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Rapport de projet pour valider BENKE

Image degradation script for performance evaluation of Comics

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Content

1.Backgrounds

1.1. General Backgrounds

Nowadays, many people upload photos on the internet, such as cartoons, manuals, and so on. It's very convenient and fast to do this. But these photos are illegal images. Illegal images are generated by scanning the original image. But when a book is scanned, the images are scanned by paper and paper, so each time illegally copies of the image change the different parameters of the original images. On this basis, we want to develop a script to change the original image to illegal images and to simulate the process of illegal images produced in batch.

2.Using Tools

2.1. Using Tools

In this project we use two main tools, one is ImageMagick and another is a database called MANGA 109. The program is programming in Batch Files.

2.2. ImageMagick

ImageMagick

ImageMagick is a free and open-source software suite for displaying, converting, and editing raster image and vector image files. It can read and write over 200 image file formats. It can also do a lot of operations to change the parameters of the Images.

This is a software without GUI, but the function is very powerful. User can use this software by input the command line.

2.3. DataBase MANGA109

This is a database of cartoons, it has a lot of original copies of the cartoons. We use these images to create the illegal copies and do the other jobs.

We can download the database MANGA109 at the web http://www.manga109.org/.

2.4. Batch files

A batch file is a kind of script file in DOS system, OS/2 and Microsoft Windows System.

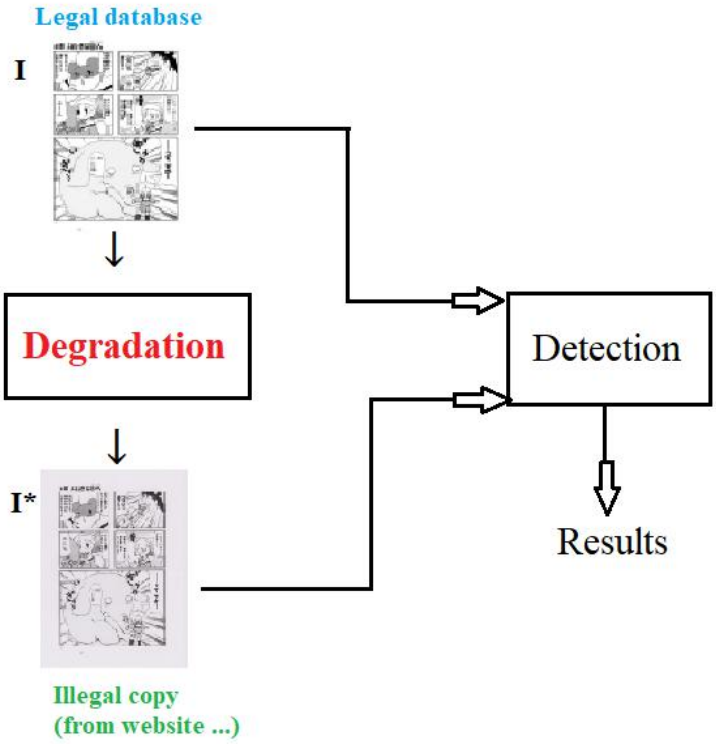
A batch file may contain any command the interpreter accepts interactively and use constructs that enable conditional branching and looping within the batch file, such as the commands "if", "for", "goto" and labels. The term "batch" is from batch processing, meaning "non-interactive execution".

.bat files

3.Purpose

3.1 Main purpose of the project

The main purpose is the same as the figure below. The square in red is my main job in this project.



Progress of Project

Processing images by batch, changing images of legal images which in the Database Manga109 to illegal images by changing the settings and different parameters of the images.

The script is based on ImageMagick commands on Windows system.

All the images that are downloaded from Database MANGA 109 are the format .JPG, so the script is mainly change the images in the format .JPG.

4.General Concept and Basic Commands

4.1. General Concept

The important concepts I learned from the project are:

Format .JPG:

All in all, .JPG is an image format. JPG files usually have a file extension of .jpg or .jpeg.

JPEG is a commonly used method of loss-less compression for digital images, especially for images produced by digital photography. The degree of compression can be adjusted, which allows a compromise between the size of the storage and the quality of the image.

JPEG typically achieves *10: 1* compression with little perceptible image quality loss.

