SHADOW'S REMOVAL USING IMAGE PROCESSING

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Master of Science in Computer Science and Engineering.

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APPROVAL

This Project/Thesis titled **"Shadow's Removal Using Image Processing**, submitted by Sumaya Akter Usrika, ID No: 193-25-811 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of M.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 22-12-2020.

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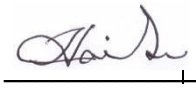

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I hereby declare that, this project has been done by me under the supervision of**, Abdus Sattar, Assistant Professor, Department of CSE** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

The Title of this thesis is “Shadow’s Removal by using Image Processing”. In this thesis, I had been proposing a method to turn this psychological concept into a machine that can automatically detection the shadows. Shadow detection and removal have been used in various images processing system such as video surveillances, scene interpretations and objects recognition. Ignoring the presences of shadows in images can causes serious problem such as objects merging, object loss, misinterpretation and alteration make-up in visual processing applications such as segment, group analysis and follow-up. Many algorithms had it proposed to books, related to the acquisition and removal of images and videos. Comparative testing and capacity building of existing methods in the video has already been reported, but we do not have the same in case the images are still standing. This paper provides the complete an existing dignity detection survey and removal technique reported in the current situation image. The test metrics involved in strategies for finding and removing strategies are also discussed with the inefficiencies of common metrics such as; the accuracy of pixel, Precision, Recall, FScore etc in the acquisition phase is also checked. Plenty and quantity the selected methods are also tested. Ku to our knowledge all of this is a special first article discusses ways to detect and remove shadows from real photos.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Introduction

We live in the age of modern technology. Here almost every things are dependent on the technology .People are getting use to the technology to make their life easy and more comfortable. Modern technology was just an advancement of old technology, the effects of technology in modern life were immeasurable, we use technology differently sometimes the ways we use different technologies end up damaging our lives or the society we leave behind. Modern technology by technology is not so new in the most important cases. For example, communication technologies have evolved over the years, these days we use email with images which have been an advancement of Fax.

The way it works and the purpose of degrading it still photo and video are not the same. For videos, details from previous frames are available with dignity, and in image we should be rely on geometrical as well the statistical feature of the shadow in one images are directly the shadow of the part. Shadow detection was widely use in the video surveillance system as a preprocessing step to achieve better performance in the application such as object tracking [1] and automatic driving [2]. While in image depends on the type of input images such as internal, external or satellite image acquisition and deletion finds application in object recognition [3] and description of the scenes [4]. For example, picture it is often analyzing, including the geometry of antiquities. dignity, to get a 3D analysis of the material to be release object geometry [4] or obtaining direction of light sources [5]. Other important application include enhancing the localization of objects and measurements, especially in the aerial imagery of saw building [3], [6], [7] to rediscover 3D scene [8], or to detect cloud and their shadows [9]. Comparative experiments with the formation of existing shadow energy The video acquisition method had already been reported Andrea Prati et al. in 2003 [10], Al-Najwadi et al. in 2012 [11] and Sanin et al. in 2012 [12]. Shadow algorithms are divided into two-layer tablets, mainly mathematical and determined by Andrea et al. [10] and four representatives of the algorithms described in detail. Al-Najwadi et al. [11] distinguish methods based on object / location and starting point. Sanin et al. [12] divides reporting activities to date

into content-based taxonomy consisting of four categories: chromaticity, physical, geometry and composition. The authors of [10] [11] [12] provided an evaluation of the measurements and quantity of activities reported in time using a standalone collection of available videos. Another interesting review of Dee and Santos [13] is a multi-facet field a conversation about a shadow that sheds light on the elements of belief in the formation of dignity. This updated discusses, as well as the view of shadows in humans and the perspective of the machine, and the ways in which the human cognitive system uses information from the shadow. However, the above reviews [10] - [12] videos are also specified other similar images had not been reported yet. Such a review could help researchers, who are planning to do so work locally.

1.2 Motivation

Now a days, we see here almost every things are dependent on the technology .People are getting use to the technology to make their life easy and comfortable. Modern technologies be just the advancement of old technology, the effects of technology on modern life are immeasurable, we used technology in a variety of ways and sometimes the way we use different technologies ends up damaging our health or the society we leave behind. photo or image. When we take pictures, we see a picture with shadows. Where because we cannot understand about this image or this image to make the system a competent recommendation must be used to have the power to decide for itself. Decision-making should require the ability to dig into the data. This makes us eager to make this kind of foundation workable. Our work is closely related to image processing techniques.

1.3 Rationale of the Study

The goal of this project was to be design a system to detect shadow remove when capture image. This system will detect the suspicious remove photo. We will detect the sentiment between the test conversations. Here we are proposing the method of designing a system that can automatically analysis the conversation and give the feedback with the image. The most important common approach to be image analysis consists of detecting the occurrence of features (image) of known value. There are some works on analyzing image data. Some of these tried to analysis the large data of image. They use sentimental analysis to detect positive negative sentiment.

1.4 Research Question

- Can we collect row data of image?

- Can I pre-process the row data to use for the Machine Learning approaches?

- Can we Machine Learning process correctly detect or identify the category of the shadow remover?

1.5 Expected Output

This project has a large prospective in the present word. It has a practical value in any shadow remove. It will audit the shadow remove. It will help the people to have a good look over the image. It will make sure the proper working condition in the image. So we can say that this thesis and proposed model of system can make a good impact on the digital automated world.

