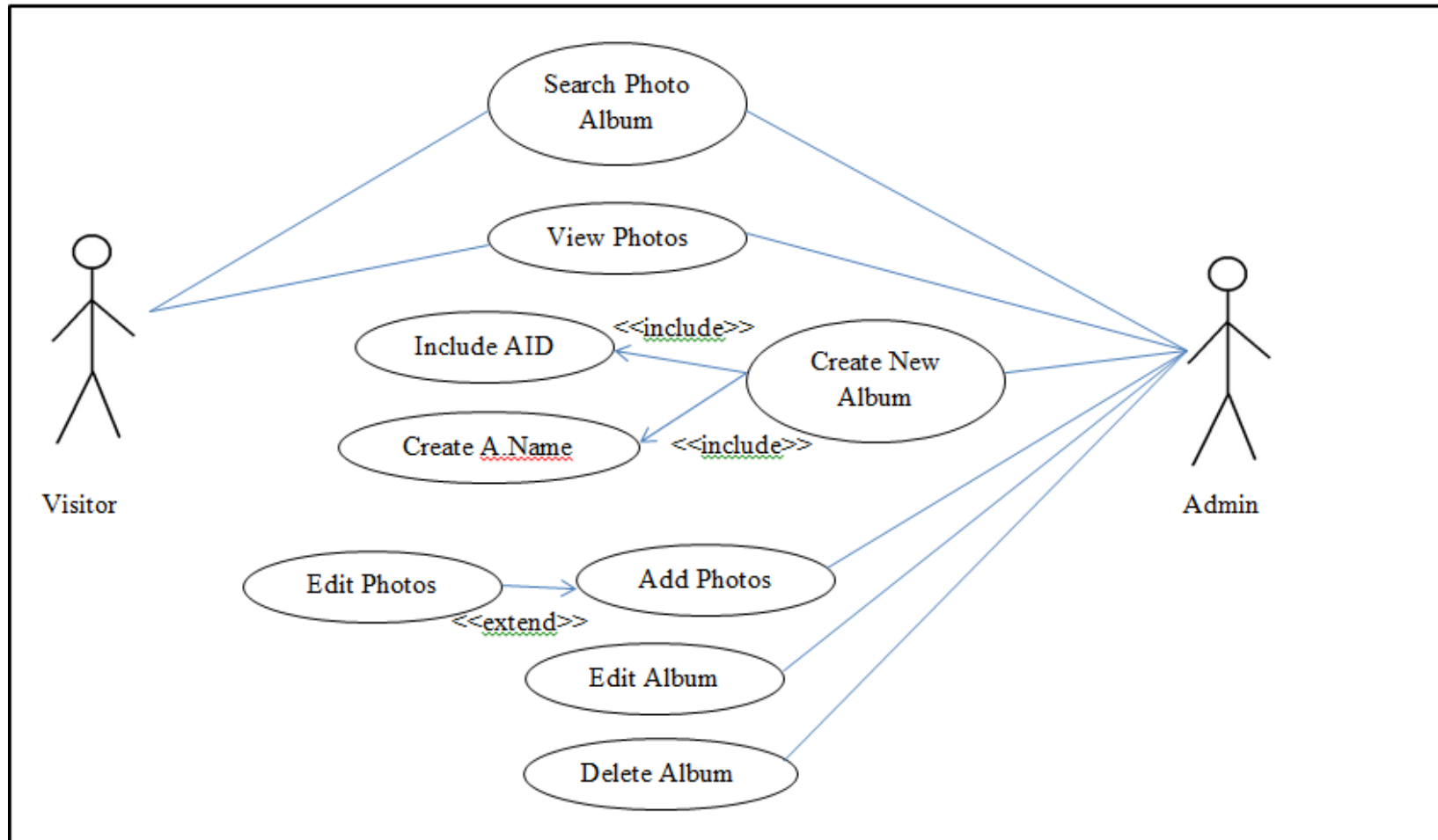
Figure 4.1 : The use-case diagram for the photo album section

4.2.1   Use-Case Diagram Description

Visitor refers to people who visit the website. Their actions are limited to only a few. They are able to search for a desired photo album by typing into the search bar, and view photos contained in the photo album. Visitors are unable to perform any admin task like uploading or managing photos.

The admin is a user who has access to the backend of the system. Admin is able to perform administration task like creating a new photo album, adding photos into designated albums, edit album and also delete album. Upon adding photos into the album, admin has the option to edit the photo before uploading, or proceed with the uploading.

4.3   Activity Diagram

Patron/Admin : View Photo Album
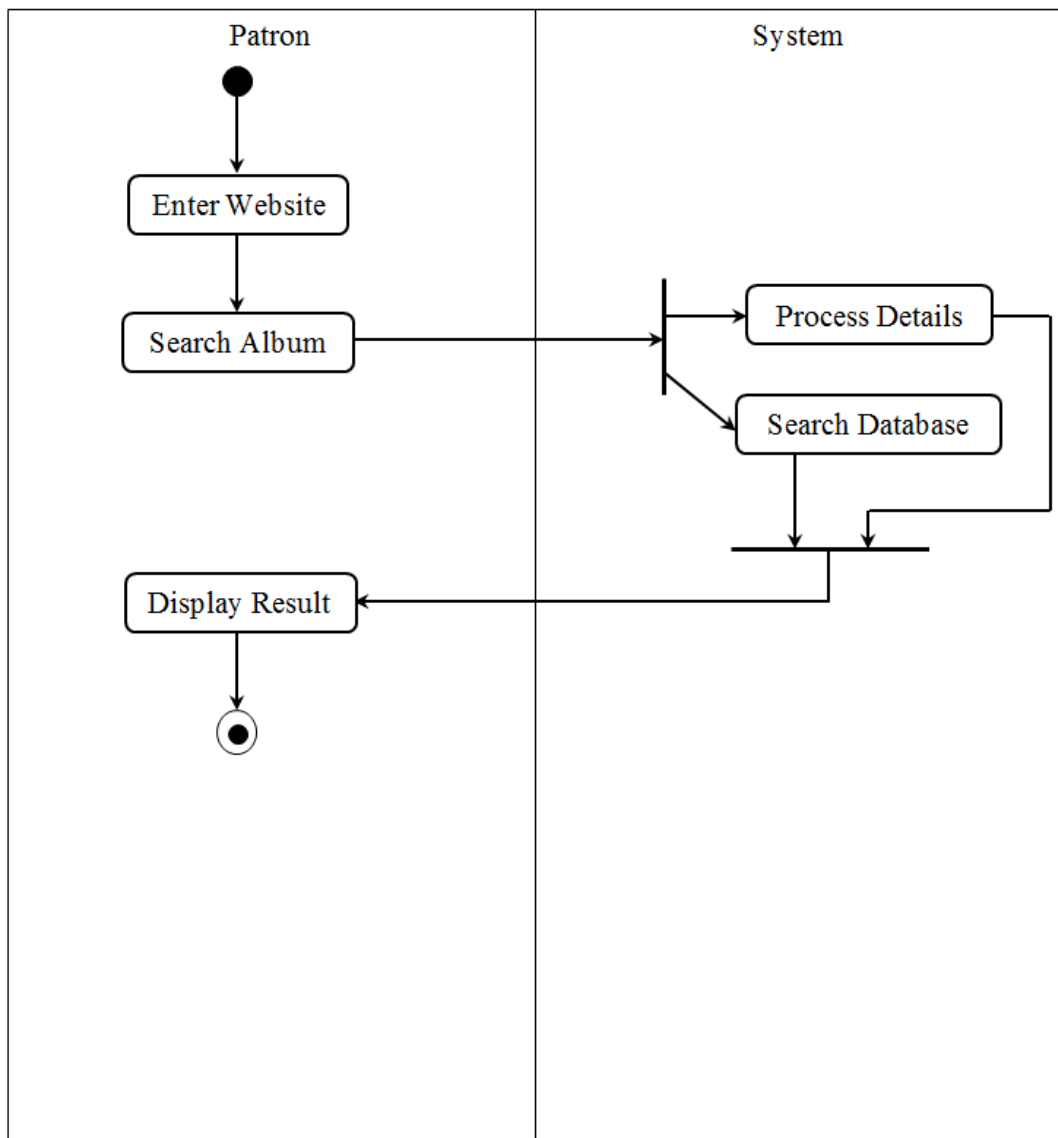
Figure 4.2 : Activity diagram for viewing photo album

