Comp Photography Final Project

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Face Mosaic

Face mosaic is proposed here for automatically combining small tiles of secret image to form a target in the sense of mosaic.

A picture that has been divided into equal sized tiled sections, each of which is replaced with another photograph that matches the target photo. When viewed at low magnifications, the individual pixels appear as the primary image, while close examination reveals that the image is in fact made up of many hundreds or thousands of smaller images.

The Goal of Your Project

Goal of the project to create face mosaic using following steps:

. Download a bunch of images from somewhere to act as the pixels of master image.

· Process a source image, calculating the average brightness of each pixels of master image.

· Go through each pixels of master image and find one of the downloaded images that can substitute for it in the photo mosaic.

· Fit the similar tile image into each pixel in the master image.

· Draw the downloaded images in the right positions and at the right sizes.

Why I chose This Project:

I had used mosaically software to create face mosaic. I found it interesting. I got this opportunity to create my own face mosaic.

Scope Changes

Did you run into issues that required you to change project scope from your proposal?

- If so, give a very short explanation here of what changed.
- I changed the way of processing the tile images in master image. I had thought of using blocks of master image. I changed with using tile images as an pixels of master image.
- I had thought of finding the similar tile image for selected source image to fit into each block in the target image. Process a source image into a grid, calculating the average brightness of each square.

- ·   Process a source image into a grid, calculating the average brightness of each square.

- ·   Go through each square in this grid and find one of the downloaded images that can substitute for it in the photo mosaic.

- Go into more depth in a later section.

Showcase what you did on This One Single Slide. That might be challenging. You may use several images; but this <u>single slide</u> should be a good pictorial representation of your work. Be creative.
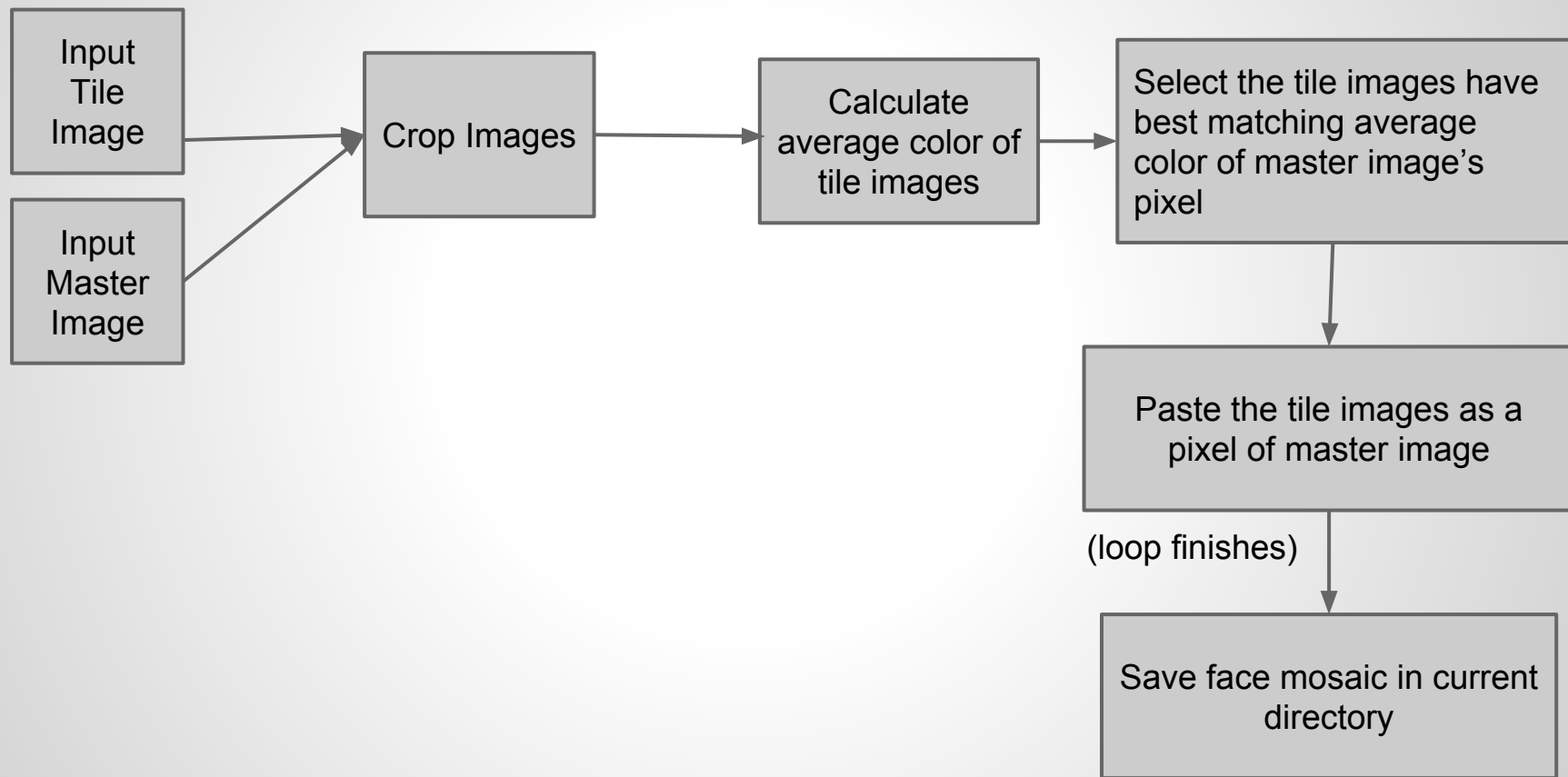
Input