1.6 Report Layout

This report is organizing into five chapters.
Chapter one contains some introductory text and preliminary information about our work, previous works contains the similar forms of work that has been worked before, present state and contribution contains my contribution in this work ,motivation of the research specify the initial thought that makes me interested in this work .

Chapter two contains literature review about the required knowledge about the project and gives the over view of the technique and study that should be done by me.

Chapter three deals with the overall process of the system and my working method or suggested technique and procedure.

In chapter four, we have presented our implemented work, experimental results and evaluations are explained.

Finally, chapter five concludes our overall work.

CHAPTER 2

BACKGROUND

2.1 Introduction

Our goal is implements a system using image processing for shadow checking from image data. To do so we have used some efficient algorithms and tools and study. It will be described in details here.

2.2 Related Works

In the last few work decades, lots of effective ways to being achieves dignity in the fields of photography or videos sequencing had been introduce. In this video sequences, shadows acquisition be used to improved target acquisition performances, which lies to be the basis for the position of tracking and identification. In the last year, with the continued development of the social economy and the advancement of computer technology, the intelligent viewing of videos that will become a program has increased dramatically. As a major problem for intellectuals to monitor programs, target acquisition for moving purposes has been one of the hottest problems in the field of computer vision research. In general, targeting targeted placement of videos was the first step, their performance directly affects the subsequent visual analysis. Since everything was shadows, the removal of shadows was important. Successful dynamics of a moving target can not only improve the performance of moving objects in video analysis but can also play an important role in the identification and behavioral analysis of moving objects in video surveillance systems. Therefore, the removal of shadows was an important and difficult problem in the directional images [3, 16, 17]. The existing method of being obtain dignity can divide into at least two categories: the model-base approach and the feature-base approach. Model-base approaches need to be establishing shadows be statistical model based on shadow attributes then judge whether each pixel was a shadow area or not based on mathematical models. Cucchiara et al. [13] suggest the basis for a method in the parameter model. An unused model-based approach is suggested in [18]. Feature-making techniques often use them to be image-related elements [17], such as brightness, color, complementary information, and other details in order to be a judge. Al-Najdawi et al. [8] and Sanin et al. [14] reviewed the dignity model and improved the research function [6]. Sasi and Govindan to provide a comprehensive report on the method used in the field of regression removal. The revisions revealed that the shadows methods to work best in the context of user interaction with multiple images. The default method available to remove a single shadow was too complex to use and set those limits in imaginary image category.

Recently, many researchers had been proposed a series of innovative ways to obtain shadows to use the convolution neural network (CNN) model. Khan et al. [16] firstly apply in-depth study method of obtaining dignity by the training the two networks to found the location of the shadows and the edge of the shadow, respectively. Predict posteriors based on excerpted elements were provided with being a random fields model to produce smooth shading path. Vincent et al. [17] was being used two ad networks to obtain dignity. The first network is used to extract the original markers.

Along with the original graph, these mark to apply to second network to get adjusted image results to mark. In [14], relying on color and texture markers, the SVM separator was used be obtain a pre-shadow map, combined with the real image and embedded in a pre-made CNN network to extract being the image effects. Nguyen et al. [15] introduced conditional opposition networks (cGAN). The effect of the generator was a shadow and discriminatory marks separating a true and false mark. The friction between the generator and the generator enables the generator to locate the shadow space. This approach has been a major improvement compared to the method [13]. Similarly, Le et al. [16] was used GAN to improve the network's ability to distinguish a shadow area. Existing methods for obtaining CNN shadows often to being use cascade networks [12-14] or GAN [15, 16], which was increasing the difficulty of model training and real-time acquisition.

With the continued development of digital image processing technology, the use of image recognition was also growing and growing in web services. Common areas had a shadow app especially for the following locations: video surveillance, security, and human-computer interaction. In the past year, with the expansion of research into the quest for dignity into an algorithm, it has been used for medical, public safety, agriculture, industry, aerospace and military defense.

Since a large amount of data viewing required large resources to be bandwidth, storage and transfer, and to store or process high-definition green video (HD) [17], the cost of transferring was much needed. Therefore, how we can integrate visual analysis with web network technology has been very valuable, especially in remote areas of the web. Due to the being limited hardware and software used as images, we needed to study the very low cost of real-time image processing and video processing on a web-based environment. The emergence of HTML5 technology has simply been given an effective way of achieving the above. HTML5, which enhances many tags and features on the basis of real HTML, makes web-based application development easier, more efficient, and easier. Compare with original applications, the development of HTML5 web applications that will help significantly reduce development costs, and once the content of the web application has been transferred to the web platform, HTML5 also supports live updates and real-time feedback. Indexed DB, which was the final HTML5 database, also provides effective solution for large amounts of image or video to data in storage and decryption [16, 17].