Compression images:

**** Loss-less compression***

Loss-less compression is preferred for archival purposes and often for medical imaging, technical drawings, clip art or comics. Lossy compression methods, especially when used at bit rates, can be used to introduce compression artifacts.

****lossy compression***

Loss methods are particularly suited to natural images such as photographs in applications where loss of minor fidelity (sometimes imperceptible) is acceptable to achieve a substantial reduction in bit rate. Lossy compression that produces negligible differences can be called visually loss-less.

4.2. Basic Commands

Basic commands

When I use ImageMagick, I have 3 commands mainly used, these commands are:

- convert

- mogrify

- compare

The ***--convert*** command is used to change a single image at the same time.

The ***--mogrify*** command is used to change many images at once.

The ***--compare*** command is used to compare the two images, display their differences and the result of the comparison.

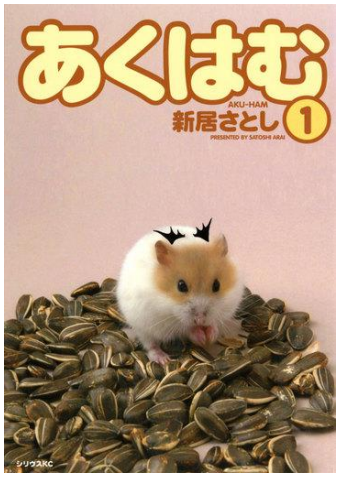
5.Implementation

5.1. Basic Algorithm

The basic Algorithm is to change the image parameters with the basic command. The following examples shows the basic algorithm.

--Size

magick mogrify -path d:/2/size/ -resize 512x512 d:/2/*.jpg



--Quality

magick mogrify -path d:/2/quality/ -quality 10 d:/2/*.jpg

--Rotate

magick mogrify -path d:/2/rotate/ -rotate 3 d:/2/*.jpg

--Bright

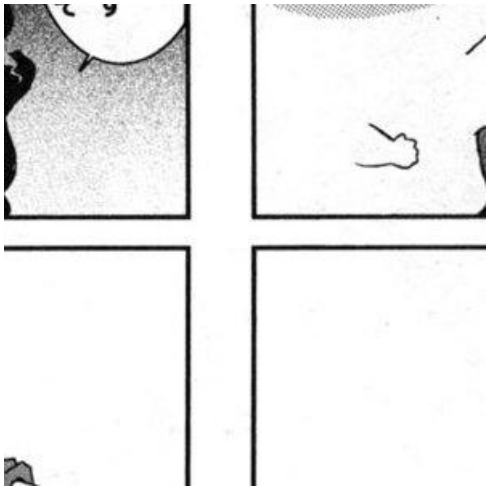
magick mogrify -path d:/2/bright/ -set option:modulate:colorspace hsb -modulate 120,90 d:/2/*.jpg