Output

Your Pipeline

(loop each master's pixel)

Input Tile Image

Input Master Image

Crop Images

Calculate average color of tile images

Select the tile images have best matching average color of master image's pixel

Paste the tile images as a pixel of master image

(loop finishes)

Save face mosaic in current directory

Your Pipeline

1) Input Tile image and Master Image: (Manual)
    Get images for the tiles and master from the argument of python script.

Ref code:

  https://github.com/swati796/ComputationPhoto/blob/master/create_mosaic.py

2) Crop the Images: (Automatic)
    Python script crop the tile images and master image using function processTileImage().

3) Calculate the average color of tile image.(Automatic)
Python script uses average_color function to calculate the average color of each tile image and map it to tile image.

4) Select the tile images that best match the colors on the master. (Automatic)
    It uses further function distance to calculate the closer_color of tile images with each master's image pixel. It further randomly choose best tile image from 10 tile images, which has closest average colors to master image pixel. Do it in loop for each pixels of master's image.

Your Pipeline

Ref code:

https://github.com/swati796/ComputationPhoto/blob/master/create_mosaic.py

5) Paste the tile image as an pixel to master Image: (Automatic)

Paste each best matched tile image as an pixel of master's image.

6) Save the face mosaic in current directory.(Automatic)

Save the created face mosaic in current directory.

Demonstration: Show complete Input/Output results

- If your results can easily be shown here, please do.

- Provide links to videos or gifs, and large or numerous images

  https://github.com/swati796/ComputationPhoto.git

  - Input tile Image: new_tiles folder
  - Master Picture: Master_pic.jpg
  - Creating Image mosaic : create_mosaic.py
  - Readme File: README.md
  - Output picture : o.jpg

Demonstration: Show complete Input/Output results

Demonstration: Show complete Input/Output results

tile Images. It is few among 806. Tile images link https://github.com/swati796/ComputationPhoto

Computation: Project Development

Use several slides to discuss how you developed your code and project outputs. Tell your story.

This can take many forms:

I divided my project into 3 following phases:

Phase	Description of Work	Start and End Dates
Phase I	Selecting source and target images to create image mosaic	06/29/2016 – 07/01/2016
Phase II	Write pseudocode of algorithm to make image mosaic	07/03/2016 - 07/17/2016
Phase III	Implementation, testing, result description	07/17/2016 - 07/24/2016

Computation: Project Development

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Phase 1:

    Selecting source and target images to create image mosaic

    I was not getting sure how to choose tile and target images to create image mosaic. I went through internet to get the idea of choosing images.