Admin : Upload Photo
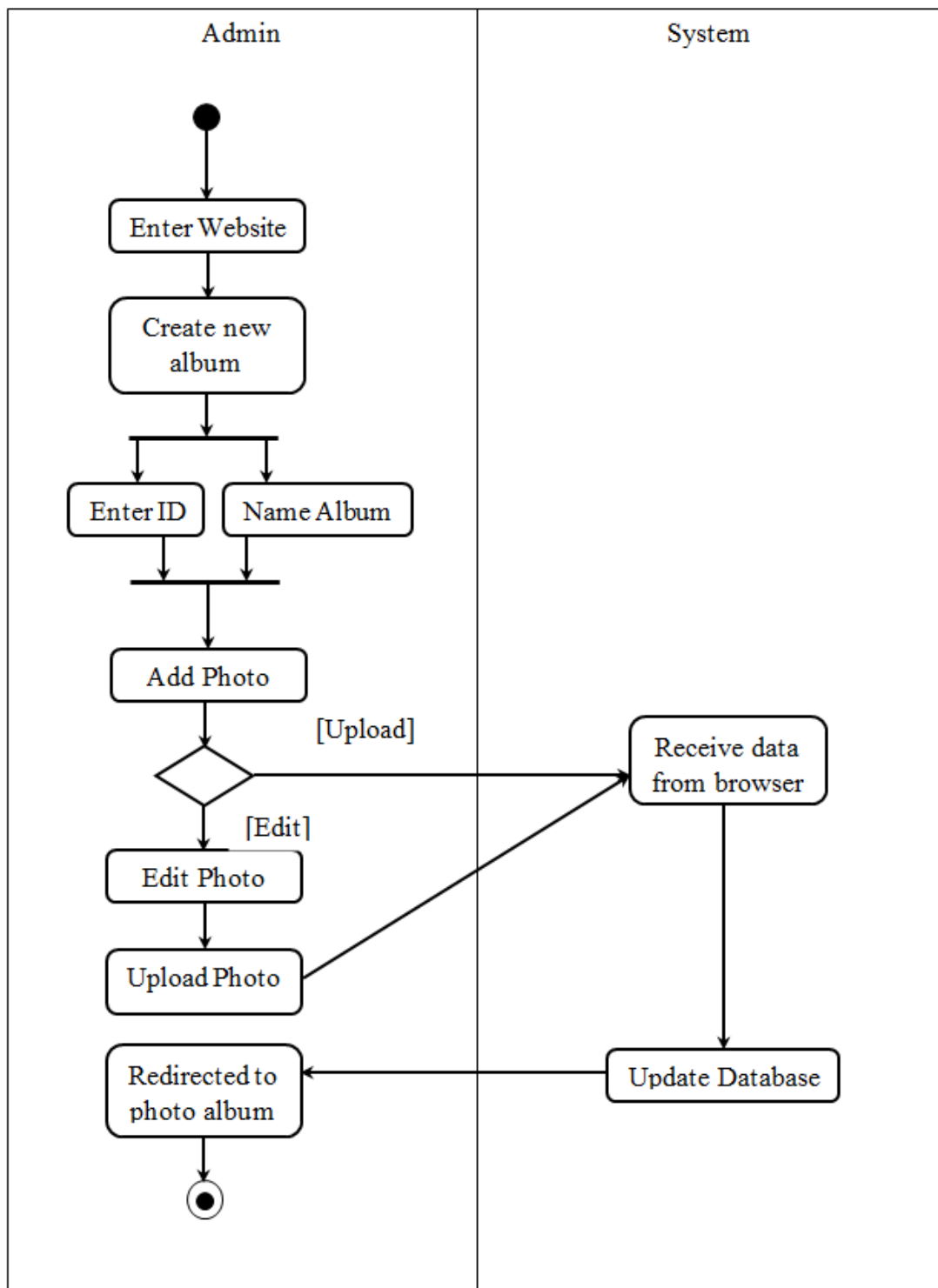
Figure 4.3 : Activity diagram for uploading photo

4.4   State Transition Diagram

State transition of Photo Album:
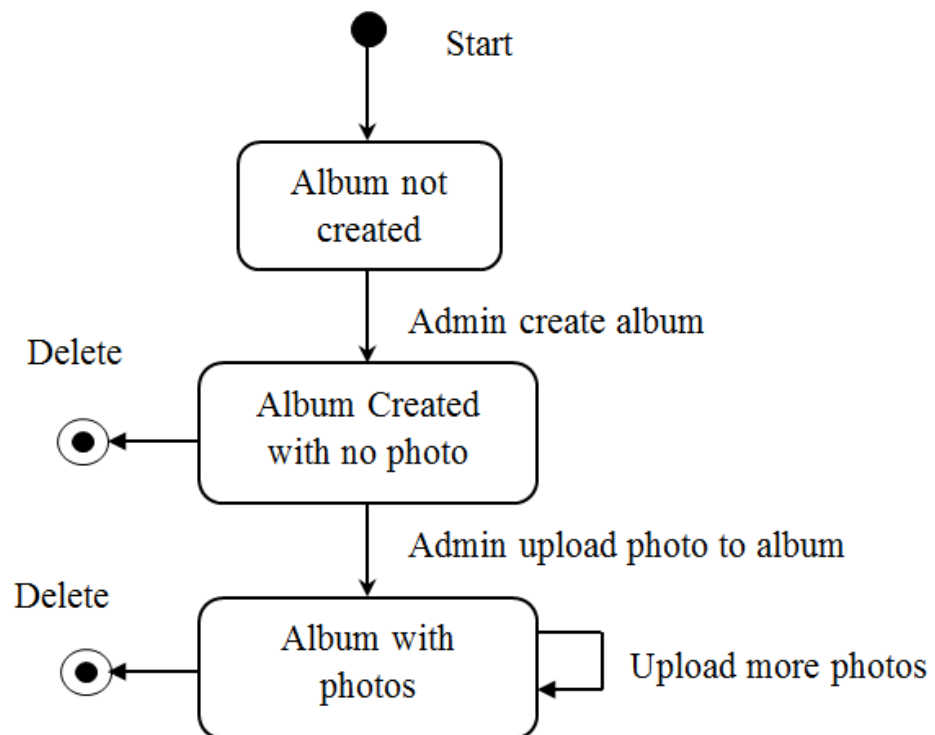
Figure 4.4 : State transition diagram of photo album

State transition of Photo:
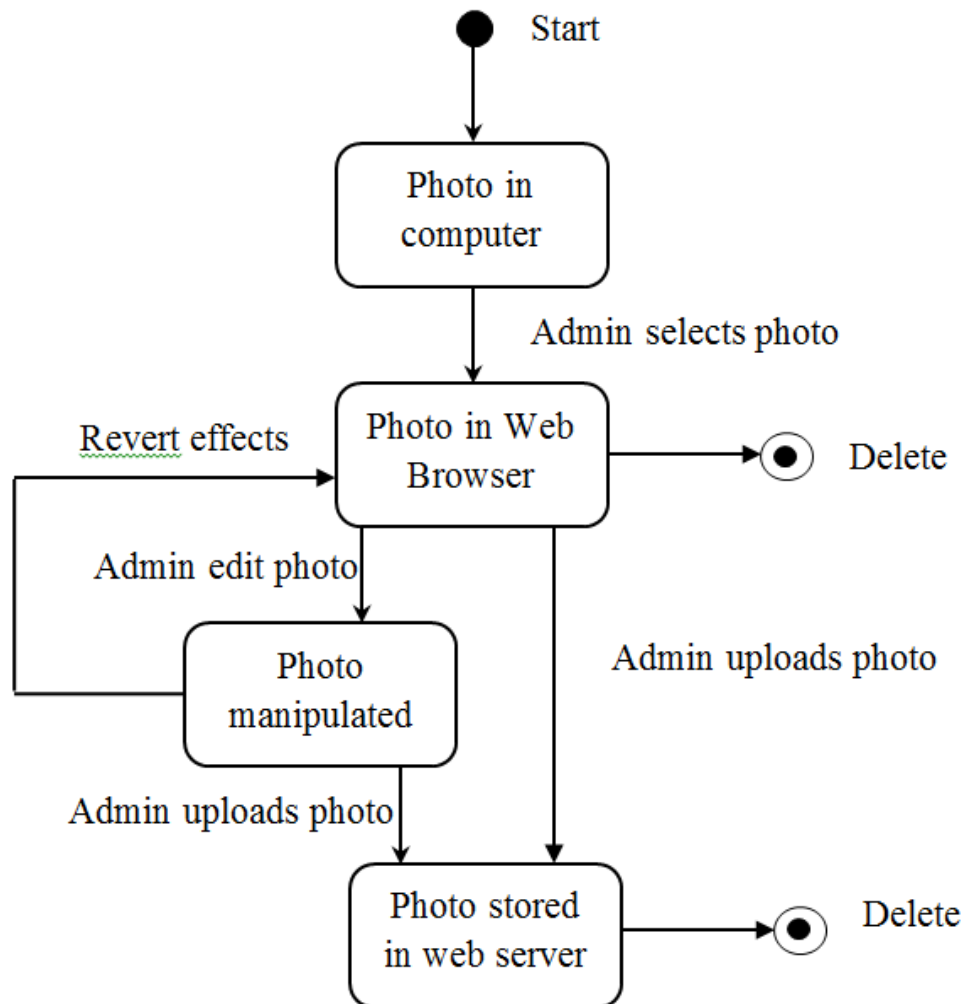
Figure 4.5 : State transition diagram of photo