2.2.1. Shadow

Creating a shadow when an invisible object blocks direct light method. Naturalists view shadow as optical deception. The shadow has no atmospheric height structures therefore cannot be scientifically accurate. In general, shadows were of two types: independent and self-discarded

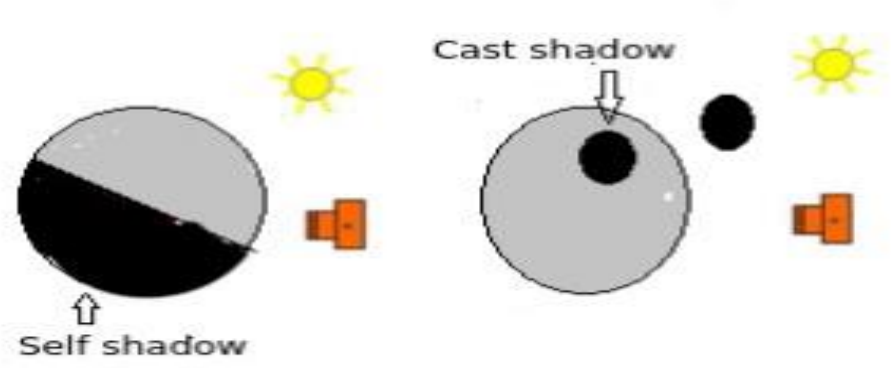

Figure 1: Self shadow and Cost shadow

dignity (See Figure 1). Dignity itself is part of dignity when the light was completely absent. The shadows is created by the object behind the event was called being cast shadows. In the nonpoint lights sources, the shadow cast continues lightly divided into umbra and penumbra regions. Umbra was such a dark central part that received no light at all. Some shadows were simple and called penumbras (see Figure 2). The combination of the umbrella and the penumbra region gives dignity. Ambient light can be present in the umbrella too penumbras [14].

2.2.2. Shadow basic mode

Barrow and Tanenbaum in 1978 proposed a model on image formation [15]. The model describes the images I (x, y) as formed by the display components R (x, y) and the new light L (x, y) as following Ik (x, y) = Rk (x, y) • Lk (x, y) (1) there are R, G, B and • • 'means intelligent multiplication by pixels. In the shadows the brightness is reduced by the size of the images reduced by the repeated scales of Ck (x, y). Therefore, (1) can be written as: Ik (x, y) = Rk (x, y)

• Lk (x, y) • Ck (x, y) (2) So in the case of logs, the shadow means more change by force. Numerous activities have been reported in books attempting to reduce the extra part of the dignity. However, it separates shadow regions from areas close to blacks it requires methods of distinguishing intelligent shadows, therefore, it is no small task. Do-it-yourself shading, meditation meditation, contrasting shadow, geometry of object shadow cast as well the art objects involved in photography make the

process dignity is even more complicated. The other paper was organized as follows: Complete review of large papers in the area of dignity and removal was performed in Section 2. Test metrics used, quality testing and selection quantities the methods in place for the acquisition and removal of shadow were discussed in the Section 3.

Final the paper is completed in section 4.

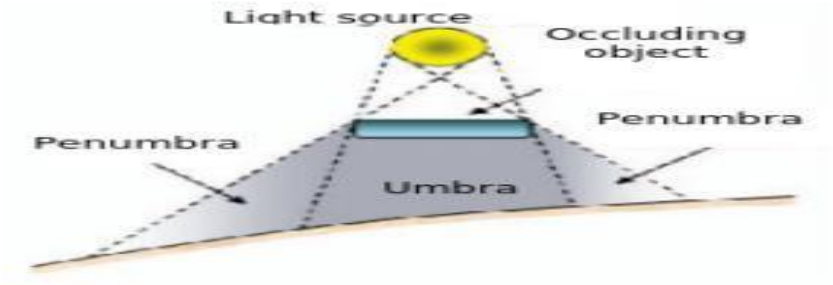

Figure 2: Umbra and Penumbra regions still images, satellite imagery and videos using learning strategies, color models, consistent images etc. discovery and removal of dignity. Many jobs had been reported the mobile shadow detection area was specified for a specific domain such as traffic monitor and video surveillance to a program. Therefore, we were not be suitable for real image. We mean certain function in obtaining dignity from motionless image think about soft shadows [16] and strong shadows [17] respectively. General the most widely use method in all categories had not been considered yet. The state of the art techniques use many photos, video frames give good results, but to accurately distinguish shadows from alone in the house or an exterior image with a variety of geometric features and lighting barriers was a major challenge. That was because of the appearance and internal and external conditions Shadows depends on a number of objects such as orientation, color, geometry, shape and input material and the place where the shadows would be sent. Researchers have offered a variety of strategies to us and find it difficult to measure those variables in different ways. Usually the removal of the shadow involves two basic stages: the discovery of the shadow regions, which is usually seen in the form of the edges of the shadow followed by the removal of the acquired shadow. Shadow removal includes a still image following different methods. Here the main task was to produce a consistent, dignified image. In terms of the processes involved we split the detection and degrading activities reported over the past few years into the next phase.

- Shadow detection and deletion were based on an abnormal image
- Dignity was based on characterization and learning
- Degrading strategies
- Alternatives

2.2.3. Dataset

Terms data set refers to being a file containing one or more records. The record was the basic unit of information to be used by a z / OS operating system.

Any group of records was called data sets. Data sets may contain encryption details such as medical records or insurance records, which are used by system applications. Data sets will also be used to store the information required by the system or operating systems themselves, such as system resources, large libraries, or program variables or parameters. For data sets that contain readable text, you can print them or display them in the console (most data sets contain upload modules or other binary data that were not actually printed). The data sets that can be used are organized, allowing data sets to be targeted by names without specifying where they are stored.

