JUST A CLICK: A Solution to Transfer Images without Medium

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Abstract

In day-to-day work, images need to be transferred from the mobile phones to the laptop or to the systems. The only way to be transferred is with the help of a physical medium such as the data cable without which the transmission would not be possible, but carrying these physical devices all the times is not reasonable and sometimes not possible also. Even in the presence of physical devices, it is still a tedious task as required to go through the entire process of first connecting the data cable with both the mobile phone and the laptop and then selecting the necessary settings and commencing the required transfer. This process is not very time efficient. But an issue as small as this must not become a bottleneck and create delay in the fluency of work. Therefore, here a small yet effective application is proposed to tackle this issue on a small scale.

With the proposed application direct transmission of images may takes place between the mobile phone and the laptop without the use of a physical medium such as a data cable. Based on augmented reality, this application is built with React Native features which make transmission possible through virtual scanning in just a click. The scanning takes place through OpenCv and the transmission through installing a local server between both the devices, mobile phones and the laptop or the system.

Keywords: Scan; React Native; OpenCv; Basenet; Pillow.

1. Introduction

The frantic workload is not a recent phenomenon but it is getting worse day by day. The goal is lucrative productivity which is requisite both in life and work. Yet trying to ameliorate the time scheduling and prioritisation seems unlikely to work no matter how effectively designed. Time is a nonpareil asset. Whether one is a newbie or someone with the experience of a veteran, they are always going to need another hour to tick tasks off their to-do list. With the fast-pacing workload environments time is the priority. Although one might want to perform multiple tasks together, it might be impossible to do every minute task at the same time. While managing time, one can boost their serenity and eventually in turn enhance their ability to focus. When people are not overwhelmed with work load, they can see that they are enwreathed with learning opportunities everywhere around them.

A number of researchers have defined Augmented Reality. It is a live and interactive environment which is formed by adding virtual objects to real images obtained by the camera [11].

In order to reduce the time, and effort of having to go through the entire process of connecting mobile phones and laptops/desktops with a data cable and then transferring the images from the mobile phone to the laptop, an application has been developed here which is based on augmented reality.

This helps in direct transmission of the data from the mobile phone to the desktop/laptop through virtual scanning in "Just A click". Comparing the previous methods where it generally requires approximately 5 to 10 minutes connecting the device with the system and specifically requires a USB cable and other expensive accessories, here this can be achieved within seconds without the use of a physical device or a medium. There are innumerable reasons why this little amount of time can do wonders for surviving in the over productive aura without the use of physical device or medium.



2. Related Works

In order to stand out from the crowd, accessing explicable time management skills over working with conventional ways is more than prominent [2]. This is the foundation of the research work. The application is made based on the React Native framework with the help of Typescript language. TypeScript is a strongly typed language for application scale JavaScript [3]. As the JavaScript code grows, it tends to get messier which makes maintaining and reusing the

code a complex job. Typescript was designed by Anders Hejlsberg at Microsoft for issuing this problem. Typescript is an object oriented and compiled language that is a typed superset of JavaScript compiled to JavaScript [7]. Typescript compiles the code and generates the compilation errors. It helps to highlight the errors before the script is run. TypeScript comes with a non-compulsory static typing and type inference system through the TLS (TypeScript Language Service). TypeScript also supports type definitions for existing JavaScript libraries. As shown in figure 1, React Native framework used allows building mobile applications on a native platform using JavaScript for enabling better user experiences.



Figure 1: Building mobile applications on a native platform

With the use of React Native it was possible to render native applications for both iOS and Android mobiles [4]. The charge of the view controller is taken by React and using JavaScript, it programmatically generates native views. It targets mobile platforms, instead of targeting browsers. React's declarative UI framework to iOS and Android is brought by React Native. Figure 1.1 shows how with React Native; one can use native UI controls and have access to the native platform. React makes it painless to create interactive UIs. Declarative views have made the code more predictable and is easier to debug. With the help of React, encapsulated components have been built that manage their state. Local changes made to the JavaScript can be live reloaded without rebuilding the native application. Thus, the physical medium has been replaced which is required to make the image transfer between the mobile and laptop possible with the installation of a local server with the help of Basenet.

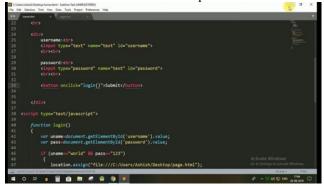


Figure 2: use of native UI controls and accessing native platform

a. Basenet

Basenet is a library that takes an image and it cuts the image into the following layer forms: Basic resblock, basic resblock with down sampling, Conv, Conv + BN + ReLU, Conv + BN + ReLU + Bilinear Unsampling, Conv + BN + MaxPool.

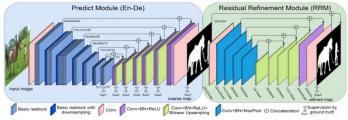


Figure 3: Predict Module and the Residual Refinement Module (RRM) of the basenet library.