CHAPTER 5

PROGRAM VERIFICATION

5.1   Testing

Web testing is a collection of activities whose purpose is to uncover as many errors as possible in a WebApp; which includes content, function, usability, navigability, performance, capacity and security. A testing strategy involving both reviews and executable testing is applied throughout the Web Engineering process. In this project, the testing process will be carried out by the author and a few respondents. The five tests which will be performed in our project will be:

i)   Content Testing
ii)   Interface Testing
iii)   Component Testing
iv)   Configuration Testing
v)   Security Testing
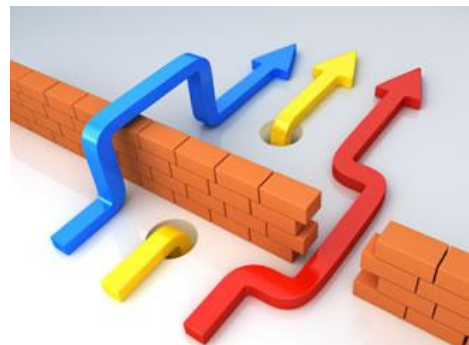
5.2 **Content Testing**

Test Case : Grammar, spelling and term check			
Description : Checked the grammar, spelling and Photoshop term throughout the application to make sure there is no mistake or misunderstanding			
Step Number	**Step Description**	**Result**	**Step taken**
1	Grammar and spelling checked throughout the application	A few Photoshop term misused	Corrected Photoshop term

Table 5.1: Content Testing for system

Test Case : Application arrangement, correctness and semantic check			
Description : Respondent are invited to use the application and later explain their semantic understanding and user experience			
Step Number	**Step Description**	**Result**	**Step taken**
1	Respondent required to explain their understanding on terms	Terms are easy to understand and cause no confusion	N/A
2	Respondent required to explain their comfortable about the system arrangement	Respondent are comfortable with arrangement	N/A

Table 5.2: Content Testing for system

5.3 **Interface Testing**

Test Case : Check for design rules compliance			
Description : Checked the interface of the application to ensure every design rules has been complied and make sure interface do not cause any ambiguity among users.			
Step Number	**Step Description**	**Result**	**Step taken**
1	Check and make sure the application interface is organized and neat	A few button do not have appropriate size	Adjustment on button size

Table 5.3: Interface Testing for system

5.4   Component Testing

Test Case : Test image editing function

Description: Test and ensure every component in the the editing system works correctly without error.

Step Number	Step Description	Expected Result	Actual Result	Conclusion
1	Test the RGB (Red Green Blue) effect by adjusting the slider bar	The photo will manipulated based on users' setting	Photo is manipulated when user adjust the slider bar	The RGB effect is working correctly as expected
2	Test the HSL (Hue Saturation Lightness) effect by adjusting the slider bar	The photo will manipulated based on users' setting	Photo is manipulated when user adjust the slider bar	HSL effect is working correctly, however currently HSL effect applies to Master. Research required.
3	Test the noise effect by adjusting the slider bar and click on the button	Noise will be added into the photo based on users' setting	Noise is added to the photo when button is clicked	Noise is added correctly to the photo.
4	Test the brightness and contrast effect by adjusting the	The photo will brighten / contrasted based on users' setting	Photo is manipulated when user adjust the	The photo is brighten and contrasted accurately

	slider bar		slider bar	
5	Test the Posterize effect by adjusting the slider bar	The photo will posterized based on users' setting	Photo is posterized when user adjust the slider bar	The photo is posterized accurately
6	Test the Lighten effect by adjusting the slider bar	The photo will lighten based on users' setting	Photo is lighten when user adjust the slider bar	The photo is Lighten accurately
7	Test the Invert effect by clicking the button	The photo colour will be inverted	The photo colour is inverted	The photo colour is inverted correctly
8	Test the Sepia effect by clicking the button	The photo will have sepia effect	The photo has sepia effect after	The sepia effect works correctly
9	Test the B&W (Black and White) effect by clicking the button	The photo will have only black and white colour after effect	The photo is black and white	The B&W effect works correctly
10	Test the sharpen effect by clicking the button	The photo will be sharpen	The photo has been sharpen	The sharpen effect works correctly
11	Test the mirror effect by clicking the button	The photo will be mirrored	The photo has been mirrored	The mirror effect works correctly

12	Test the solarize effect by clicking the button	The photo will be solarized	The photo has been solarized	The solarize effect works correctly
13	Test the blur effect by clicking the button	The photo will be blurred	The photo has been blurred	The blue effect works correctly
14	Test the image resizing function for landscape images	The photo will be resized to 800 width and 600 height	The photo has been resized to 800 width and 600 height	The resizing function works correctly
15	Test the image resizing function for portrait images	The photo will be resized to 600 width and 800 height	The photo has been resized to 600 width and 800 height	The resizing function works correctly
16	Test the revert image function	All the manipulated effect on the photo will be removed	The photo has been reverted to original condition	The revert function works correctly
17	Test the textbox by inserting non numeric value into it	The textbox should not accept non-numeric value	User is unable to input non-numeric value into textbox	The textbox works correctly

Table 5.4: Component Testing for system

5.5   Configuration Testing

Test Case : Test the application across different web browser			
Description : To test the application compatibility across different web browser for example Google Chrome, Mozilla Firefox and Internet Explorer			
Step Number	**Step Description**	**Result**	**Step taken**
1	Performed application testing on Google Chrome	Great usage experience as GC has wide support against HTML5	N/A
2	Performed application testing on Mozilla Firefox	Average usage experience. Some feature may not work due to lack of support of HTML5 in MF.	N/A
3	Performed application testing on Internet Explorer	Poor usage experience. IE9.0 has poor support against HTML5.	N/A

Table 5.5: Configuration Testing for system

5.6   Security Testing

Test Case : System backend panel security test				
Description: The backend panel of the system is breached to test for security				
Step Number	**Step Description**	**Expected Result**	**Actual Result**	**Conclusion**
1	Enter the system backend panel from visitor PC	Normal user will not have access to backend panel	User is unable to access the backend panel	Only user with administration privilege has access to backend

Table 5.6: Content Testing for system

CHAPTER 6

SYSTEM RESULT AND FUNCTIONALITY

6.1   Introduction

The following section will show and demonstrate the interface and functionality of HTML5 Image Manipulator developed in this project. Instead of the integrated version of Image Manipulator, client side version of the system will be shown in the following section as integration work is still under progress.
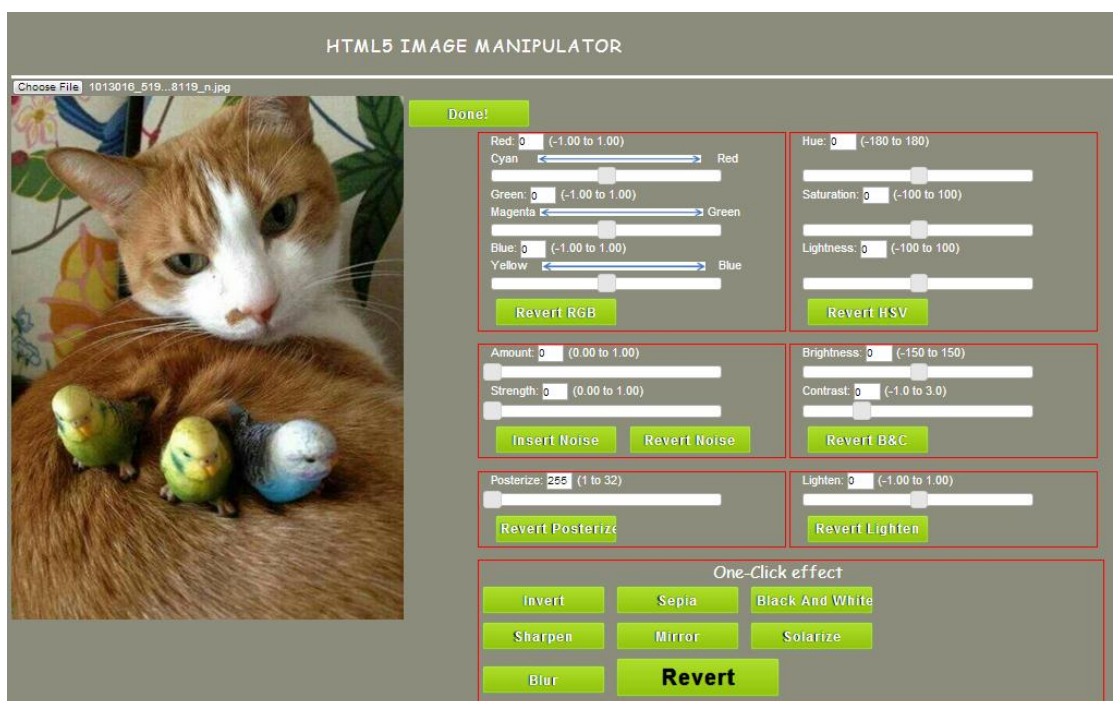
6.2   System Interface

Figure 6.1 : Interface of the HTML5 Image Manipulator

Figure6.1 shows the interface of the HTML5 Image Manipulator together with an image loaded into the canvas. The interface mainly divided into 2 panels: the left panel and right panel. The left panel consist of the canvas; where image is loaded into and rendered pixel by pixel. The right panel will be the manipulation part where user manipulates their photo by clicking button and sliding the slider bar. Besides, user is also given the option to manually manipulate their photo by entering a value into the textbox.