--Blur

magick mogrify -path d:/2/blur/ -blur 50x5 d:/2/*.jpg

5.2. Basic Commands Result

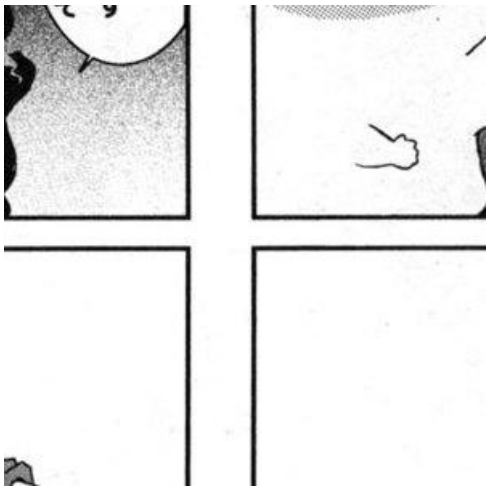
Change Size



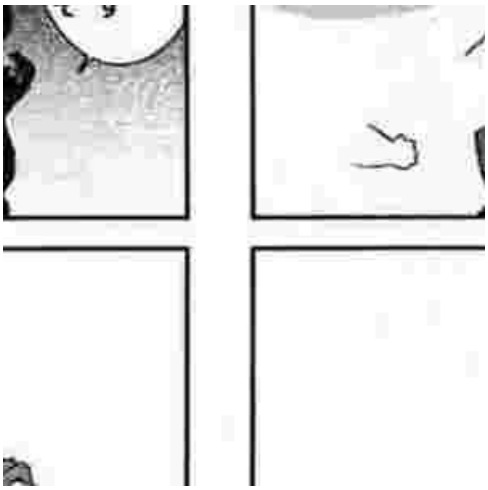
Original Image

Resized Image

Change Quality

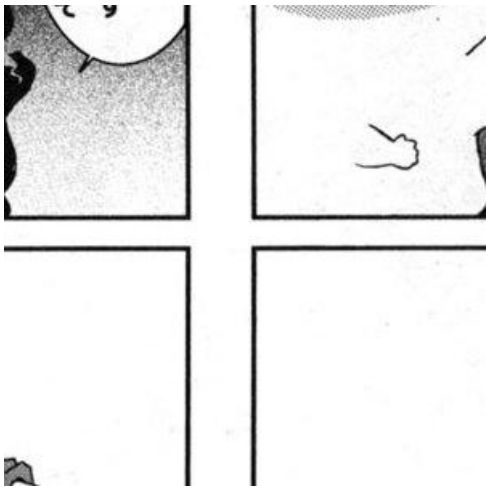


Original Image

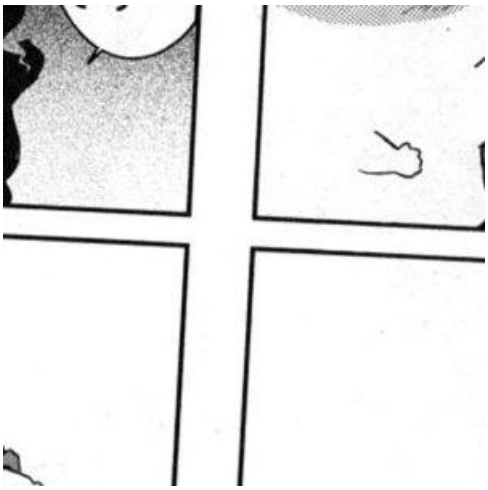


After Changing Quality

Rotate

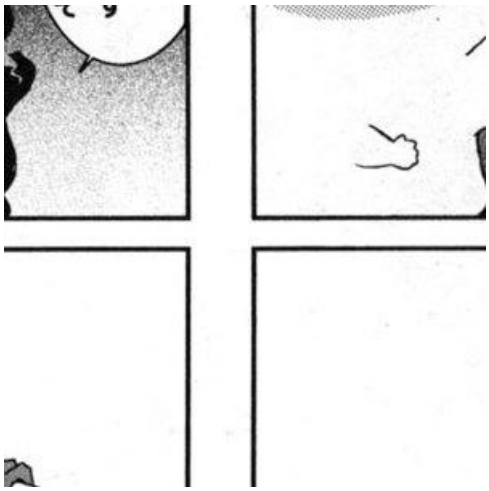


Original Image

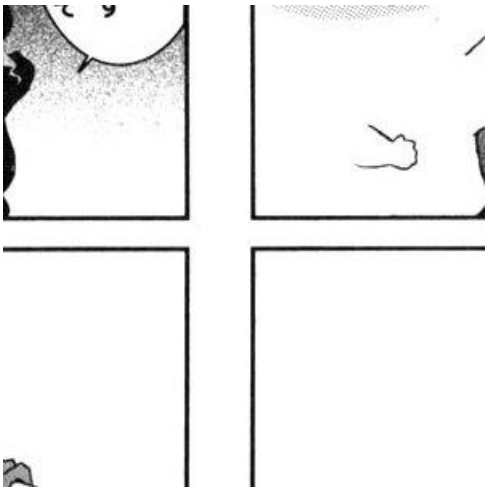


After Rotating

Bright

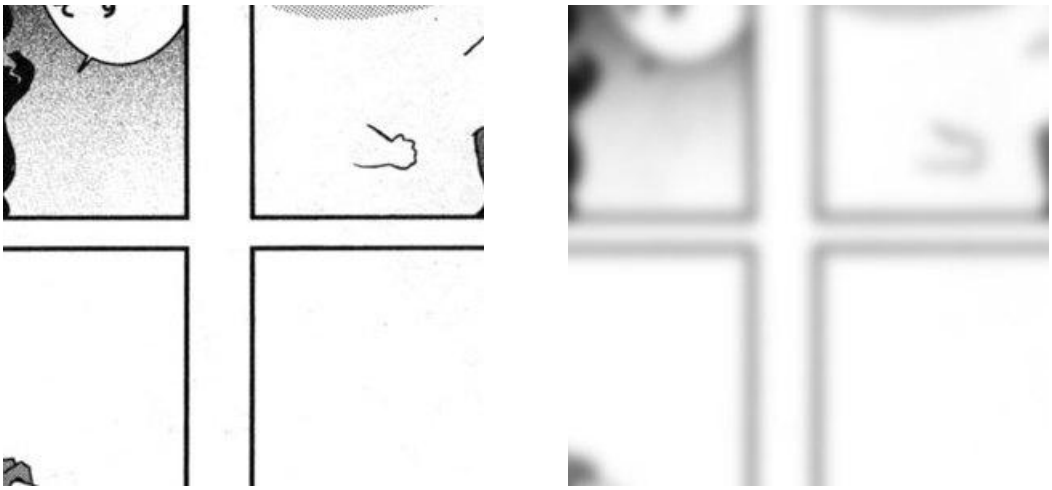


Original Image



After Changing Brightness

Blur



Original Image *After Blur*

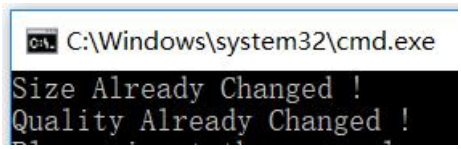
5.3. Implementation progress

To batch simulating the illegal images :

1. Because using the same scanning machine to scan the picture, all the picture size and quality changes are almost the same, so I use the fixed parameters to change the size and quality of the pictures.

@magick mogrify -path d:/7/Size/ -resize 1024x1024 d:/7/DatabasePictures/*.jpg
@echo Size Already Changed !

@magick mogrify -path d:/7/Quality/ -quality 10 d:/7/Size/*.jpg
@echo Quality Already Changed !



User Interface Display