In simple terms, the record was the number of fixed bytes containing data. Often, recorded collections associate information that was treated as a unit, such as one item in a database or staff to data about one department member. A term field means to be a specific part of a record that will be used for a specific category of data, such as an employee or department name.

Data set records can be organized in a variety of ways, depending on how we plan to access the information. When you write an application program that does something similar to employee data, for example, your program can define individual data recording format [15].

2.3 Research Summary

The above discussion done on various types of research works from different research teams, it is being appeared to us that recently, research work on shadow remover is increasing day by day. Some good outcomes already prove this statement well. Though, enough resources are not present, but hope is that this field is becoming more resourceful each after passing a single day.

2.4 Scope of the Problem

In order to exchange the image most of the large use many other people. They provide all their image to another one. And continue the communication with them. Using a capture image, the

biggest problem is to handle the shadow challenge. There are some tools that can handle the problem also.

2.5 Challenges

We have to face some challenge in this thesis. Collecting real-time image from the system by customizing the POP3 protocol and at the same time analyzing them to detect shadow remover will be challenged. Also we have to first build an algorithm which will be able to detect image processing by shadow remover. It is the biggest challenge for us.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In that chapter I will be describe architecture of shadow remover Framework. There were mainly three sections in chapter. First section 3.1 was about the system architecture of the image Detection Framework where different modules of the architecture and relationship among them are described briefly. Among the main modules of the architecture like image Data Fetching module, storage module, Data Analyzing module, alert sending module. In section 3.2 we discuss about the analytical representation of our system which gives the details of the developed system with different algorithms, necessity flowcharts and tables required for analysis. Section

3.3 is about the complexity analysis of shadow Detection Framework.

3.2 Research Subject and Instrumentation

I would say that the subject of the study was that the area of study was reading and research to clarify understanding. Not only a clear understanding, but also the research studies were responsible for providing relevant information on the various parameters of the study.

Instrumentation, on the other hand, refers to the equipment or tools that investigators should have used.

3.3 Data Collection Procedure

To research these specific fields, the fastest and most prominent was Data. The data were, in fact, regarded as the heart of machine learning as a process. And in our study, there was no other data. Therefore, it has been our most challenging tasks for us researched. I build up our data sets by analyzing being lots of journal.

3.4 Data Preprocessing

Data Scientists beyond the name of the word have been trying to give meaning to the advancement of Data. Simply put, however, in data processing it was a data mining process that involved turning raw data into an understandable format. Real-world data was often incomplete, inconsistent, and / or lacking in certain behaviors or trends, and could contain many errors. Data processing was a proven way to solve such issues.

How is this done? Just like medical professionals like to wake up a patient who has undergone surgery and therefore to process the data, it prepares raw data for further processing. Below are the steps to take in data processing

1. Data purification: fill in lost values, smooth data pointing or removing outliers, and resolve inconsistencies.
2. Data integration: using large amounts of data, data cubes, or files.
3. Data modification: generalization and integration.
4. Data reduction: volume reduction but produces the same or similar analysis result.
5. Data optional: part of the data is reduced, replacing the derecognition value. [16]

3.4.1. Algorithm

What we see mainly is that the text tends to have a background with a consistent color everywhere, so the unused effect had that place as well. I suggest adding a factor, αi, as determine by our integrated shadows map for each pixel in the inputs image to match the local domain color intensity with earth index color. Specifically, I include: ci = ci αi , (1)
Where ci ne -ci is the RGB color intensity of the dignified input with extensions not included in pixels i, respectively. We found the background and background size of the text in the text and customize the background size with the earth index to produce shadow map for each RGB pixel, α. Inserting this shadow map in the file the insert image produce that final result.

3.4.2. Local and Global Background Colors

To gets background colors of the area, we start by splitting the installation images into small scattered block. In for each of those blocks, we combine pixels sizes into two groups ourselves Labels as a paper or text background. Both local and global data, we used to be Gaussian hybrid model (GMM) equivalent to be Expectation Maximization (EM) and start with k-means clustering. Typically, documents usually had a brightly colored text with a bright background.

According to this, assign a high-definition collection center like to be your local RGB color, i, when I define a pixel in the center of the current blocks. In the program a block cases with a fixed colors (e.g., all in the background), the collections were almost identical the same geography so choosing the higher one stills applies. Next, we found the universal background colors. We take the intensity of the pixels in all inputs, rather than the local regions, and combine them two categories of paper and texts, as before. Also, the collection means you had the maximum value was listed as the background strength. Finally, we searches all the details for the power of the original inputs and provide the closest to the background collection as the ultimate global RGB references, g. Note that it was useless The definition of a collection can be used in this steps instead of the closest force, we it has been find conceptually that this method improve the results slightly.

3.4.3. Computing Shadow Map

I expect the background colors to be the same real background colors. Background color deviate from this due to lighting effects such as shadows and blurring. To remove the influences of lighting, we calculate the ratio of background and local color to produce a shadows map such as: $\alpha i = ig$, (2) where i was the localization intensity in pixels i and g was the global background reference for all pixels. Additionally, ai maps each pixel inputs file to the background color of the reference and, when applied to the input images (Eq. 1), produces the unused end results.