The right interface consist of 13 types of manipulating methods, which are RGB, HSL, Noise, Brightness & Contrast, Posterize, Lighten, Invert, Sepia, B&W, Sharpen, Mirror, Solarize and Blur. The RGB, HSL, Brightness & Contrast, Posterize and Lighten effects were controlled using slider bars. User can simply manipulate their photo by sliding the slider bar. Also, user is given the option to manually insert a numeric value to manipulate their photo. Invert, Sepia, B&W, Sharpen, Mirror, Solarize and Blur effects can be manipulated by clicking on buttons.

It is also noticeable that under every cubicle for the slider bars, there is a button to revert the effect manipulated by user. These buttons were used to remove any particular effects manipulated by the user. The functionality of these buttons will be demonstrated in the following section.

6.3   System Demonstration

This section will demonstrate all the functionality developed in this HTML5 Image Manipulator.

6.3.1   Image Resizing Functionality

A built-in image resizing functionality has been developed in this project. When the user loads an image into the canvas, the image will be resized automatically. This image resizing function has been developed to recognize whether if the image is in portrait or landscape, and will perform resizing respectively. This

functionality is to prevent any possible quality of dimension defects on the photo. If an image is in landscape, the image will be resized into 480pixel width and 640pixel height. If an image is in portrait, the image will be resized into 640pixel height and 480pixel width.

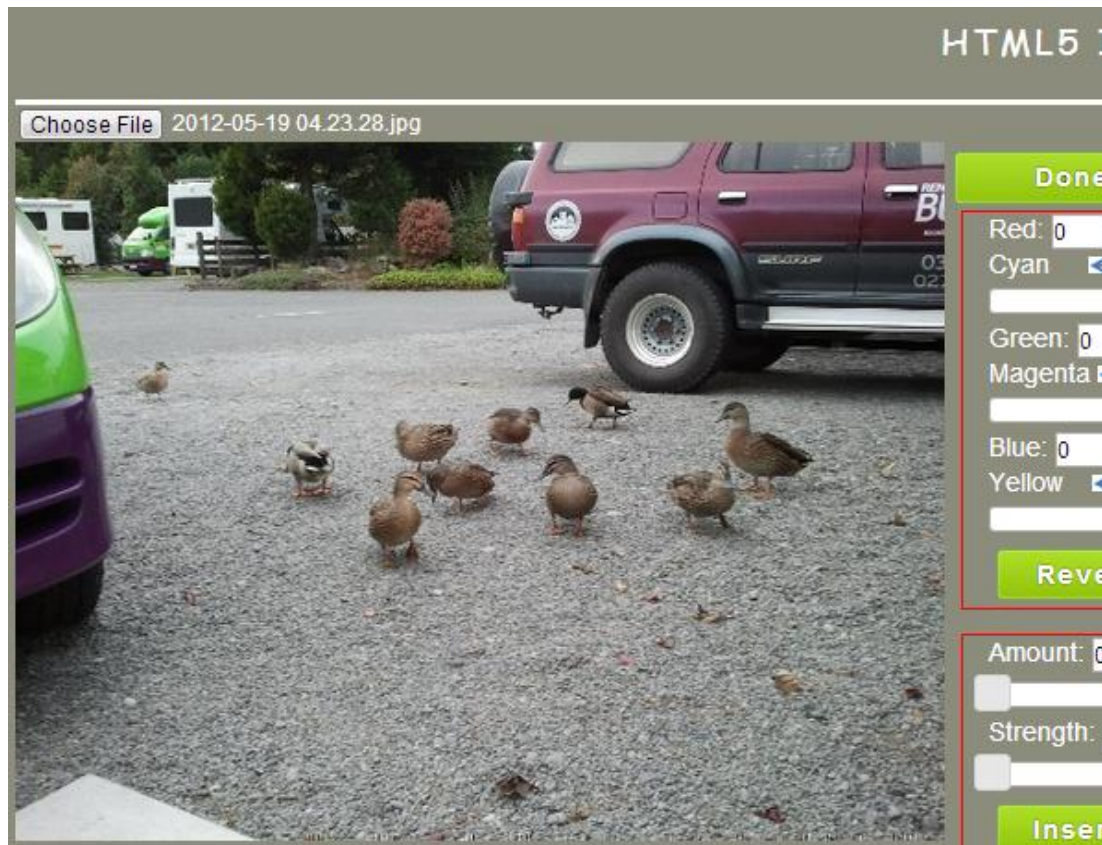Figure 6.2: Portrait image has been resized into 640pixel height x 480pixel width

Figure 6.3: Landscape image has been resized into 640pixel width x 480pixel height

Figure6.2 and Figure6.3 demonstrates the image resizing functionality. The admin can simply adjust their desired resizing dimension by editing values in the JavaScript.

6.3.2 RGB Functionality

The RGB functionality has been developed in this project. It will manipulate the Red, Green and Blue aspect of the image based on users' requirement. User can either manipulate the RGB by sliding the slider bar or manually inserts a value into the text box.
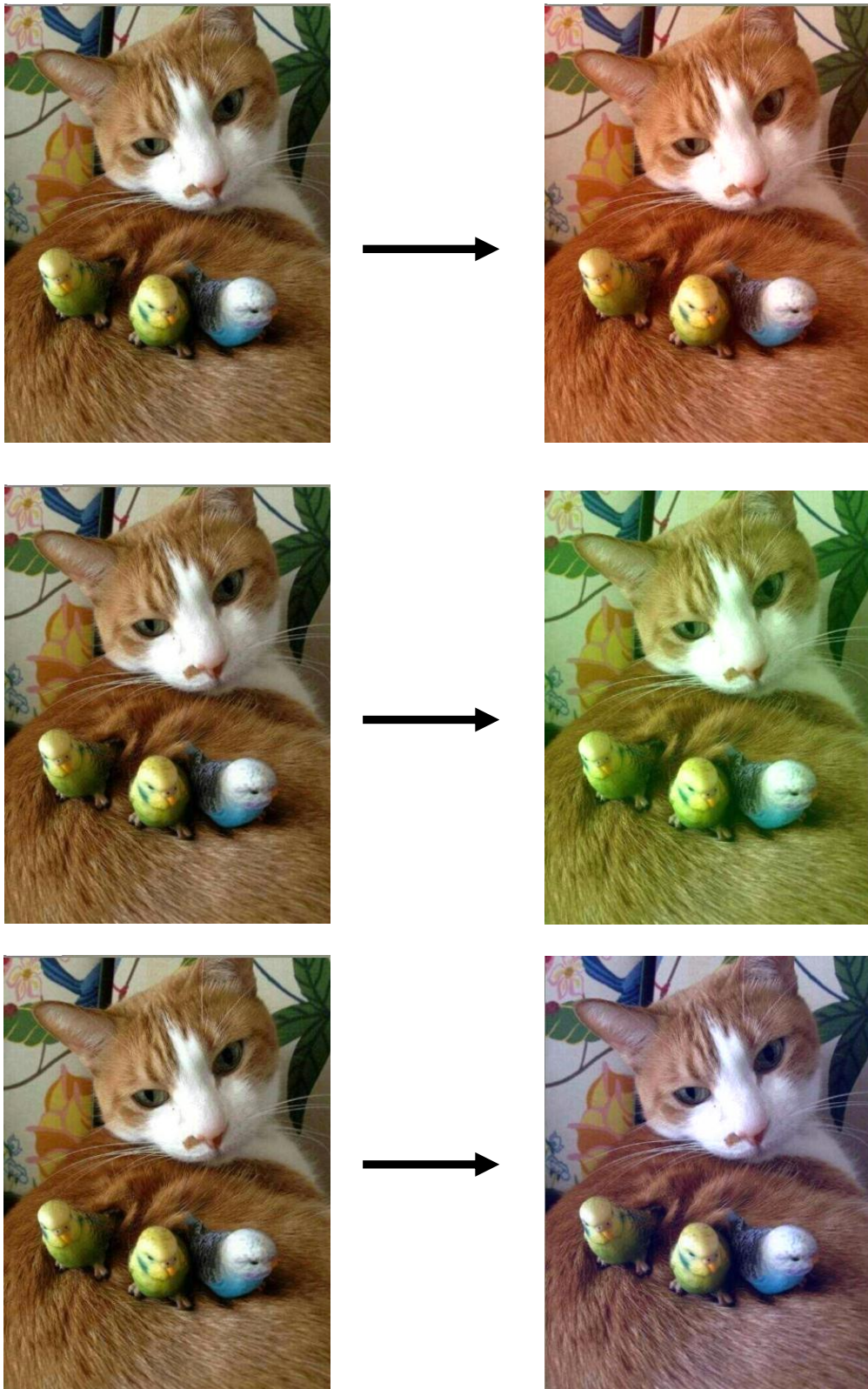
Figure 6.4: From top to down, image has been manipulated with 0.15 Red, Green, Blue respectively