It provides both, a local server between two mediums like mobile phone and laptop or system and removes the background at the same time as shown in figure 3. The various steps that the image goes through while it is being cut by dividing into multiple layers and the image that we receive as the result are shown in Figure 4.

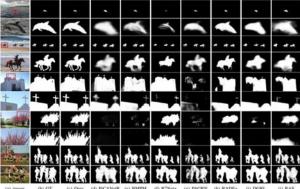


Figure 4: Steps to process an image

The code of the basenet that are being used for building the application is shown in Figure 5.

Figure 5: Code for building the application

After using basnet the application performs to take the image as shown in figure 6.



Figure 6: Application performance for taking image

b. Pillow

Pillow is built on top of PIL (Python Imaging Library). For image processing in Python, PIL is one of the important modules. This module can be used with Python 3.x versions as PIL. It can read in thirty different formats of images. The formats that can be read by Pillow include IPEG, PNG, GIF, TIFF, and BMP. PIL provides an efficient internal representation, extensive file format support and has powerful image processing capabilities. The core image library is designed for fast access to data stored in a few basic pixel formats.

Anything can be done on digital images using pillow module apart from basic image processing functionality, including point operations, filtering images using built-in convolution kernels, and color space conversions.

Image Processing is a method of analyzing and manipulating digital images. The main goal is to extract some information that can be used somewhere else. Opening an image is a basic operation of the image processing.

The image module can be import from the PIL library to load which provides the image.

Open() method takes an image filename as an argument. This method returns the image object. Any modification can be made to image object which can be saved to an image with the save () method. Once the image is opened, various operations can be performed as resize, crop, draw or many others.

Python pillow library is used to image class within it to show the image. The image modules which belong to the pillow package with a few inbuilt functions such as create new images or load images etc. Anything can be done on the digital images using the pillow module. Pillow library is used in the application to hold the captured image as shown in figure 7.

Figure 7: Python Pillow Library

Python Pillow module makes very simple the process to work with the images.

c. OpenCV

OpenCV is a cross platform open-source library that is used for machine learning, real-time computer vision and image processing. OpenCV supports a broad variety of programming languages like Java, C++ and Python etc. It can process images and videos to identify objects, faces or even handwriting of a human. It was started by Intel in 1999 by Gary Bradsky [5]. OpenCV is integrated with various libraries like NumPy which is a highly optimized library for numerical operations, then the number of weapons increases in Arsenal i.e whatever operations one can do in NumPy can be combined with OpenCV. All the OpenCV array structures are converted to and from NumPy arrays. This also makes it easier to integrate with other libraries that use NumPy such as SciPy and Matplotlib [8]. The following activities are possible on an image through OpenCV:

- 1. Reading an image
- 2. Taking out the RGB values of a pixel
- 3. Extracting the Region of Interest (ROI)
- 4. Resizing the image
- 5. Rotating the image

Therefore, in the application, OpenCV library is used for extracting only the object that one wants to see while removing the background by extracting the Region of Interest (ROI). The conventional systems also offer this feature like in Photoshop, but the user still has to crop out the object of interest manually whereas the application mentioned here does this task automatically. It crops out the object of the interest and removes the background immediately after capturing the image.

d.NumPv

NumPy is a Python library which is used for working with arrays [1]. It is written partially in Python, but most of the parts that require fast computation are written in C or C++. It stands for Numerical Python. It has functions for the following operations:

- Mathematical and logical operations on arrays. (i)
- (ii) Fourier transforms and routines for shape manipulation.
- Operations related to linear algebra, NumPy has in-built functions for linear algebra and random (iii) number generation.

NumPy was created in 2005 by Travis Oliphant. It is a library for processing of arrays and it is consisting of multidimensional array objects and a collection of routines. In Python, lists serve the purpose of arrays, but they are slow to process. NumPy intends to provide an array object that is around 50 times faster than traditional Python lists. The array object in NumPy is called ndarray; it provides lot of supporting functions that make working with

ndarray very easy. Processes can access and manipulate NumPy arrays very efficiently as these are stored at one continuous place in memory unlike lists. It is optimized to work with latest CPU architectures as shown in figure 8

NumPy is used in the application for the array manipulation of the array of the coordinates of the image captured in

the mobile phone.



Figure 8: NumPy arrays

e.Screenpoint

It is a library of Python that finds the (x,y)coordinates of the centroid of an image (e.g. a mobile phone camera image)pointing at another image (e.g. a computer screen) using OpenCV SIFT.ScreenPoint is used here to match the coordinates of the image captured in the mobile phone to the coordinates of the laptop screen as shown in figure 9.