2. For the parameters of rotate, brightness, and blur , when we scan, the degree of changing is serious impacted by the outside environment, so I use the random number processor to generate random numbers to change the parameters of different pictures .

For each image, we do the same operations in this following steps, changing size---changing quality---rotating---changing brightness---blur---cutting image---compare image.

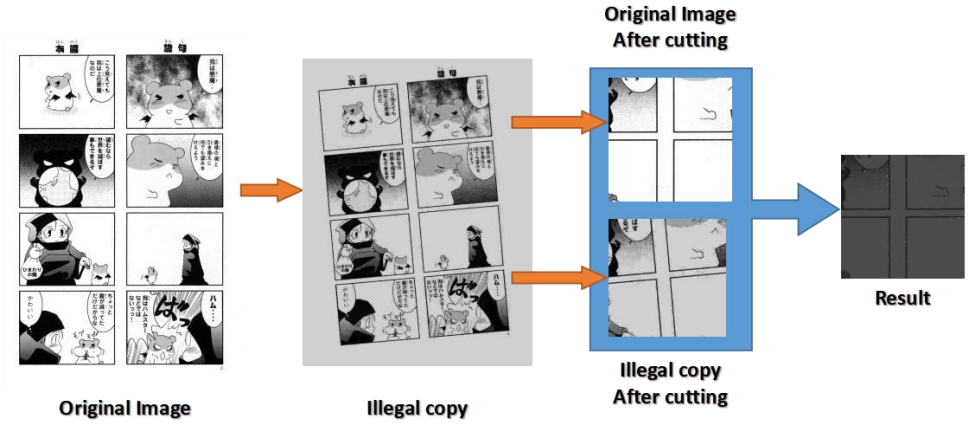
For each operation, we set a circulation to do this operation, at the same time, in this circulation, we gain a random parameter by the random number generator as the parameter of this operation command in this circulation.

For the rotating image operation and cutting image operation, we also set the range for the random number generator to make sure the authenticity of the illegal copy simulation. And the range is set by the users.

Enter a range of random numbers and generate the different random number for each picture to randomly change the image's parameters.

By looping the convert command to batch processing the picture, in the loop, every processing for a picture, it will result in a different random number to deal with the picture.

3. Finally, I try to compare the illegal pictures with the original pictures and output the differences between two types of picture , to distinguish whether the picture is changed.



