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Android Based Document Scanning And Sharing System

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Abstract—Twenty first century era and the 2020 pandemic situation where everything is digitized and depends on the internet where every resource or every file/document is digital and online. To make a paper document into a soft document was done by printers and scanners in the early days. In the current generation, the Mobile phone and its camera can be used to convert papers into digital documents. Sharing of files from one system to another is also a crucial task in the current generation through wireless means. There are different ways to share the file wirelessly such as Bluetooth and wifi/WLAN. The Proposed system/technique focuses on converting the hard copies of the document to make a scanned copy and to save the file in Pdf format as well as the system will also be used to share the files from one system to another which makes the application a unique android project. The document scanning system is based on canny edge detection algorithm. and the file-sharing system will be based on wifi direct where the server-client connection is created thus providing a required connection for further process. Despite the exclusion of a few extra features which are given by other scanning systems this project will mainly focus on the proper creation of the document and an uninterrupted secured transferring of files between two systems. There might be some limitations such as the speed of the transfer action. The overall project is proposed in the android environment.

Keywords— Camera Scanning, Share, Canny Edge Detection, Wi-Fi Direct, Android, Mobile Application.

I. INTRODUCTION

Mobile applications grew rapidly in less than two decades. By providing efficient, fast, consistent, and authentic tools in the form of internet and mobile applications, information technology is penetrating human life and is playing an important role in changing the lives of so many people around the globe.

By definition, a document scanner is a device, which converts a document or text from its paper form into

digital data. Document scanners reduce time and labor to transform the information from printed materials to digital data stores, for example, to the hard disks of a personal computer or storage in the cloud. Also, using a document scanner, it is possible to recover, retrieve and preserve old or valuable documents. Scanned documents are great. They let us archive stacks of paper into a folder, taking up far less space and being infinitely easier to organize, move, and copy.

File sharing is the practice of distributing or providing access to digitally stored information, such as computer programs, multimedia (audio, images, and video), documents, or electronic books. It may be implemented in a variety of ways. Sharing files from one system to another through wireless means is an important task.

Android is a relatively new mobile operating system developed by Google and the Open Handset Alliance. Officially released in October 2008, it has revolutionized mobile application development since it is open source. It allows developers unparalleled freedom to create varied and interesting applications. Android provides easy yet secure access to first and third-party applications, allowing deeper integration between components in different programs, and encourages software sharing and reuse. The user interface can be built quickly and simply through XML or graphically. There is no application available that can perform both the operation i.e. document scanning and media sharing.

II. REVIEW OF LITERATURE

Natalya Skoryukina (2018-19) - Proposed algorithm was tested on a dataset containing more than 8000 images and shows about 98% accuracy. Algorithm's high efficiency allows for processing images received from camera device in real time.

Krupa Shah (2014-15) - Canny edge detector provides better and more accurate results. In case of Sobel and Prewitt edge detection techniques, both give approximately the same results but they do not provide better precision and hence resultant image with edge detection is not as recognizable as that of Canny.

Muhammad Muzzamil Luqman (2015-16) - Our method employs the gyroscope sensor of the phone for providing a visual feedback to the user for avoiding perspective distortion video scanning of documents not only allows to reconstruct the full page mosaic image of a document page from its mobile phone camera-based video scanning, but also reconstructs the full page mosaic image at a better resolution than the physical limits of the camera lens.

Sunanda Gupta (2014-15) - An edge is the real or imagined line that marks the limit and divides of plane, object or appearance from other places or things. This means that if the edges in an image can be identified accurately, all of the objects can be located and basic properties can be measured.

Aarti Bawche (2017-18) - An attempt is made in this study to detect and extract objects in an image implemented on android platform. Color images are converted to binary images using the thresholding technique. In the process objects are extracted and stored in an array for further analysis.

Prof. Mrs. Kanchan A. Khedikara (2016-17) - In this paper smart file transfer model permits efficient file sharing between mobile smart phones over a low- cost transfer. This smart file transfer model divides the message into 'n' number of blocks and performs the "Resume Operation" by calculating hash values and comparing these blocks between two mobile devices and avoids the data redundancy problems. Smart file transfer connectivity is achieved via Wi-Fi and Bluetooth.

