CST 205 Homework 2

Due February 23, 2018 at 11:55pm

Background

Analyzing a series of images of the (*exact*) same location at different times is known as **temporal** processing. (This is opposed to *spatial* processing which analyzes one image and focuses on each pixel's neighbors.)

One example of a temporal filter is a **median filter**. Given several images, a temporal median filter takes a list of pixel channel values at each coordinate and calculates the median. This removes outliers and can act to subtract unwanted elements from an image.

In general, to calculate the median of a list of numbers of odd length, you sort the list, calculate the middle location, and return the value at that middle location. If we have a list of length n, where n is odd, the location of the middle value is at:

$$\frac{n+1}{2}$$

For example, if we have the numbers:

```
2, 4, 6, 237, 1
```

we sort the numbers to get:

```
1, 2, 4, 6, 237
```

The list is of length `5`, so the middle value is located in the third position, which is the number:

```
4
```

(**Note:** Given that Python lists are indexed at `0`, we need to substract one from the calculated middle location in our program.)

Task (20 points)

Imagine you are a motorcycle aficionado and spot a stunning retro sidecar motorcycle on a sidewalk. You are in a hurry, but quickly take multiple pictures of it, only to notice back home that all of your images are ruined — by a fox on a motorcycle! The motorcycle fox rode through all of the 11 images that you took. (These images can be downloaded at bit.ly/205hw2 and will also be provided on Slack.)

Luckily, you know Python (and Pillow) and can write a median filter program to remove the motorcycle fox. The basic idea is presented below (though you will use all of the provided images):

Note: Your program will be tested on different images, but you can assume that the file name numbering system will be the same. You can also assume that your program will be tested on an odd number of images. (Do not assume that the test images will have the same dimensions.)

Deliverable

Submit all source code files and **only** your final image. All source code files should include header comments. (Do not submit the source images.)