ISSN: 2277-9655
Scientific Journal Impact Factor: 3.449
(ISRA), Impact Factor: 1.852

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

PhotoSynthesis – Photo Sharing Application (Android)

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Abstract

"PhotoSynthesis" is an Android application that provides its users a simple solution for sharing photos with friends and family. Traditionally, pictures are clicked and shared on numerous devices using social media, messengers and other online platforms. Instead of waiting for the photos to show up on Facebook or asking your friends to send pictures via Bluetooth, email or messengers, this mobile application automates the process of sharing photos. The application scans the gallery of the user and groups the pictures according to the time, date, and location, after that application finds if there is a match between the location of the user and his Facebook friends and determines whether the friends were present at the same location where the photos were clicked. Using this information it notifies and allows the user to send multiple photos to selected friends by the click of a button. The application is designed to help its users to share photos without having to go through the trouble of uploading them on various available platforms. This application also helps one keep a collection of photos outing/event wise.

Keywords: PhotoSynthesis, Photo Sharing, Android Application, Geo Tagging.

Introduction

"PhotoSynthesis" is a photo sharing application that provides an intuitive way of sharing photographs. Because of the fast growing use of Android devices [1], PhotoSynthesis application has been developed for Android platform which encompasses majority of the target audience.

Photo is given as input to the system and after a fixed time interval, it sends user a reminder to share the photos. The application is pre-populated with all the photos taken in the recent session along with a list of friends who were present during the session. The application determines that, by checking the location and timestamp of the user and his Facebook friends. User can remove photos that he/she doesn't want to share. Photos are uploaded once user selects share option and are visible to other Facebook friends who were present during the photo session.

This application prevents sending photo to unknowns and thus taking care of the privacy by filtering out the strangers and recognizing the people present along with user when the photos were taken.

The application runs in the background using minimal battery power to share photos effectively and makes sure one never misses another photo again.

The rest of the paper is organized as - Section 2, covers the literature survey which gives the overview of the existing systems used for sharing photos using various technologies. Section 3, presents the Proposed Approach for the application development. Section 4, is about the Design and Implementation, it explains the design, building method, working modules, implementation challenges and benefits of the application. Section 5, describes the Evaluation and Results. This section also explains the working of the application along with the constraints of the application. The paper ends with conclusion and the future scope.

Literature survey

The first photo sharing sites originated during the mid to late 1990's and provided photofinishing service (i.e. online ordering of prints). Later, during early 2000's many more sites came into market with the goal of providing permanent and centralized access to a user's photos and in some cases video clips too. Webshots, SmugMug, Yahoo! Photos and Flickr were among the first [1].

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Existing Technologies

Peer-to-peer photo sharing:

With the introduction of high speed (broadband) connections directly to homes, it is feasible to share pictures and movies without going through a central service. The advantages of peer-to-peer sharing are reduced hosting costs and no loss of control to a central service. Applications like Tonidophotos provide peer-to-peer photo sharing [2].

Peer-to-Server photo sharing

Operating peer-to-peer solutions without a central server can create problems as some users do not leave their computers online and connected all the time. Using an always-on server like Windows Home Server which acts as an intermediate point, it is possible to share photos peer-to-peer with the reliability and security of a central server. Photos are securely stored behind a firewall on the Windows Home Server and can be accessed only by those with appropriate permissions [2].

Peer-to-browser photo sharing

Peer-to-browser sharing has (similar to peer-to-peer) reduced hosting costs, no loss of control to a central service, and no waiting for files to upload to the central service. Furthermore, universal web browser access to shared files makes them more widely accessible and available for use in different ways, such as embedding in, or linking to, from within web pages [2].

Social Network Photo sharing

Social Network photo sharing allows users to share photos with only those they specify as being allowed to see those albums, whether it is all users, or only those whom they are connected with[2].

Mobile photo sharing

Photo sharing via mobile phones has become the rage of 2011. Several networks and applications have sprung up offering capabilities to share photos directly from mobile phones to social networks. The most prominent of these is Instagram which has quickly become the dominant mobile social network with over 200 million members [2].

Pitfalls in existing systems

All the present architecture provide vivid ways of sharing photos but in each of the above method the user needs to upload, download or share the photos/albums themselves. There is no architecture which automates the process of photo sharing. The steps required in the existing systems, for the process of photo sharing, are more elaborate.