3.5 Statistical Analysis

That section provides an overview of the structure of the system provided in previous sections. The above system configuration reflects the internal and external configuration of the system modules integrated into a single package for the first program. The following sections provided were a brief overview of the tool used and the details of the implementation of the various modules of the

advanced program that have been going from start to finish. The entire system is made up of Windows operating system, PhpStorm IDE and PyCharm IDE platform.

3.6 Implementation Requirements

After the proper analysis on the all necessary statistical or theoretical concept and method, a list of requirements had been generated that must be required for such a works of shadow remover Classification. The probable necessary things:

Software Requirements / Hardware

- Operating System (Windows 7 or above)
- Hard Disk (minimum 4 GB)
- Ram(more than 1 GB)
- Web Browser(preferably chrome)

Developing Tools

- Python Environment
- Jupyter (Anaconda3)
- Notepad++
- Bootstrap

CHAPTER 4

EXPIMENTAL RESULT AND DISCUSSION

4.1 Introduction

In that chapter of implementations of shadow remove detection module, we will discuss about the overall implementation procedure of the project. It is a challenging task to implement this module. In the first chapter 4.1 we described our experimental setups. In the next section 4.2 shows the system that can be used to exchange the image data among the people of the world. Section 4.3 shows the detection shadow remove procedure. And in the last one section 4.4 we will conclude this chapter of implementation. We have tested our system with extensive experiment. Then we will present the performance of the system and compare it with existing systems.

4.2 Experimental Setup

Shadow remover Detection Framework had being to develop on the machine have the Windows 10, core i5 processor with 8GB RAM. The system had being developed in Python and Php in the backend and javascript was used to be in the front end. Mysql was used for the storing was related data in this framework.

For coding in python, we had used the latest version of PyCharm which was 2018.2.4 with the python version 3.6. For coding in php, we had used to be the latest version of phpstorm which was 2018.2.2 with php version 7. System configuration follows showing the internal and external configuration of the system modules that are integrated together into a single package to become the first system. The following sections are provided with a brief overview of the existing tools and implementation details of the various modules of the program developed from start to finish. The whole system is built into the Windows Operating System again using pycharm and phpstorm IDE.

4.3Experimental Results

After completing the shadow remover, User Interface shown in figure bellow:

4.3.1. Shadow Removing System

In this page we will discuss about a shadows removing systems. Here we build a system that can show us an interface. In this system we build the process to shadow remove from any type of image. In this system anyone can remove shadow by image. This system can be used from anywhere of this world using internet. This system is hosted with a Public IP. Thus anyone in anywhere can remove shadow by image of this system.

Figure 4.1 shows a snapshot of the systems of remove shadow by the image. In here we will give the snapshot of the Enter Page of the interface:

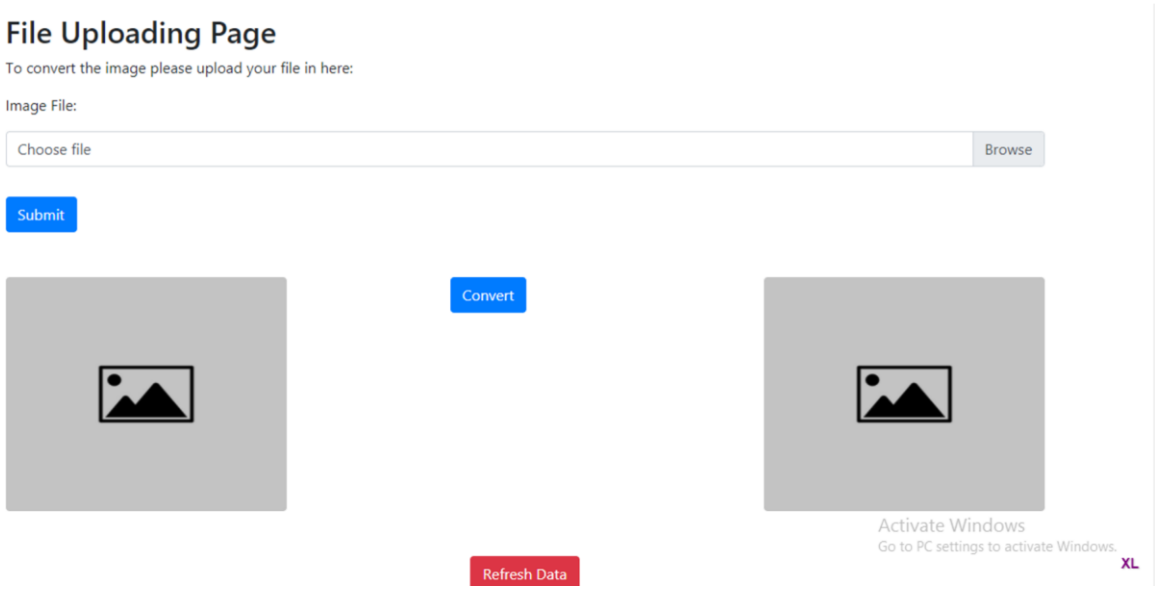

Figure 4.1: Enter interface of Shadow Removal.

Now we will give the shadow image in the interface of our system that will show the shadow image remove the shadow. This page will be seen after uploading shadow image.