6.3.3   HSL Functionality

The HSL functionality has been developed in this project. It works by adjusting the amount of Hue, Saturation and Lightness of the image. It is one of the most useful functionality in Photoshop. However due to technology and library limitation, the HSL functionality developed in this project is only able to adjust the master HSL of the image.
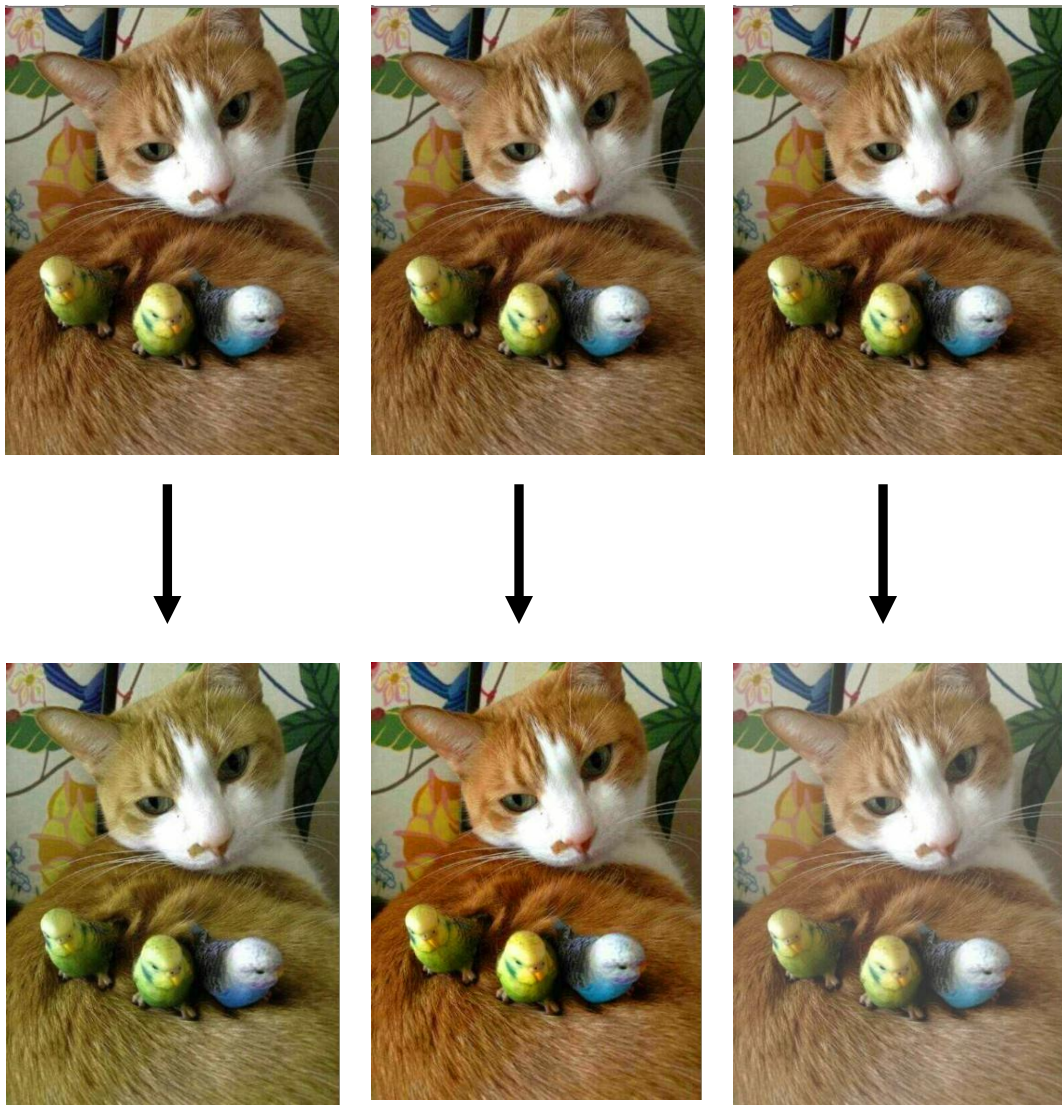

Figure 6.5: From left to right, image has been manipulated with 15, 25and 20 Hue, Saturation and Lightness respectively.

6.3.4   Noise Functionality

User is able to add some noise to enhance the image atmosphere by using the Noise functionality developed in this project. User can adjust the amount and strength of noise added into the image by adjusting the slider bar.
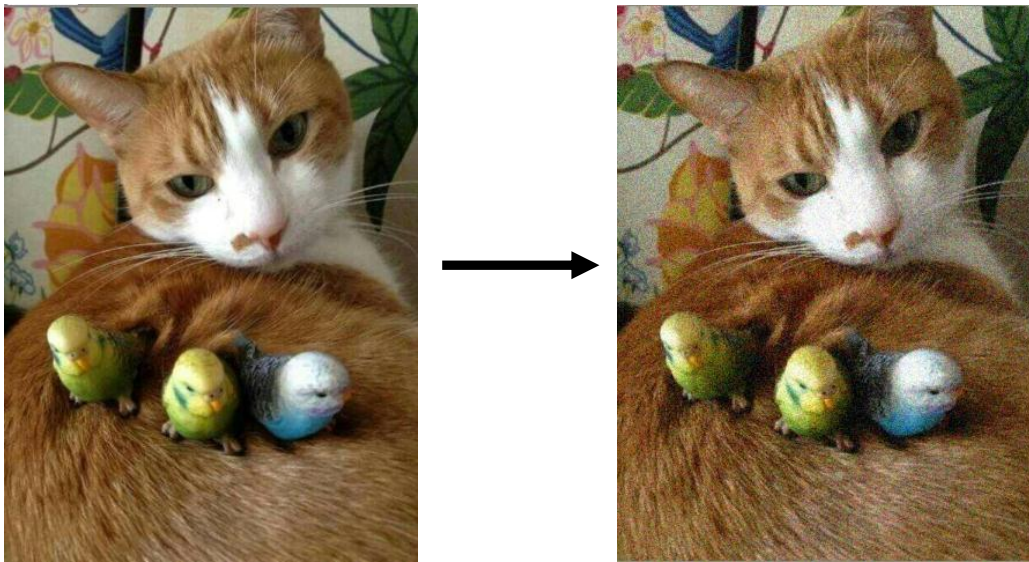

Figure 6.6: Image has been added with noise of 0.8 strength and amount

6.3.5   Brightness & Contrast Functionality

In occasion where image captured may be too dark or with poor lighting, user is able to adjust the brightness and contrast of the image by adjusting the brightness and contrast slider bar. Following will demonstrate the functionality of brightness and contrast.
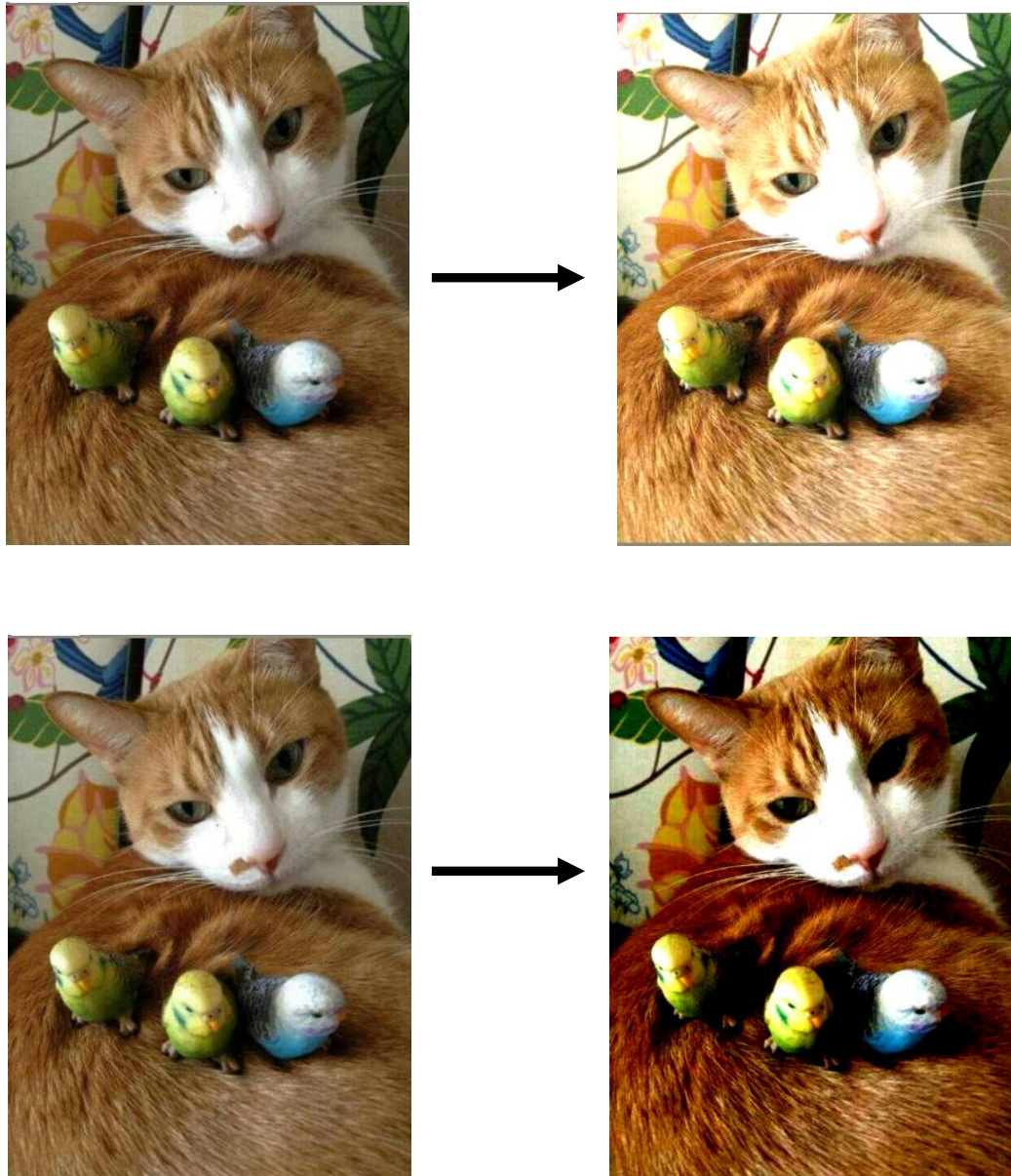
Figure 6.7: From top to down, image has been manipulated with 100 brightness and 1.0 contrast respectively