Pawan Shrikondawar (2018-19) - Wi-Fi direct is made for temporarily connecting a few devices in an easy-to-use and secure way, but it does not work well for larger network topologies. The major problem users may confront while using the built application is that the devices are not compatible with each other.

N.Surya (2018-19) - The design and implementation of an ambient student information system and user interface is to replace the current paper records.

Anas Irfan (2017-18) - file sharing applications have issues related to security aspects such as confidentiality, authentication, integrity etc.

File sharing applications use WLAN for sharing files faster among the connected devices.

MinSeok Jeon (2015-16) - All users need a simple operation done by themselves. SFS will be extended to send and receive files at the same time. And it can improve the limitation of devices such as low battery or lack of capacity.

Paul Bao (2005-06) - The technique of scale multiplication is analyzed in the framework of Canny edge detection. A scale multiplication function is defined as the product of the responses of the detection filter at two scales. Edge maps are constructed as the local maxima by thresholding the scale multiplication results. At a small loss in the detection criterion, the localization criterion can be much improved by scale multiplication. The product of the two criteria for scale multiplication is greater than that for a single scale, which leads to better edge detection performance.

Daniel Camps-Mur (2014-15) - Wi-Fi Direct is a new technology defined by the Wi-Fi Alliance aimed at enhancing direct device to device communications in Wi-Fi. Thus, given the wide base of devices with Wi-Fi capabilities, and the fact that it can be entirely implemented in software over traditional Wi-Fi radios, this technology is expected to have a significant impact. In particular, our results quantify the delays to be expected in practice when Wi-Fi Direct devices discover each other and establish a connection, and the performance of its novel power saving protocols.

Rafika Thabet (2014-15) - Despite the fact that some image processing algorithms expressing a high degree of parallelism have been successfully accelerated, using the OpenGL ES 2.0 and the OpenCL frameworks, the emerging applications need more speedups. In order to efficiently and fully use the limited computation resources on mobile processors, some points should be carefully considered to achieve a high performance: (i) explore the algorithmic parallelism, (ii) partition the tasks between the CPU and the GPUs, (iii) optimize the overhead of CPU-GPUs memory transfers, (iv) avoid useless access to the memory (v) choose the appropriate programming model for using the mobile GPGPU, (vi) and select the right hardware design including a unified shader design, a tiling architecture, and a texture compression.

III. METHODOLOGY

We have designed an Android Application using Android Studio. Then we design the User Interface for our Application and list out features like accessing camera, image enhancement, edge detection. We have used Android Studio for our Android Application. First we create a feature of scanning a document and then feature of sharing a document.

To scan a document first we access the Camera from our Mobile Application. Then we design the document capture from our Camera. After that we apply the Canny edge detection algorithm to detect edges of the images and it is further processed to do Image Enhancement on the Image. After processing we save the image in image format and then we convert the image into pdf format and save it on our device.

The Canny edge detection algorithm is composed of 5 steps:

1. Noise reduction;
2. Gradient calculation;
3. Non-maximum suppression;
4. Edge Tracking by Hysteresis.

One important thing to mention, is that the algorithm is based on grayscale pictures. Therefore, the prerequisite is to convert the image to grayscale before following the above-mentioned steps.

Canny edge detection works in various stages. Initially it removes the noise in the image by using a 5*5 gaussian filter. Smoothened image is then filtered with Sobel Kernel in both horizontal and vertical direction to get first derivative in Horizontal direction (G_x) and in Vertical direction (G_y). After getting gradient magnitude and direction, a full scan of the image is done to remove any unwanted pixels which may not constitute the edge. For this, at every pixel, pixel is checked if it is a local maximum in its neighborhood in the direction of gradient