Figure 4.2 will show the figure below:

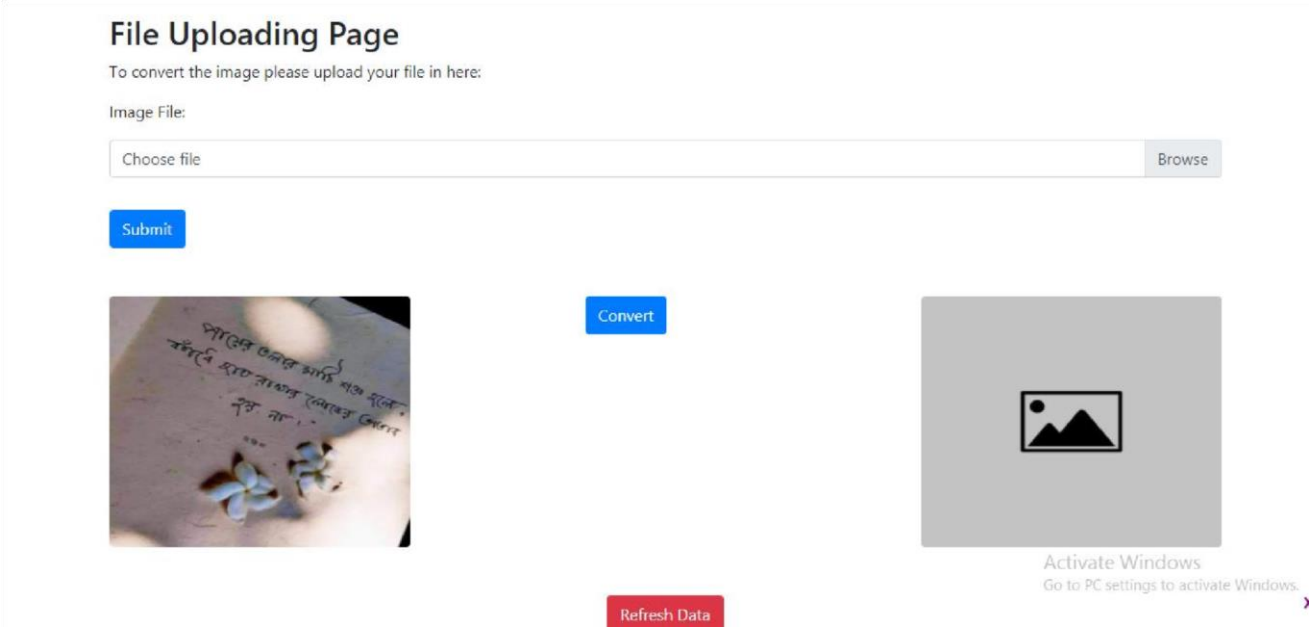

Figure 4.2: Uploading Shadow Image

Here we will give the necessary interface of the remove shadow of the system.

Figure 4.3 will show the interface:

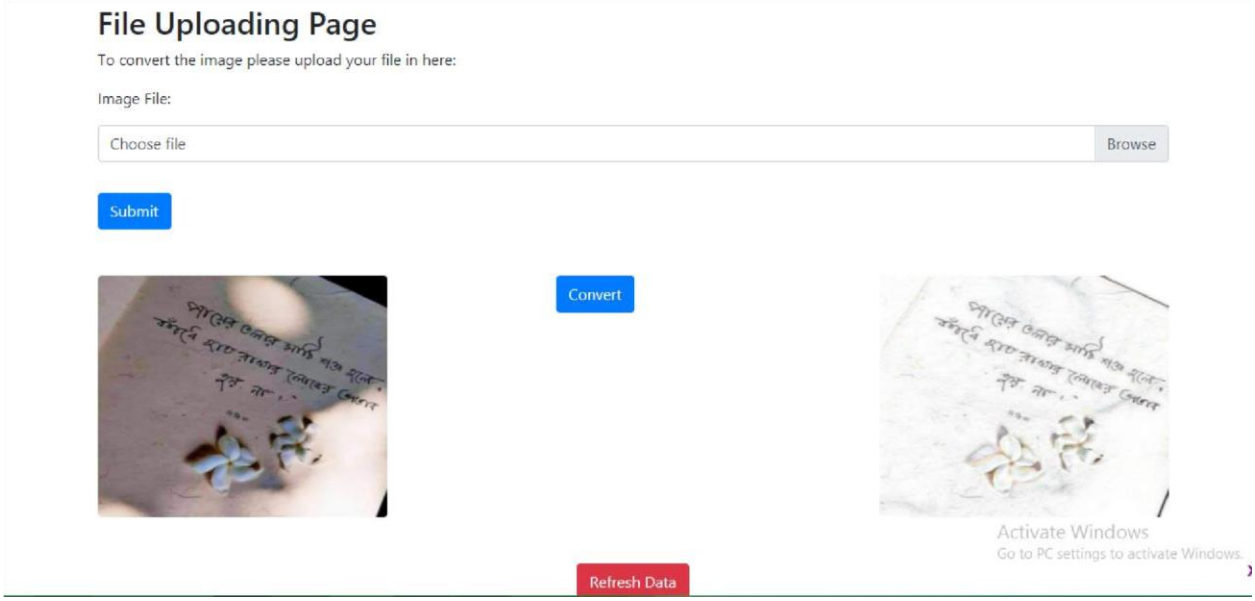

Figure 4.3: Remove Shadow Image

4.4 Descriptive Analysis

In this section we will discuss about the interface of the detection model. Here the system management can have the image with shadow and got the image without shadow in real time. If anyone upload image, still the system can monitor the image in real time. It stores the image with shadow after analyzing in a image without shadow proof of the image.