6.3.6 Posterize Functionality

Posterize is an effect added to image to enhance the image atmosphere and additional effect. User is able to posterize the image by sliding the slider bar. Following section will demonstrate the functionality of Posterize developed in this project.
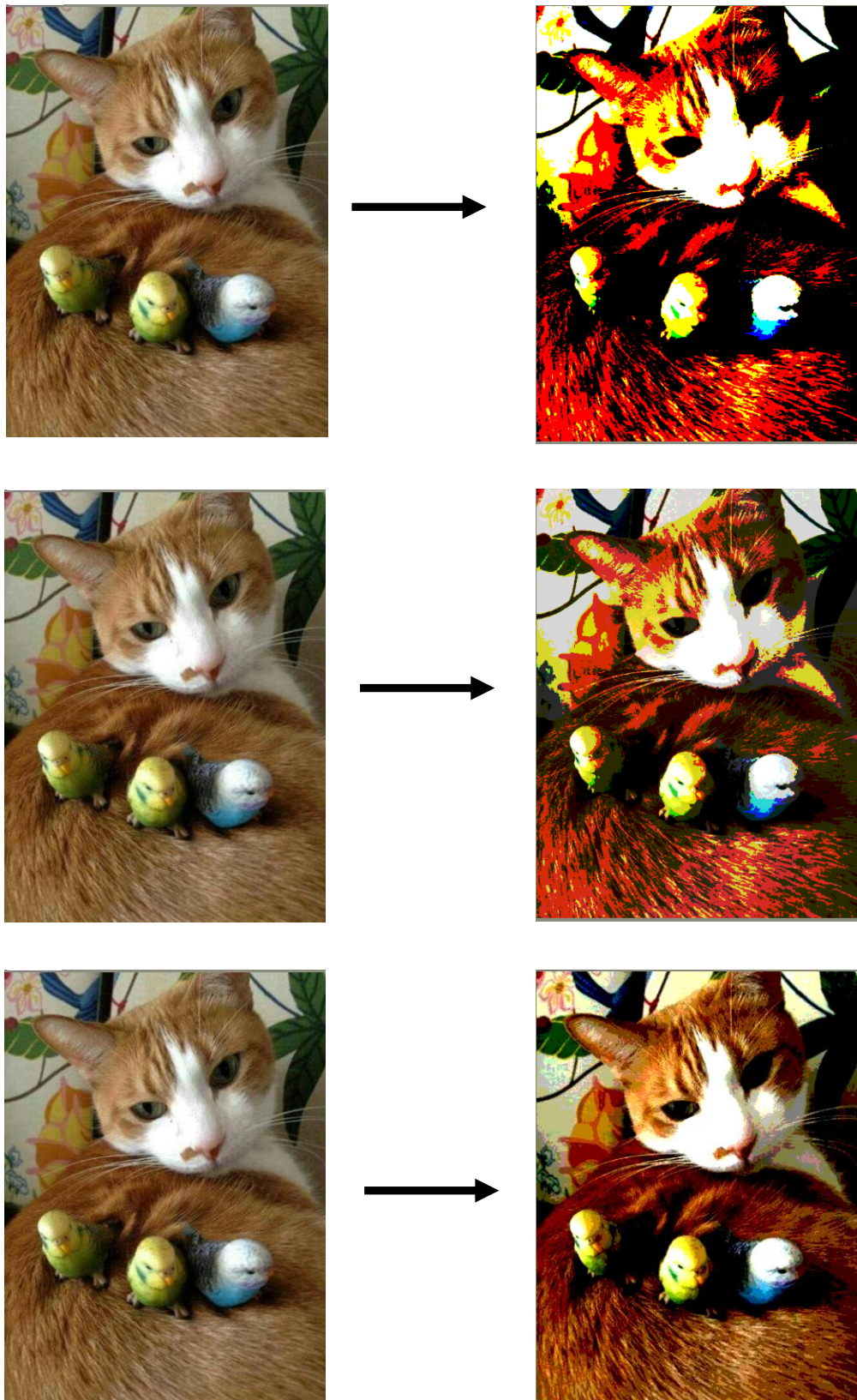
Figure 6.8: From top to down, image has been manipulated with 1, 4 and 9 Posterize value respectively

6.3.7   Lighten Functionality

Lighten is an effect to enhance the lighting condition of the image. User will find it handy when they are trying to manipulate an image with poor lighting condition. The following will demonstrate the lighten functionality developed in this system.
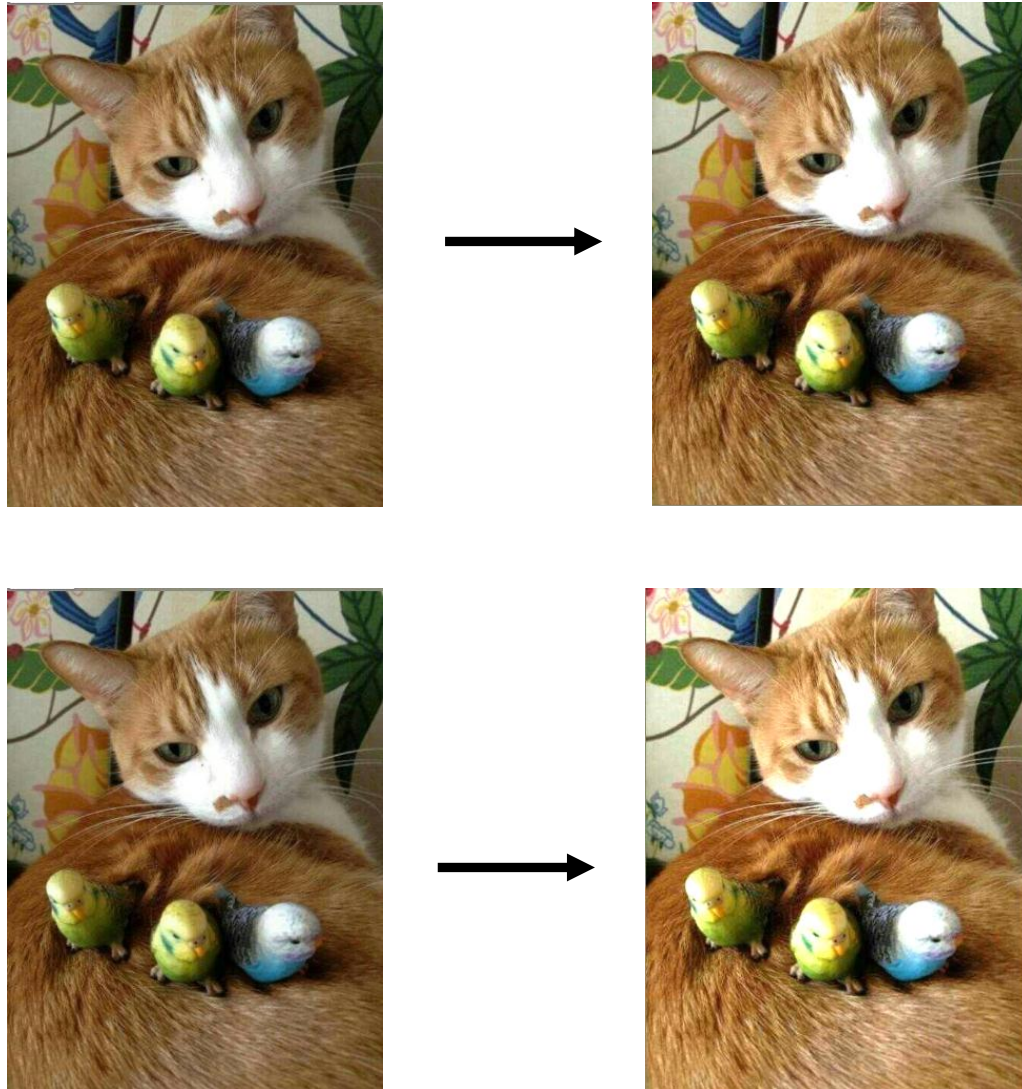

Figure 6.9: From top to down, image has been Lighten with value of 0.2 and 0.4 respectively