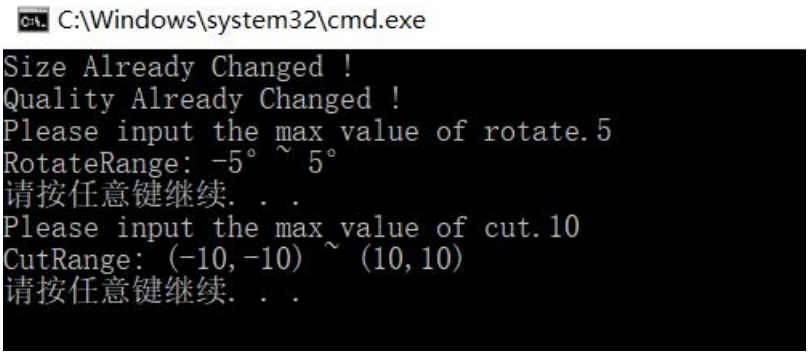
Simulation Progress of the program

5.4. User Interface

The random number generator:

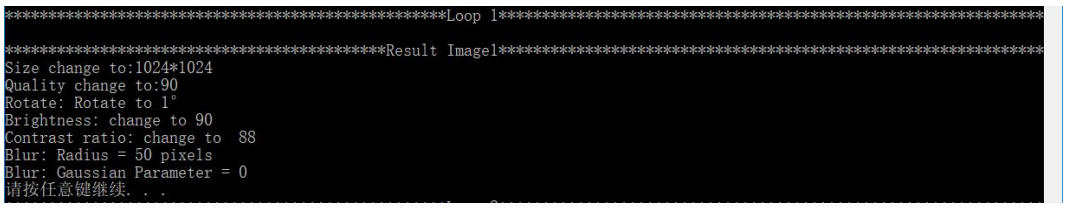
The program will ask the user to input the range of the different random numbers for different parameters.

After inputting the range, the program will gain the random number.



Random Number Generator display in UI

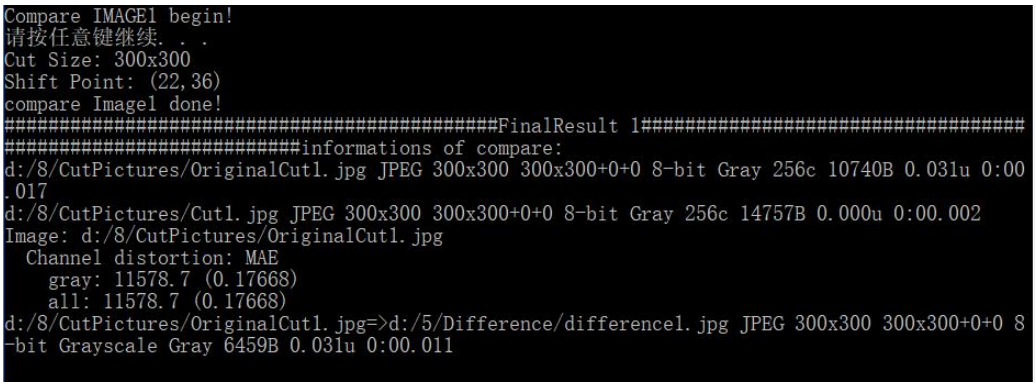
The program will display the different random numbers for the parameters and all the step. So each images will change differently and make the illegal copies simulations more like the reality.



Result of Simulation illegal Copy

Each image will have a display like this, so we can know the progress of how the program changes the image.

After all the simulating steps have been done, it will display the final result -- the informations of comparing.



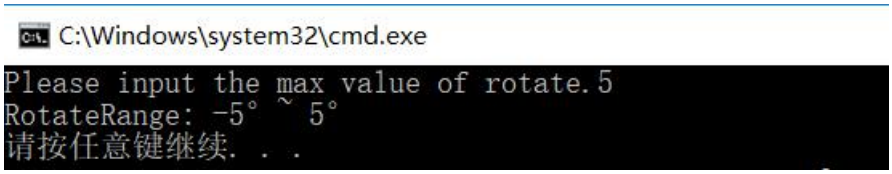
Final result

5.5. Experiments

I copy 5 images from the database and do the test. The program will follow the steps like:

Resize -> Change Quality -> rotating -> changing brightness -> blur -> cutting image -> Compare image

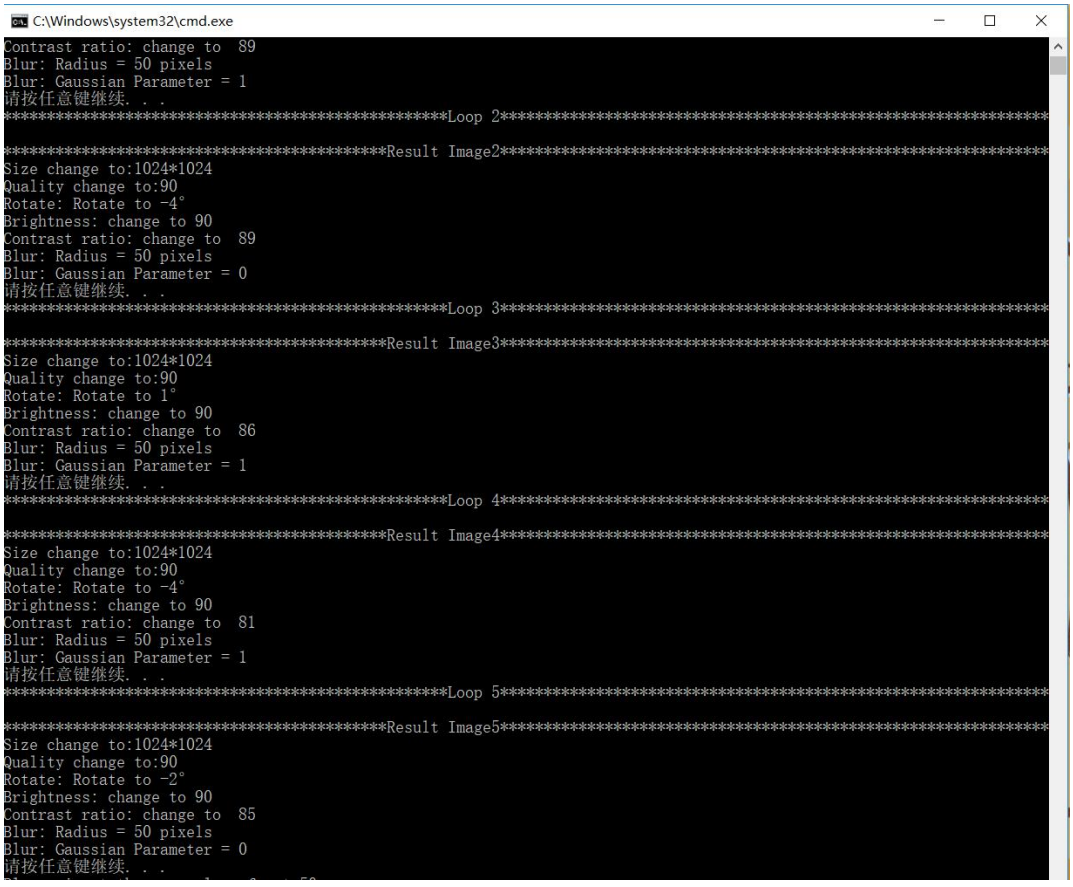
First of all the program change the size and quality of the image. And then it will ask the user the range of random numbers of rotate.



After the user inputting the range and the program will start to run in circulation in order to make the illegal copy. The program will display how to change the original pictures, and each step it will output a new image after changing.

UI display

In the program it will run as circulation, so the program will run 5 times in the test and we can see all the changes of the illegal copies.



UI display

And then we can see in the folder, there are 5 illegal copies.