Mobile Application Building Approach

The three popular approaches used for building mobile applications are Web Apps, Hybrid Apps and Native Apps [3].

1. Mobile Web App: In this approach, the application runs on a mobile browser. The browser only hosts the application's presentation layer that is designed using HTML5. The interface typically looks and behaves like a traditional web site but is designed for the mobile device form factor.
2. Hybrid App: This approach emerged to address the inability of the Web App approach to access device sensors (like cameras and Bluetooth) while preserving its highly desirable cross-platform support.
3. Native App: In this approach, the mobile application is custom built for the target device operating system with a compiled programming. Example: Objective C for iOS, Java for Android, and C# for Windows phone.

Native approach offers the best performance and a great user experience. The apps are faster since the executables are compiled for the specific OS and are run directly on the OS. They come with their development environments including various simulators and infrastructure to do actual device testing.

Proposed approach

PhotoSynthesis is built using the Native App approach. The application is custom built for the target device operating system with a compiled programming language. Using the Android Software Development Kit (SDK) with Eclipse Integrated Development Environment (IDE) the application is coded in Java.

Design and implementation

This section discusses the details of the design and implementation.

Logical Architecture

The logical architecture of the system is represented in Figure 1 as shown below:

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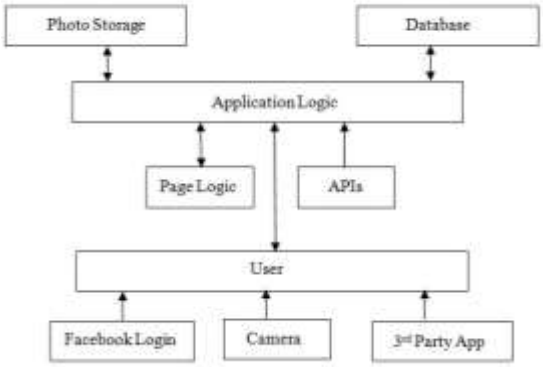
Figure 1:



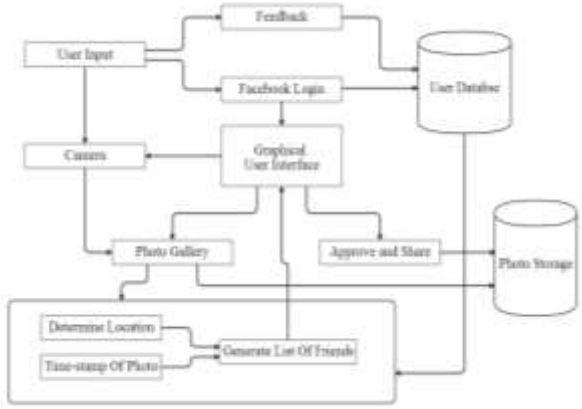
Logical Architecture

The photo storage block represents the folders on the server where the photos are stored. The Database comprises of tables with users information such as Facebook ID, location, path of images on the server, etc. The user provides the application with its Facebook login, photos taken from camera or any 3rd Party Apps which gets processed by the application logic. The libraries of different Application Programming Interfaces (APIs) form an integral part of the application logic. The page logic gathers information about the user's actions and displays relevant data.

Physical Architecture

The physical architecture of the system is represented in Figure 2 as shown below:

Figure 2:



Physical Architecture

The application gathers User information using the Facebook login and also inputs the feedback about the application. A successful login enables the user to see the home page of the application and also stores the information into the User Database. The camera of the device is used to take photos which get tagged with the location and timestamp. After processing the data the application displays the list of photos to share along with the specific friend list. The approval of the user enables uploading of photos to the photo storage.

Implementation

1. Facebook SDK/ Login

Using the Facebook SDK the user's profile information and friend list is obtained [4].

Figure 3:

Login Button and display after successful Login

2. PhotoFeed

The pictures are sorted into albums as per their location, date and friends that were present and displayed to the user in the form of a listview.

Figure 4:

Pre-Populated albums with suggested Friend List

3. Shared Albums

This module will have the list of photos shared by your Friends. The photos are shown as clickable thumbnails. There is a save button on the top left of the full-screen photo viewer. It will save the photo to your Camera Roll.