6.3.8   One Click Effect Functionality

Rather than sliding slider bars, user has the option to manipulate their photo by one-click effect such as mirror image, sepia image or sharpen image. One Click effect developed are Invert, Sepia, Black and White, Sharpen, Blur, Solarize and Mirror. Demonstration of One Click effect will be shown in the following figures.
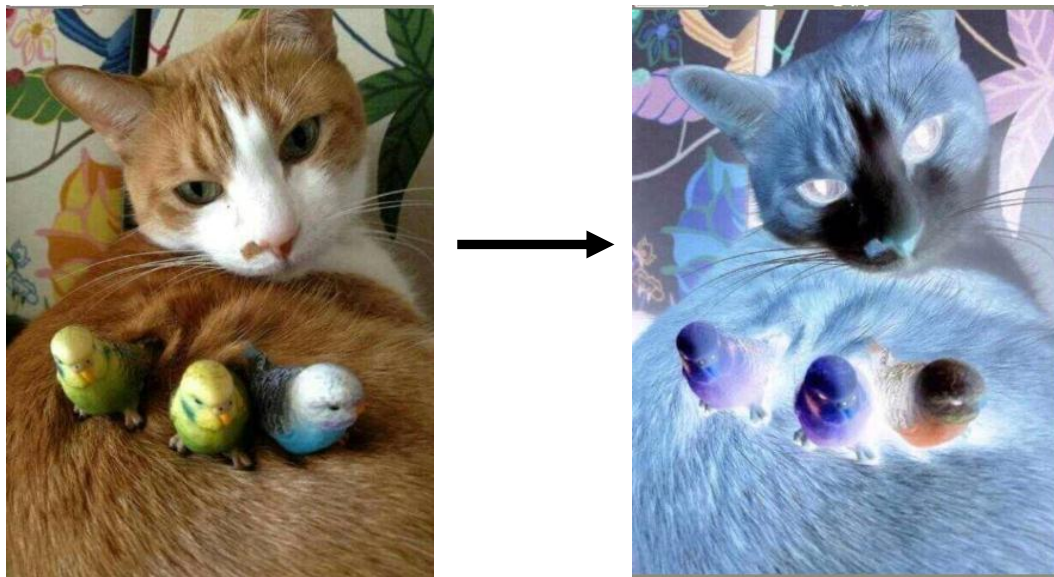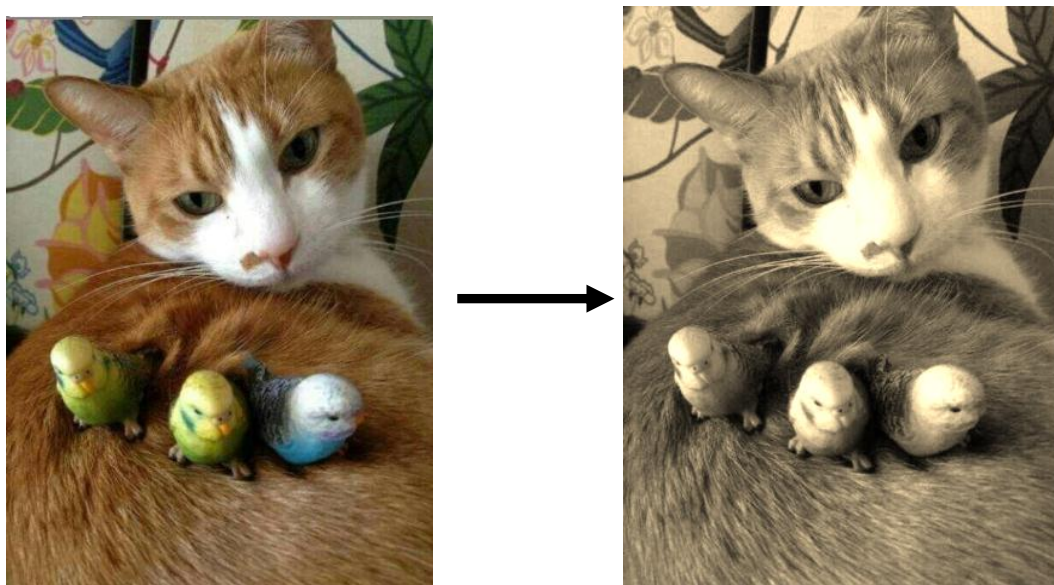

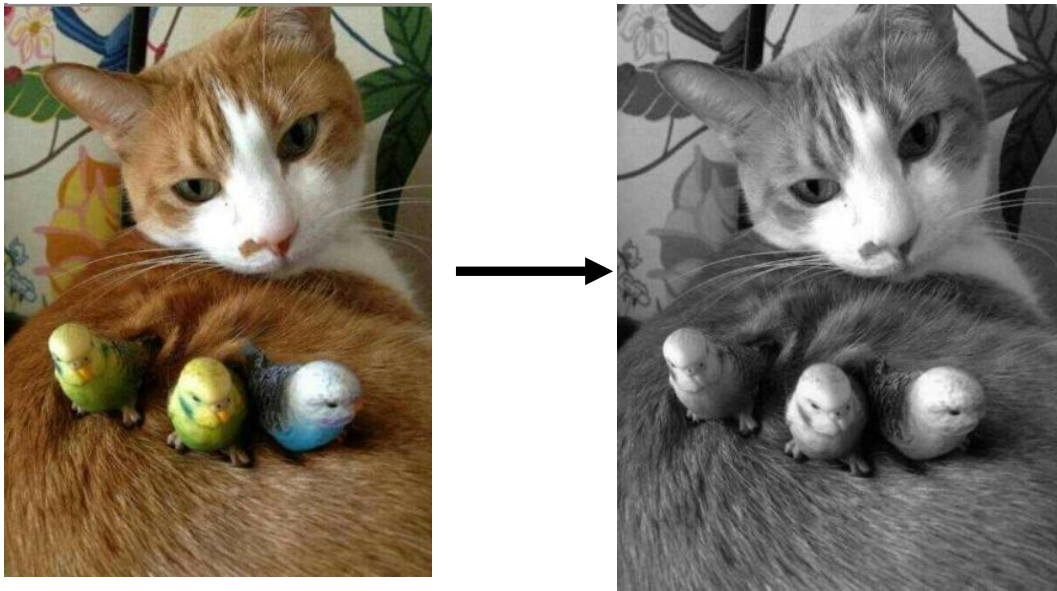Figure 6.10: Invert Effect

Figure 6.11: Sepia Effect
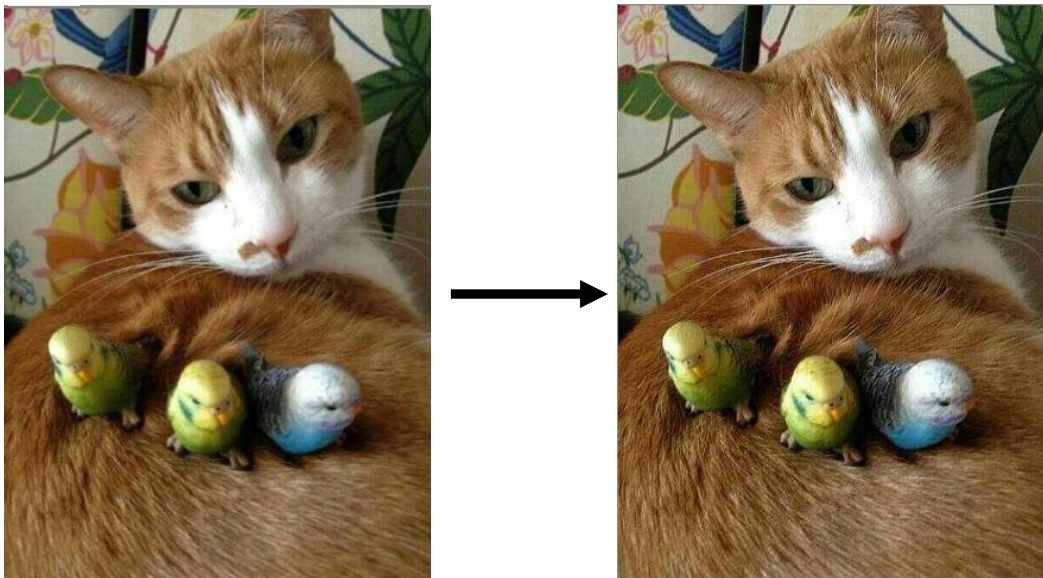
Figure 6.12: Black & White effect
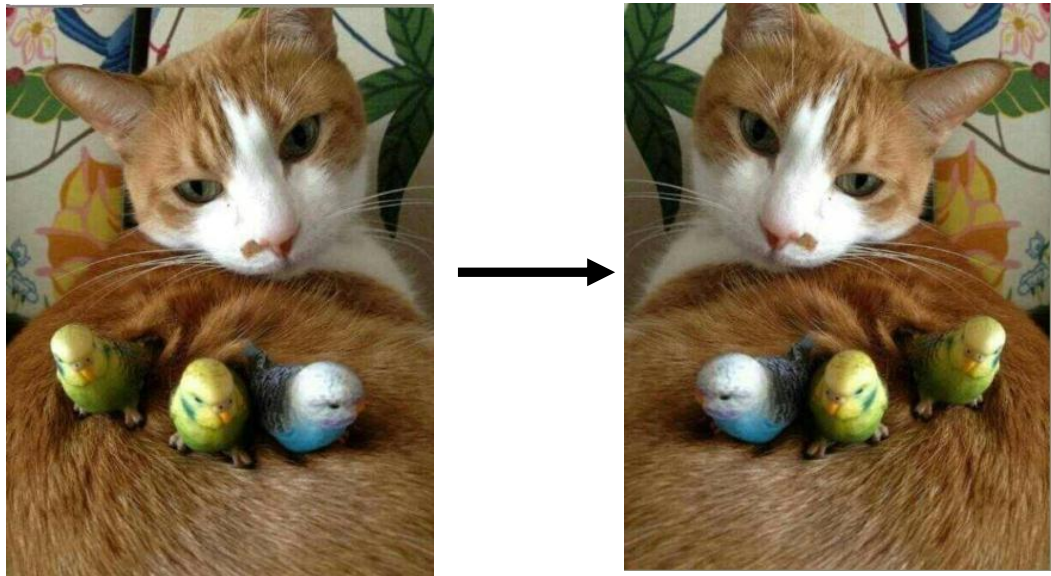