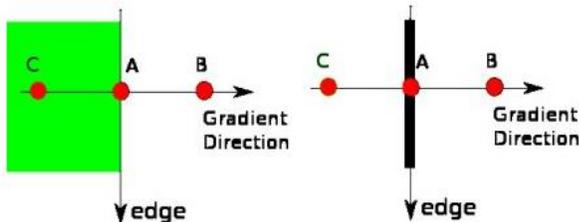


Fig.(1) Non-maximum Suppression

Point A is on edge in vertical direction. Gradient direction is normal to the edge. Point B and C are in gradient direction. So point A is checked with point B and C to see it forms a local maximum. If so it is considered for the next stage otherwise it is suppressed. The next stage decides which all edges are really edges and which are not. For this, we need two threshold values, minVal

and maxVal. Any edges with intensity gradient more than maxVal are sure to be edges and those below minVal are sure to be non-edges, so discarded. Those who lie between these two thresholds are classified edges or non-edges based on their connectivity. If they are connected to "sure-edge" pixels, they are considered to be part of edges. Otherwise, they are also discarded. See the image below:

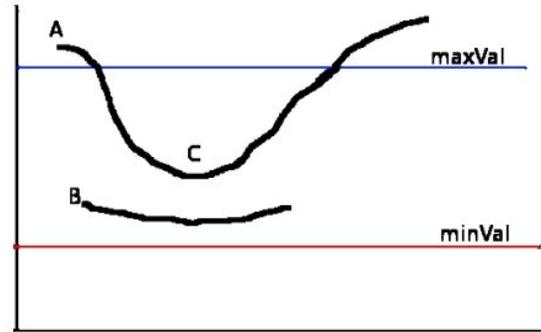


Fig.(2) Hysteresis Thresholding

The edge A is above the maxVal, so considered as "sure-edge". Although edge C is below maxVal, it is connected to edge A, so that is also considered as a valid edge and we get that full curve. But edge B, although it is above minVal and is in the same region as that of edge C, it is not connected to any "sure-edge", so that is discarded. So it is very important that we have to select minVal and maxVal accordingly to get the correct result. This stage also removes small pixels noises on the assumption that edges are long lines.

To share a document in the beginning we will access the WIFI by taking user permission. So we will be using a Hotspot Controller since there are NO APIs available on Android for enabling/disabling Hotspots. This components will provide functionalities such as : Controller creates an OPEN Wifi hotspot configuration with an SSID which can be intercepted by Receivers to recognize the senders including port and sender's names.

Restores user Hotspot-Configuration when Share mode is disabled. Provides a list of connected WiFi clients. After getting permission from the user he will be able to pick up the files from the device storage. After selecting the files the user needs to select a receiver from a list of available users and then it creates a Server-client relationship between two devices by using WIFI Direct. The Server will be sender and Client will be receiver.

At Sender Mode, to select file from our device, we will be using a nice library called android-filepicker of android studio. Picker—A system UI that lets users access documents from all document providers that satisfy the client app's search criteria.

Now to share the file we are using content URIs generated by the Android FileProvider component and temporary permissions that you grant to the receiver for the content URI. Then we add the path of the file to be shared in our FileProvider component and we get the URI of the file to be shared. On successful server setup, Hotspot Controller creates an OPEN Wifi Configuration with an SSID using a combination of Android ID, Port number and Sender Name.

At the Receiver Mode, starting receiver mode is pretty simple as no intent extras needed. Receiver Activity starts scanning for senders automatically. Receiver scans for wifi based on naming convention used and fetches files information from server after successful connection.

IV. CONCLUSION AND FUTURE SCOPE

We proposed that this application can be used for educational purposes to enhance the learning process and increase student productivity. It's a two-in-one unique and efficient Indian mobile application which will be used for scanning and creating documents and sharing any types of files from one device to another. It is safe and secure. Andis updated version of the existing system. The work is in progress and we are working on the detailed experimental evaluation.

File It Up mobile application will be secure in the field of individual data and also it will be encrypted during the time of data sharing from one device to another device. There will be many image filter options for image enhancement. The application will be very useful to the education sector in the current situation and also for every other sector that requires document scanning and sharing.

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