In this every section we the result when uploading image with shadow this system after remove shadow of the image:

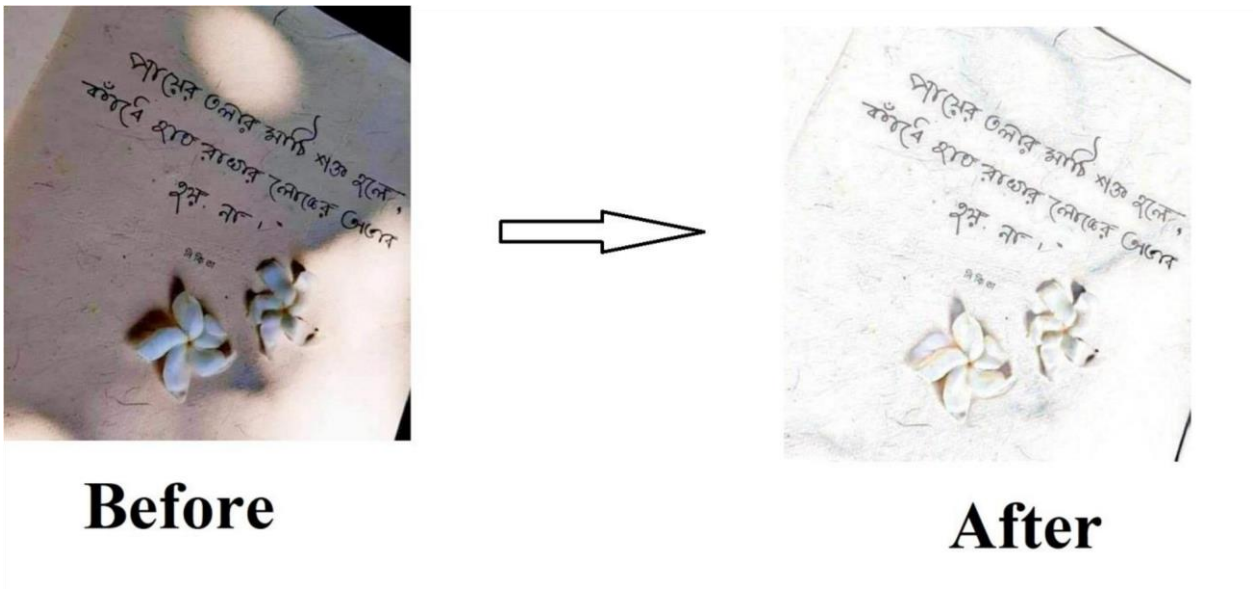

Figure 4.4: Remove Shadow Image Before to After

4.4.1. Evaluates from the Real Time Shadow Removal:

In order to evaluate the performance of the shadow detection method proposed two evaluation indicators, i.e., the shadow detection rate ci and shadow discrimination rate ni, which are defined as

$$ci = \frac{TP_S}{TP_S + FN_S} * 100\%$$

$$ni = \frac{TP_F}{TP_F + FN_F} * 100\%$$

Where the subscripts *S* and *F*, respectively, represent the shadow and the target; TP_S and TP_F, respectively, represent the number of shadow pixels and target pixels which is detected correctly; and FN_S and FN_F, respectively, represent the number of shadow pixels and target pixels which is detected falsely. Obviously, ci and ni are the evaluation of the shadow and target detection performance, but they cannot comprehensively reflect the performance of the shadow detection algorithm. Evaluation index avg, which was the average of the shadow detection rate and the shadow discrimination rate.

It is defined as follows:

$$Avg = \frac{ci+ni}{2}$$

To evaluate our method, we compare the proposed algorithm with the SNP algorithm, SP algorithm, DNM1 algorithm, and DNM2 algorithm which are summarized in [6] in terms of the shadow

detection rate, the shadow discrimination rate, and the average. The experimental results are shown in Table 4.1. As we can see that our method is better than the contrast algorithm, especially the average value which reflects the integrated performance of the algorithm is about 10% higher than other algorithms because the proposed algorithm combines the HSV shadow detection method with texture features to eliminate the shadow. Through the analysis of the shadow, it shows that the physical properties of the background area casted are unchanged, so the texture of the shadow area and the background area are similar. In addition, the brightness value of the shadow itself is lower than the brightness value of the background area projected by the shadow. The local variance extracts the local texture feature from the original gray level of the image.

Table 4.1: Real Time Accuracy of Shadow Removal

Test criterion	SNP	SP	DNM1	DNM2	Our method
ci	72.8	76.2	78.6	62.0	85.0
ni	88.9	90.7	90.3	93.9	94.0
Avg	80.9	83.5	84.5	78.0	89.5

4.5 Summary

After obtaining that accuracy, the highest results come from the shadows as to why, once satisfied, if we are trying to increase our accuracy, we should be well prepared for the database. All images must be the same number. At the time, to increase the level of accuracy, data purification was no exception. When more details are processed, more accurate predictions will be made by the divider.