    I chose my daughter's album to create the face mosaic.

    I needed to crop the image to create face mosaic. I looked for software , which can easily crop the images.

    I used click 2 crop software to crop the images and use them as tile images.

   Link of my tile images and master image are:

      https://github.com/swati796/ComputationPhoto.git

- ○   Input tile Image: new_tiles/ folder
- ○   Master Picture: Master_pic.jpg

Computation: Project Development

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Phase 2:

Write pseudocode of algorithm to make face mosaic

I have input tile images and master pic image. I have to write code to create face mosaic.

I thought of using python. As I am comfortable writing code in python.

I finalized the Pseudo code of algorithm as below:

a) I heavily used PIL library. I saw it's implementation on internet and i found it is good library to use it for my current implementation.

b) Resize the tile images to make it square images. I was not using it before, but it had many issues and I had to consider this. I will share the images of not considering it.

c) For list of tile images, map the properties like: main image, image as pixels, path of this image, average color of this image.

Algorithm to calculate the average colour of each tile images

i) Add the pixel's intensity and channels of tile image

ii) Divide it by width*height of tile image.

Computation: Project Development

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Phase 2 cont: (Code) (https://github.com/swati796/ComputationPhoto.git**)**

create_mosaic.py

a)   Resize the tile images to make it square images. I was not using it before, but it had many issues and I had to consider this. I will share the images of not considering it.

Ref function : ProcessTileImage(`image_dir, out_dir`) at line 10

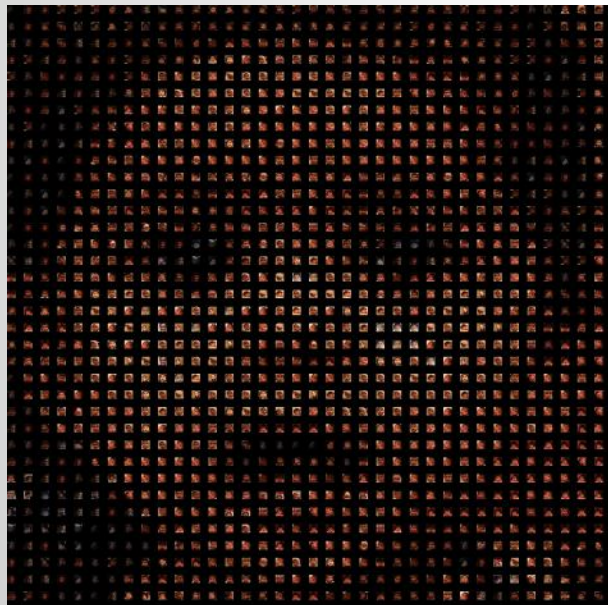b)   Algorithm to calculate the average colour of each tile images

Ref function: average_colour(pixels, image) at line 45

Setting the mapped property of each tile images

Ref function: main() at line 81-86

Phase 2 cont..: step b Images

Not resizing the tile images. Here tile images of size 32X32 , while master's pixel's size 16X16

Not resizing the tile images. Here tile images of size 32X32 , while master's pixel's size 64X64

Resizing the tile images. Here tile images of size 32X32 , while master's pixel's size 32X32

Computation: Project Development

Use several slides to discuss how you developed your code and project outputs. Tell your story.