Figure 6.13: Sharpen effect
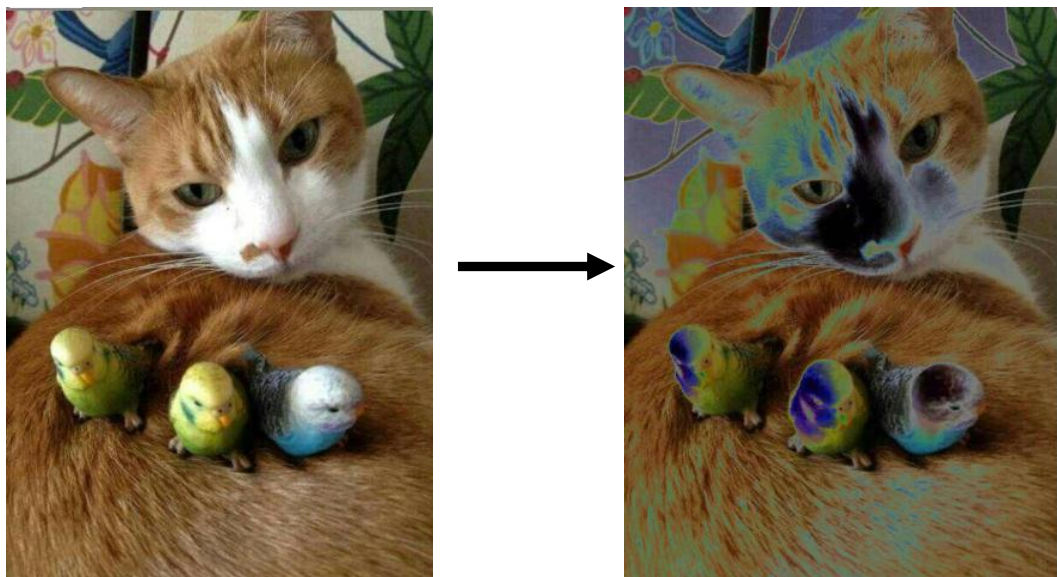
Figure 6.14: Mirror effect

Figure 6.15: Solarize effect

6.3.9 Revert Functionality

The purpose of Revert functionality is to remove all manipulated effects on the image. If the user has decided to remove all the edited effect or a particular effect, they can choose to revert the manipulated effect by clicking on the respective button. Following section will demonstrate the revert functionality
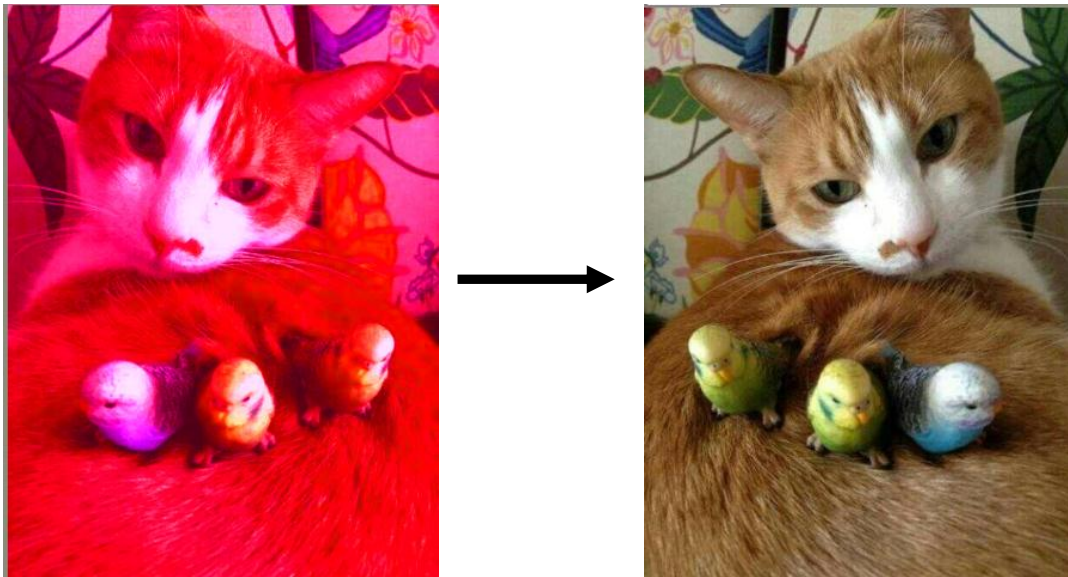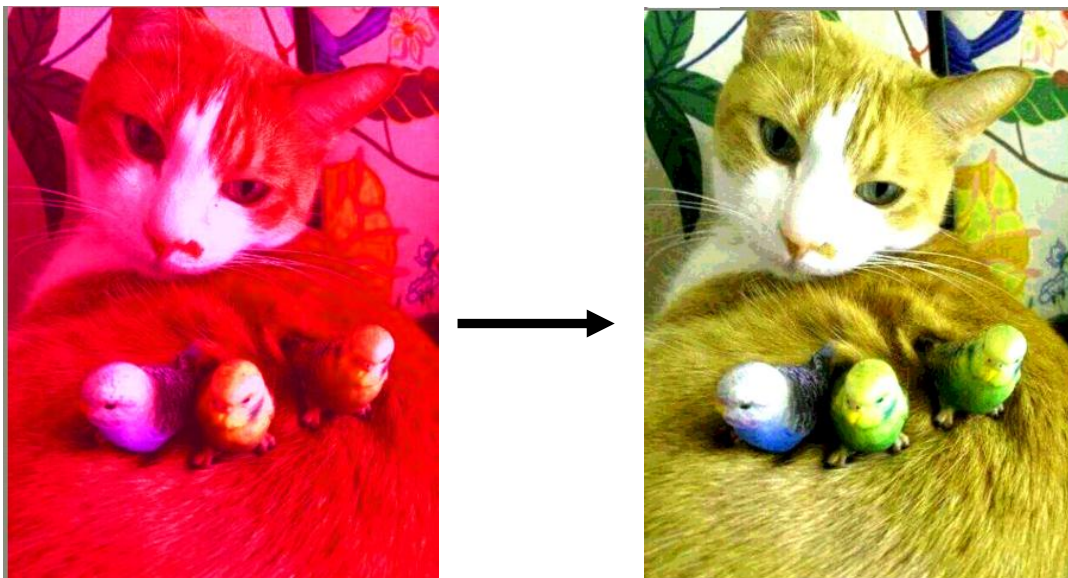

Figure 6.16: Revert all effect

Figure 6.17: Revert RGB effect

CHAPTER 7

CONCLUSION AND RECOMMENDATION

7.1   Conclusion

HTML5 is a web-based programming language which has been gaining huge popularity in the market. There are numerous websites and devices have migrated towards the development of HTML5. Besides, HTML5 is a powerful programming language which has the capability to perform many actions which previously could not be done.

One of the most powerful ability of HTML5 is being able to manipulate photo diversely. A number of Photoshop effect can now be achieved with HTML5. Furthermore, many mobile-based devices have begun to ditch the support against Flash. Therefore this is a great opportunity to develop a web-based image editing application using HTML5.

The HTML5 based application developed in this project is able to fulfil most of the commonly used image editing feature and important tools. For example, the RGB saturation, HSL adjustment, brightness, contrast, sepia, etc. has been implemented into this application and is fully functional. User is able to upload their desired photo to the web browser, and then perform necessary manipulating and editing on the photo before uploading to the server.

HTML5 is definitely a powerful language with lots of built-in feature and ability. The W3C will be introducing more useful features into HTML5 in the coming future. A web-based HTML5 image manipulator has the potential to grow and possess more useful effects in the near future.

7.2   Recommendation

Due to insufficient amount of time and lack of PHP knowledge, the HTML5 image manipulator has not been successfully integrated to the web-based photo gallery. The application however is functioning on the client side. The author recommends individual with PHP knowledge to continue the integration work of this project in the future. Besides, certain manipulating function could be further polished and improved.

Besides, since HTML5 is still a growing language, more image manipulating effects will be introduced into it. HTML5 has the potential to perform almost every effect in Adobe Photoshop CS6 in the coming time. The author also strongly recommends this project to be improved in the future with more additional function and ability integrated to the current project.

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