Image Fusion

A Research Project by ASRC Federal
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Image Merge Inputs

Image Merge Output

- Takes two equal size images and compares each pixel using a hot swappable function. A hot swappable action is performed if the comparison is true.
- Has different merge styles to fit the use case.
- Uses the command pattern extensively to be adaptable and extensible.

Image Merge Group Output

- A function of the extraction remote is to pull out groups of connected, changed pixels. These groups can be used in other functions, sorted, and drawn separately.

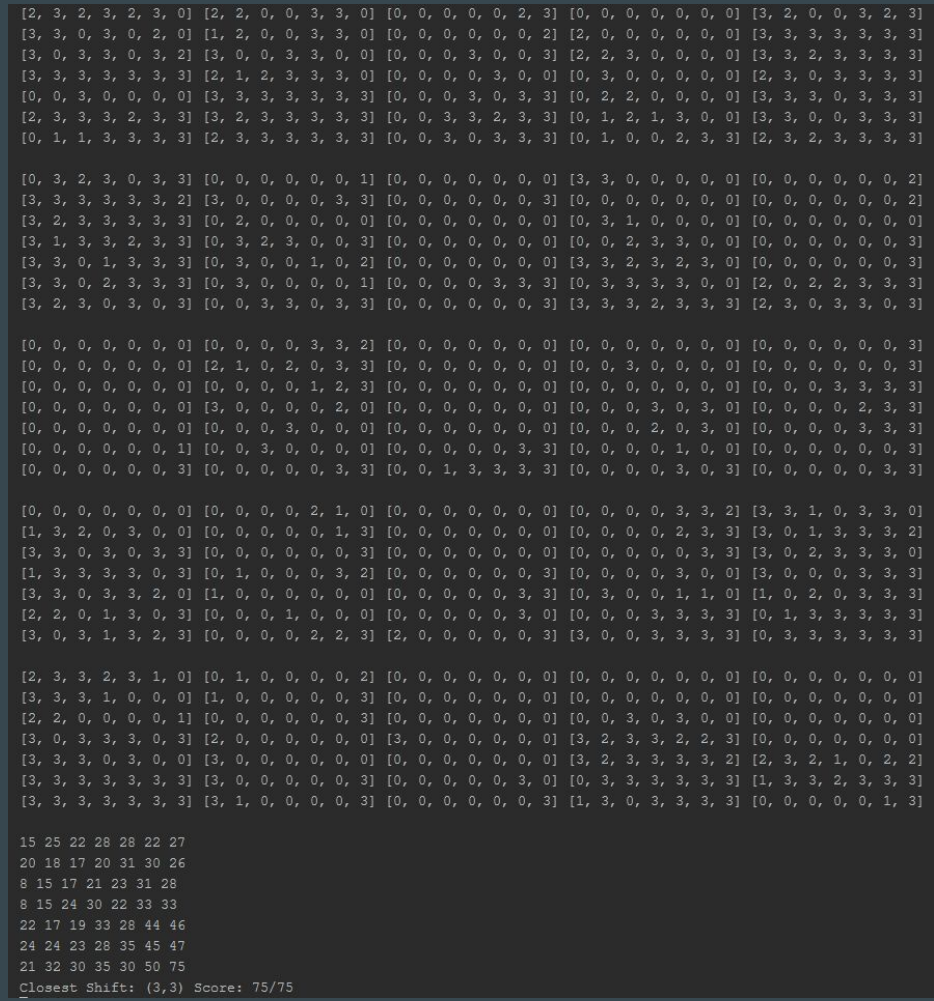
People Detection

A stand alone script that detects human shapes in an image. Uses OpenCV libraries.

Shift Analysis Input

Shift Analysis

- Compares a pixel to surrounding pixels in a second image, trying to find if the second image has been shifted by some degree. This is repeated for accuracy.
- Can recognize a panned image by the similar regions.
- Results are displayed below the detailed information.



Shift Results (Larger)

```
15 25 22 28 28 22 27
20 18 17 20 31 30 26
8 15 17 21 23 31 28
8 15 24 30 22 33 33
22 17 19 33 28 44 46
24 24 23 28 35 45 47
21 32 30 35 30 50 75
Closest Shift: (3,3) Score: 75/75
```

Template Matching Input

Template Matching

- This OpenCV2 utility finds a smaller or equal size image (referred to as the template) in a larger image. The utility has been expanded to resize the template linearly to find the best match.
- Can be used to find where a smaller image fits into the larger, to ‘reverse the crop’ of an image.

Object Distance Finding

- A module that can use four different algorithms to investigate the real distance of an object in a 2D image.
- When the difference between two images is found, using the image merge, utilities the dimensions of the detected object are used to find distance
- Trigonometric principles relating distance to the properties of the lens of the camera that captured the image allow for precise calculation.

Homography: the modification of image details using relative perspectives

- To change the perspective of an image based programmatically
- By applying formulas of algebraic manipulation, pixels are altered to ‘warp’ an image
- Given two images that contain a complete common object, the perspective of one image can be altered to appear as though it is being viewed from the perspective of the other image based on the relative locations of features of the common object

Console Module

- An interface that allows for easy use of the scripts and tools in the package.
- Works interactively, and contains interactive help as well.
- In addition, full documentation is in the code and python docs are able to automatically generated.

```
Documented commands (type help <topic>):
========================================
colordiff        filtergroups  ratiosortgroups  show
countsortgroups  gengroups     redhighlight     showgroups
cropfind         help          regularremote    takenonemptysecond
detect           merge         resetcommands    takesecond
exportmerge      mergeas       save             templatematch
extractremote    pixelshift    savefirstgroup   testmerge

>
```

Commands for the Console

Merging Commands	Remote Commands	Remote Command Controls
❑ Merge ❑ Testmerge ❑ Exportmerge ❑ mergeas	❑ Redhighlight ❑ Takesecond ❑ takenonemptysecond ❑ Colordiff ❑ resetcommands	❑ Extractremote ❑ regularremote
Pixel Group Commands	**Script Commands**	**Utility Commands**
❑ Gengroups ❑ Showgroups ❑ Filtergroups ❑ Countsortgroups ❑ Ratiosortgroups ❑ savefirstgroup	❑ Detect ❑ Cropfind ❑ Templatematch ❑ pixelshift	❑ Save ❑ Show

Thank You