Phase 2 cont.:

Write pseudocode of algorithm to make face mosaic

d) Set the dimensions of output image. Its dimension must be calculated as = Master's pic width * Pixel_size of tile image, Master's pic height * Pixel_size of tile image

I came to this calculation after randomly choosing height , width of output image. Images is shared in further slides.

e) Go through each pixel's of output image and each tile image's calculated mapped property of averge_color. I tried to find the minimum distance between each tile's average color and master's image pixel. I chose 10 tile images, which has average color matching to that pixel of master image.

f) I randomly selected one tile image to be used as pixel from 10 sorted tile image. I was not using random selection and was using the one picture ,which had matching pixel of master image's average color. Not all tile images was getting used and was repeating the tile images. I will post the pictures in later slides.

g) I went through each pos_x, pos_y of master image as an pixel and replaced it by matched tile images.

Computation: Project Development

Use several slides to discuss how you developed your code and project outputs. Tell your story.

Phase 2 cont.:

(Code) (https://github.com/swati796/ComputationPhoto.git)

create_mosaic.py

d) Set the dimensions of output image. Its dimension must be calculated as = Master's pic width * Pixel_size of tile image, Master's pic height * Pixel_size of tile image

Ref function: main() : line 77 - 79

e) Go through each pixel's of output image and each tile image's calculated mapped property of averge_color. I tried to find the minimum distance between each tile's average color and master's image pixel. I chose 10 tile images, which has average color matching to that pixel of master image.

Ref function: main() : line 97- 106

g) I went through each pos_x, pos_y of master image as an pixel and replaced it by matched tile images.

Ref function: main() : line 97- 113

Phase 2: step f) Image

Not using the random selection of tile images for average color of master's pixel. Many tile images are repetitive.

Computation: Project Development

Use several slides to discuss how you developed your code and project outputs. Tell your story.

Phase 3:

  Implementation, testing, result description

a) Used this code to implement to create my face mosaic.
b) Added the files to github
c) Writing finalproject.pdf

Computation: Code Explanation

Walk through your code functions, similar to what was done in assignments.

- Show and discuss code snippets.

- Explain the major algorithms. If you used them, you should understand them.

- Code discussion may be incorporated in the Project Development area if that works better for you.

- Make sure your credit your sources, either here or in Resources.

- Use as many pages as necessary.

Details: What worked?

- I am successful to create Face mosaic, so finally everything worked for me.

Details: What did not work? Why?

- I had to change the algorithm to map tile images to master images.

My Previous plan was as following

Download a bunch of images from somewhere to act as the pixels.

Find the similar tile image for selected source image to fit into each block in the target image.

Process a source image into a grid, calculating the average brightness of each square.
Go through each square in this grid and find one of the downloaded images that can substitute

for it in the photo mosaic.

Above italic font steps didn't work for me. It was getting complicated and taking much longer Within

given timeframe, I substituted with simple algorithm.

Substitute each master's pixel with tile images, which will act as master's pixel. Choose the tile

images based on matching average color of each pixel of master image.

Details: What would you do differently?

I would have changed the algorithm to select the tile images as below

Find the similar tile image for selected source image to fit into each block in the target image.

    Process a source image into a grid, calculating the average brightness of each square.
    Go through each square in this grid and find one of the downloaded images that can substitute

for it in the photo mosaic.

Resources

- You must provide references to all the source documents, code, and significant other information you used.

- http://www.slideshare.net/arulj7978/ieee-mini-project-mosaic-image

- http://urbanhonking.com/ideasfordozens/2013/01/14/making-photomosaics-in-processing/

- http://dncr-qar.s3.amazonaws.com/s3fs-public/documents/files/20-Fall-2003-Photo-Mosaic-Project-Proposal.pdf

- https://en.wikipedia.org/wiki/Photographic_mosaic

- https://github.com/charlienewey/image-mosaic/blob/master/

Teamwork (required for teams only)

- Not Applicable

Your Code

We do not have a preference for the form of your code submission. We rarely run project code, but we do inspect it.

If you did not already:

- provide a link to your code: https://github.com/swati796/ComputationPhoto.git

- or your code functional description did not extensively show your code
- or you are not submitting the code file to bonnie because it's actually several files;

https://github.com/swati796/ComputationPhoto.git/README.md

Credits or Thanks

- Prof. Irfan Essa
- All TAs
- Piazza members