Figure 5:

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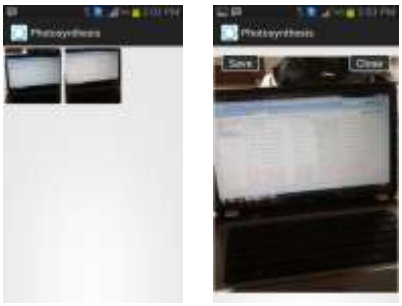

Photos shared by other friends

4. Server

All the photos will be uploaded to the server and downloaded from the server to the respective phones. The user information is stored in the form of tables.

Figure 6:

Tables stored on the Server

Benefits of the System

1. The application provides security by filtering and sending photos to selected list of people. In this manner the application prevents sending photos to unknowns and thus taking care of the privacy.
2. This application helps solve a major problem of people asking others to send them photos taken at every occasion.
3. This also helps you keep a collection of all the photos captured at any particular event as the photos are grouped according to date, time and location.

Implementation Challenges

1. Monitoring the user's location at regular intervals only and ensuring battery consumption is minimized. Location is obtained using Network or GPS [5].
2. Mobile Data used for uploading and downloading photos is regulated and minimized by reducing the size of the photos.
3. Allowing more than 10 photos to be uploaded at an instant by increasing the buffer size of storage array.

Evaluation and results

1. Evaluating Usability: Android device users were asked to try out PhotoSynthesis and give feedback about the user friendliness and ease of navigation.
2. Evaluating Accuracy: Users have been consulted to see how happy they are with the functionality provided.

Table 1. Evaluation Cases and Results

Sr. No	Evaluation Parameter	Method Used	Test Results
1.	Application Design	Usability expert was consulted. Students and teachers tried out the app.	Attractive layout and design scheme.
2.	Usability	Usability expert was consulted. Students and teachers tried out the app.	Easy to use and navigate
3.	Accuracy	Application was tested during a particular event.	The application grouped photos and suggested friends accurately
4.	Response Time and Speed on various devices	Tested on multiple Android Devices such as Nexus 4, Nexus 5, Samsung Grand, HTC one Mini	Smooth functioning and consistency in all devices

Guidelines to use the application

Install the Application on the Android device

1. Install the application from the play store or using the .apk file.
2. Provide the application with the permissions.
3. A progress bar depicts the loading time of the application at start up.
4. Login via Facebook.

PhotoFeed to Share

1. PhotoFeed will have created the albums to share.
2. Share photos with friends.

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Check for Notifications (Shared Albums)

1. Albums shared by friends will be visible here.

Constraints for using the application

1. Location Services of the mobile device should be on while taking the photo. Camera should have geo-tagging on.
2. Device should have Internet connectivity.
3. Android Kitkat 4.0 platform installed for best results.
4. User should have a Facebook account to register and login.

To test the claim that PhotoSynthesis automates and improves the process of photo sharing a simple test was conducted. A small gathering of 10 college students was arranged. The users took multiple photos during that session from different Android devices. While taking the photos the location services and geo-tagging was kept on. The Android devices had Whatsapp and PhotoSynthesis installed. After the session was over the users were notified by the PhotoSynthesis app to share the photos. It successfully grouped the photos during that session into an album on the respective phones. It also short listed all the friends present during that session by matching their respective locations. The photos were shared with each other by a click of the share button. The feedback from the users suggested that the overhead of selecting individual photos taken during that session was removed. Also, the users were able to share photos with a specific number of people rather than sharing the photos on a Whatsapp group which had many more members who were not present during that session. More than 10 photos could be shared at a time. The task of uploading photos on social media or sharing via messengers or Bluetooth was simplified. From this it can be concluded that PhotoSynthesis is a better solution for sharing photos than the existing systems.

Conclusion and future scope

The idea behind the PhotoSynthesis application is to simplify the process of photo sharing for the user. Extensive research has been done which shows that this idea is different and standing out compared to the competitors in the photo-sharing application market. The success of the application is based on its ability to automatically group photos according to events and suggest friends accurately to share photos. The application simplifies and reduces the steps required to share photos. PhotoSynthesis does not change the behavior of the user, as they can click photos using their default camera application. Users can focus on clicking pictures without having to worry about sharing them.

Future scope

1. Smart Share: Sharing of photographs based on location and face recognition.
2. Adding filters and editing photographs.
3. Supporting Video Formats.

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