*In the folder /**IllegalCopy***

After simulation, the program will ask the user the range of shifting point of the cutting command.

```
Please input the max value of cut.50
CutRange: (-50,-50) ~ (50,50)
请按任意键继续. . .
```

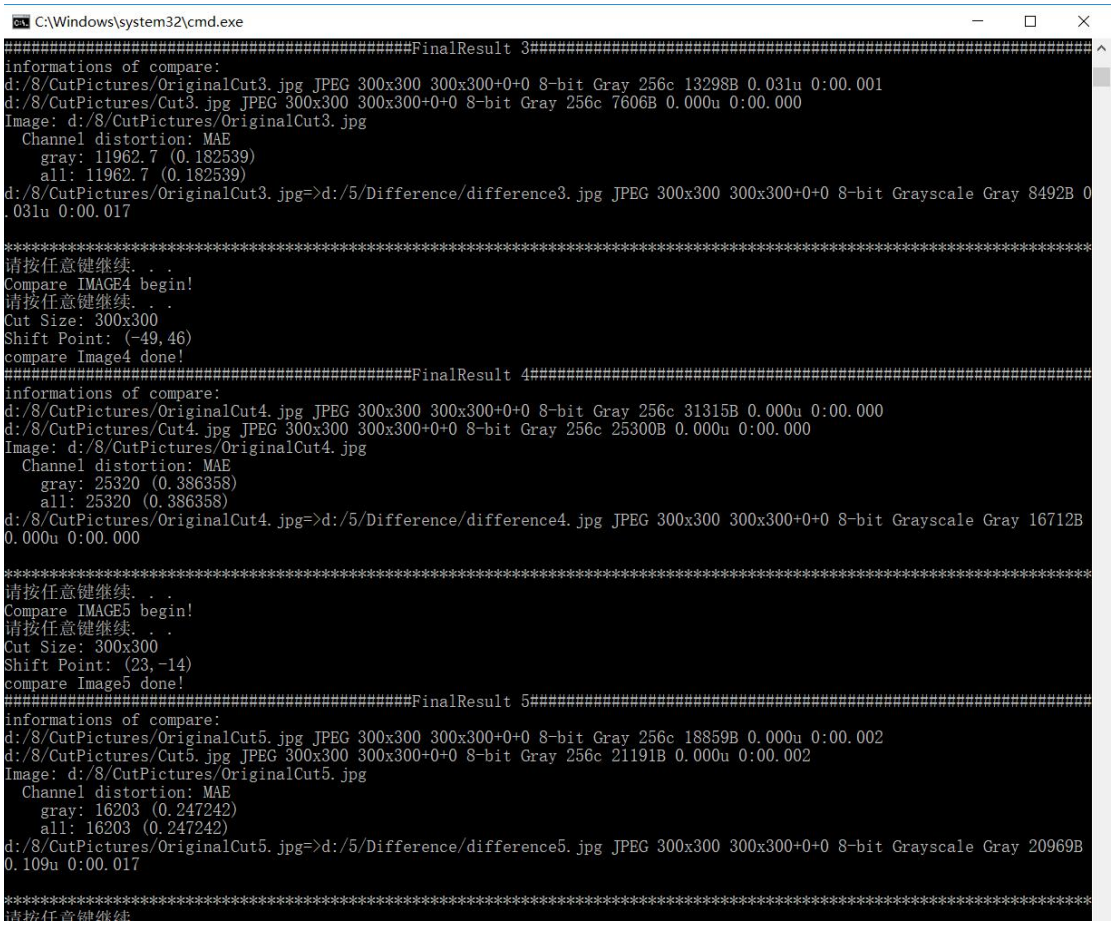
Range of cutting

And then the program will start to cut the original images and illegal copies, and also compare the images after cutting. It will output the final result of outputting. And we can see the Visualization comparing result and the images after cutting.