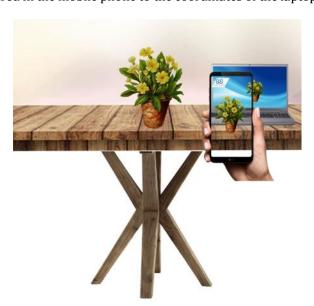


Figure 9: Matching coordinates of image in both devices

Once the coordinates match, the image is dropped onto the laptop or computer screen.

Steps and Observations 3.

The previous methods generally required approximately 5-10 minutes to connect the required device with the system and specifically requires a USB cable and other expensive accessories for scanning or shifting an image as

physical device or medium.

shown in figure 10. In comparison to this, the same task can be achieved within seconds without the use of any



Figure 10: Traditional Method

A login page has been built which is the very first thing that the user will come across while using the designed application. Here the user will have to log in using his or her email through google account or the facebook account. Once the user is logged into the application, he or she can access the camera by allowing the designed application to use the camera feature of his or her mobile phone to capture the required image. The same application needs to be installed on the system also to make this transfer possible. As soon as the image is captured in the mobile phone, Pillow library starts working to hold the image within the coordinates so that the object of interest can be extracted. When the image is being held within the mobile screen, OpenCV works to remove the background and extract the Region of Interest (ROI). NumPy also works here as the image is being held within the array which is formed by the coordinates of the image captured.

After successful completion of these two steps, the final image becomes ready on the mobile screen to be transferred now. The local server created through Basenet serves as the intermediary connection between both the devices. Mobile Screen is now placed in front of the laptop screen where Screen Point finds the coordinates of the image captured via mobile phone and the coordinates of the laptop screen. Once the coordinates match successfully the image is transferred onto the laptop screen in the same position as on the mobile screen.



Figure 11: Steps of transfer of image

With the bare minimum system requirement of a working laptop/desktop and a smartphone with an adequate camera quality, the designed application shows efficacy by saving the time and performing the transfer without complexity or externals devices as show in figure 11.

Results and Conclusions

The issues with the existing methods to make image transfer possible between the mobile phones and the laptop is having to go through the entire process of first connecting all three devices including mobile phone, data cable and the laptop and then after making the necessary setting changes on both the phone and the laptop to make the transfer possible. It is obvious that the existing methodology mandatorily requires to have a physical medium, without which the transfer is not possible. In addition to this, additionally cropping the object of interest out of the entire image takes a little extra time too. This also increase the time taken to do such an easy and small task in more time than desired.

Comparing the previous methods where it generally requires more time connecting the device with the system and specifically requires a USB cable & other expensive accessory, the same task can be achieved within seconds without the use of any physical device or medium.

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The region of interest will be automatically cropped out within seconds immediately when the image is captured. All you need is Just A Click application as shown in figure 11.

Hence an application has been successfully designed to transfer the image files possible with just the available devices. This does not only remove the external physical medium but it also has reduced the time and effort.

The quality of the image is adequate rendering this application useful for professional purposes also. The server connectivity is streamlined and adequate to make the transfer easy and hassle free.

5. Future scope

There is still scope for improvement as there is for every other existent technology. The designed application has been currently tested for some images through which the image quality turned out to be perfectly fine. The paths have not been met with any kind of hurdle in the process of proving the viability of it quite yet. But further efforts may be done to achieve better results.

Reference

- [1] "NumPy: Fundamental package for scientific computing with Python". https://github.com/numpy/numpy. Accessed on December 2022.
- "Reactnative.dev.Repository" A framework for building native applications using React on https:// github.com / facebook / react-native. Accessed on Dec 2022.
- [3] Christopher, Chedeau. "A Deep Dive into React Native" (30 January 2015) on YouTube.
- [4] Releases-"Facebook/React". GitHub on https://github.com/facebook/react. Retrieved on April 2022.
- [5] Open Source Computer Vision module. Retrieved March 2022 from https://docs.opencv.org/master/ modules.html
- [6] "Scoped and unscoped packages", Retrieved on April 2022 from https://Npmjs.com
- [7] Introduction to Computer Vision using JavaScript. From https://Towardsdatascience.com, Retrieved on March 2022.
- [8] 2022 NumPy indexing and slicing. Retrieved April from array on https://web.archive.org/web/20171224122803/https://docs.scipv.org/doc/numpydev/user/quickstart.html
- [9] Image processing in Python using OpenCV (March 2022). Retrieved from https://stackoverflow.com
- [10] 35 Awesome augmented reality examples (June 14, 2009). "Banner Blog News". Retrieved from http://www.bannerblog.com.au/news/2009/06/35 awesome augmented reality examples.php
- [11] Milgram, P., Takemura, H., Utsumi, A. and Kishino, F. (1994). Augmented reality: a class of displays on the reality-virtuality continuum in Proceedings of Tele manipulator and Telepresence Technologies (SPIE), 282-292. https://doi.org/10.1117/12.197321