CHAPTER 5

SUMMARY, CONCLUTION, RECOMEDATION AND IMPLECATION FOR FUTURE RESARCH

In the chapter in that section 5.1 we were concluded our development to system. I describe the limitation of our developed systems in section 5.2. In a same section, I also provided suggestion in future improvements.

5.1 Summary of the Study

It had no doubt that there are lots of researches works on image Processing especially on English Language. When the outcome of such kind of works is taking a revolutionary change in our computing life, recently, such kind of research is being increased this time. We get some outstanding real life applications on the blessing of such kind of research works. But it is a matter of great regrets that there has no such of research work on Shadow remover. But it is the hope for us that many of researchers from the various countries have started to do research on this field. In our research work, we do some approaches of our Shadow remover to classify its category.

5.2 Conclusion

Our primary aim was to develop a system that can automatically detect shadow image. We have introduced a method of removing shadow from text image (e.g. document, menu, receipt) by making shadows maps, or pixel measurements, corresponding to the background colors in the global references. My approach work power, as indicated by quality and proportion, in many types of examples that contain a large amount of solid shadows in the both controlled and real world settings.

5.3 Limitations and Suggestions for Future

In this paper, we had provided in-depth study of existing methods of detecting and removing shadows organized into most useful category. Test metric involved in strategies for finding and removing dignity was also being reviewer. Method that being used many images or methods that allow user intervention to provide better results. The assumptions presented in most studies increase the complexity of image removal in a single image and limit it shadows section image that can be treated in those ways. Ways such as recovery methods and time-consuming learning methods. Image in painting method works well in the region of small parks, but the expansion of in painting is a large clip the hole brings a difficult calculation. Also, dark things exist it is usually wrong as shadows. Many options available video sequence was a specific application and will not be use for

still images. Dignity acquisition and removal from single images with different geometries features and texture that reflected different display parameters remain a major challenge.

References

[1].G. Forman: *An extensive empirical study of feature selection metrics for text classification*.Journal of Machine Learning Research, 2003:1289-1305.

[2].Bo Pang , Lillian Lee . Seeing Stars: Exploiting Class Relationships for SentimentCategorization with respect to Rating Scales, ACL2005:115-1243

[3].Tumey, Peter, and Littman, Michael L. Measuring praise and criticism: Inference of semanticorientation from association. ACM Transactions on Information Systems, 2003: 315-346

[4].Sisi Liu and Ickjai Lee, A hybrid sentiment analysis framework for large email data, IntelligentSystems and Knowledge Engineering (ISKE), 2015 10th International Conference on, IEEE,2015, pp. 324–330.

[5].Feng, S., Wang, D., Yu, G., Yang, C. and Yang, N. Sentiment clustering: a novel method toexplore in the blogosphere. Springer,City, 2009.

[6].Li, N. and Wu, D. D. Using text mining and sentiment analysis for online forums hotspotdetection and forecast. Decision Support Systems, 48, 2 2010), 354-368.

[7].Balasubramanyan, R., Routledge, B. R. and Smith, N. A.From tweets to polls: Linking textsentiment to public opinion time series2010).

[8].Klimt, B. and Yang, Y. The enron corpus: A new dataset for Email classification research.Springer, City, 2004.

[9].Sharma, A. K. and Sahni, S. A comparative study of classification algorithms for spam Emaildata analysis. International Journal on Computer Science and Engineering, 3, 5 2011), 1890-1895.

[10].Sahami, M., Dumais, S., Heckerman, D. and Horvitz, E. *A Bayesian approach to filteringjunk e-mail*. City, 1998.

[11].Mohammad, S. M. and Yang, T. W. Tracking sentiment in mail: how genders differ onemotional axes. City, 2011.

[12].Hangal, S., Lam, M. S. and Heer, J. Muse: Reviving memories using Email archives. ACM, City, 2011.

[13].Jan-Willem van Prooijen and Mark van Vugt, Conspiracy theories: Evolved functions andpsychological mechanisms, Perspectives on Psychological Science 0 (0), no. 0,1745691618774270, PMID: 30231213.

[14].Karen M. Douglas and Ana Caroline Leite, Suspicion in the workplace: Organizationalconspiracy theories and work-related outcomes. British journal of psychology 108 3 (2017), 486–506.

[15].https://www.ibm.com/support/knowledgecenter/zosbasics/com.ibm.zos.zconcepts/zconc_dat asetintro.htm

[16].https://medium.com/datadriveninvestor/machine-learning-ml-data-preprocessing-5b346766fc48[SENTIMENTANALYSIS WITH CLASSIFIER ENSEMBLES."] Decision Support Systems, Vol.66, Pages 170–179, October 2014.

[17].Yassine Al-Amrani, Mohamed Lazaar, and Kamal Eddine Elkadiri, Sentiment analysis usingsupervised classification algorithms, Proceedings of the 2nd international Conference on BigData, Cloud and Applications, ACM, 2017, p. 61.

Appendix

Project Reflection

To complete the project I was faced so many problems first one I was to determine the methodological approaches for my projects. It was not traditional works it was a research based project, more over there were not much works done before on that area. So we could not get that much help from anywhere. Another problem was that, collection of data it was big challenges for me. There was no available source where we could get data, that's why we started collect data manually. After a long time with hard work we could do that.