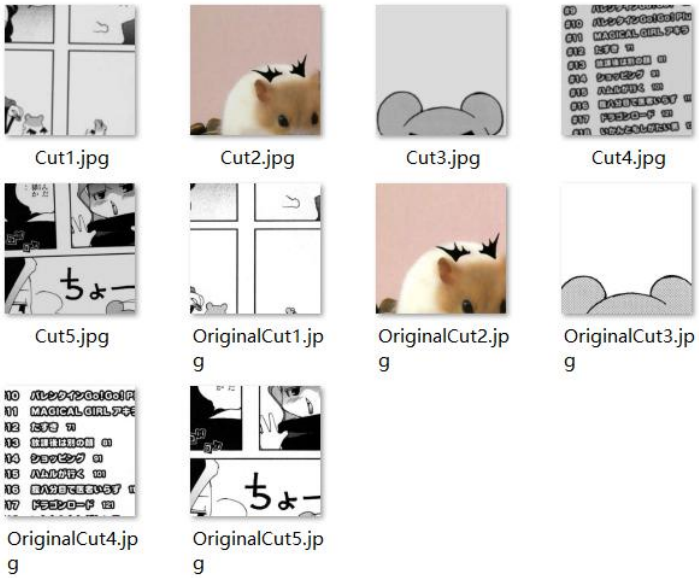
```
Compare IMAGE1 begin!
请按任意键继续. . .
Cut Size: 300x300
Shift Point: (6,46)
compare Image1 done!
##############################################FinalResult 1#############################################################
informations of compare:
d:/8/CutPictures/OriginalCut1.jpg JPEG 300x300 300x300+0+0 8-bit Gray 256c 11200B 0.000u 0:00.001
d:/8/CutPictures/Cut1.jpg JPEG 300x300 300x300+0+0 8-bit Gray 256c 11253B 0.031u 0:00.003
Image: d:/8/CutPictures/OriginalCut1.jpg
  Channel distortion: MAE
    gray: 11588.6 (0.176831)
    all: 11588.6 (0.176831)
d:/8/CutPictures/OriginalCut1.jpg=>d:/5/Difference/difference1.jpg JPEG 300x300 300x300+0+0 8-bit Grayscale Gray 6553B 0
.109u 0:00.017

########################################################################################################################
```

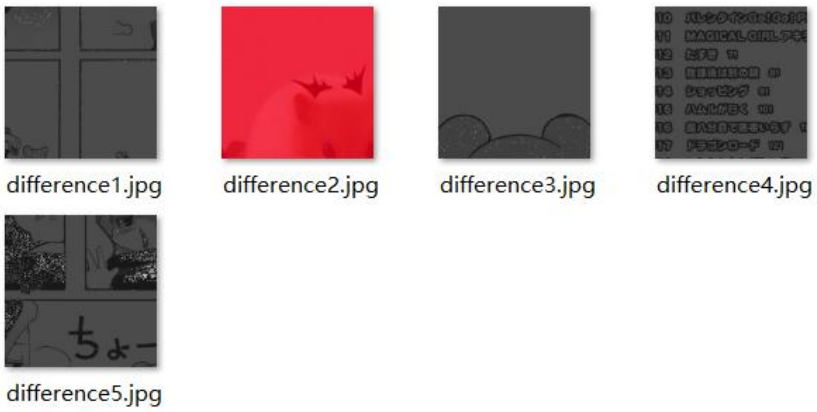
Display the final comparing result



The program run as circulations

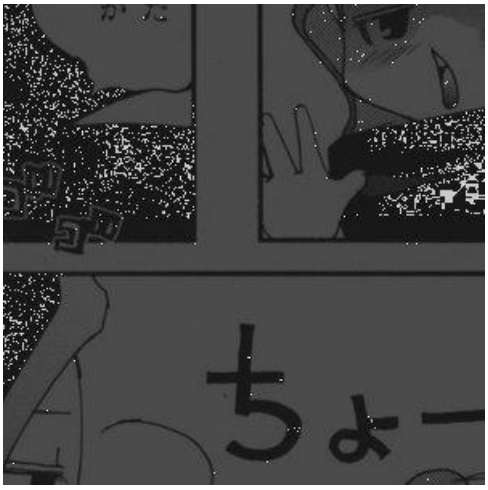


*The images after cutting in the folder **/CutPictures***



The output of Comparing the difference in the folder ***/Difference***

From the images in the folder ***/Difference*** we can see the final result, as the example shows, the white points are the pixels which are not be changed in the simulations. And the colorful parts(red or black) are the pixels which are already be changed.



difference5.jpg

6.Summary

6.1. Summary

Through this project, I learned about the image of the relevant knowledge, how to use Imagemagick this software, learned some of his orders and Windows command line command, in a try and learn again and again, learned the Windows command line command random The number of generated, to generate random number manual input range and so on.

6.2. Improvement and Perspective

Want to improve the program, not only can. JPG format images to operate, while other formats can operate the picture.

More in-depth study of the compare command, you can more specific output of the two types of pictures specifically produced what changes, size, quality changed how much, how much change in brightness tilt, etc., rather than just generate the same pixel and different pixels result.

Increase the function, in addition to simulation can produce illegal pictures, but also can handle the real picture, so that with the legitimate copy of the database picture to compare the picture to determine whether the picture is illegal.