STAT 327 Homework 3

1 Implement a parallel mean filter for image smoothing

Visit `http://www.stat.wisc.edu/~jgillett/327-3/3/hw3.html` for a description of this part.

2 Detect edges

Do basic edge detection. One quick way to find edges is to change `mean()` to `sd()` in your filter! Use $k = 1$. Identify those pixels for which the `sd()` (in your choice of one of the colors) is high, say in the top 10% or top 1%: the color is changing quickly here, so it's a candidate for an edge. Change the image by using the value 1 in each color channel, which makes the edge pixels white.

- Find edges in the Van Gogh painting, `http://www.stat.wisc.edu/~jgillett/327-3/3/Van_Gogh.png`. What feature of the painting is emphasized by edges from the red channel?
- Find edges in the Madison photo `http://www.stat.wisc.edu/~jgillett/327-3/3/Madison.png`. What feature is emphasized?

3 What to submit

- `hw3.Rmd`: Create this file from scratch. Include your name and email address at the top.
- `hw3.html`: Create this by running "KnitHTML" on your `hw3.Rmd` file. (We may run "KnitHTML" on your `hw3.Rmd` file too, but your submitting `hw3.html` saves us the time of knitting if we don't want to wait.) It should show these things:
  - your code, in reasonably small chunks
  - for each code chunk, a very brief description of what it does, written for a reader who has already read the posted assignment description
  - the three Van Gogh and two edge images (Van Gogh, Madison); include each with
    `![alt text](filename.png)`
    in the text (not a code chunk) of `hw3.Rmd` (`alt text` appears if the image won't load)
  - answers to the questions

We'll grade your work by opening your `hw3.Rmd` file in RStudio (in a directory containing the data files), clicking "KnitHTML" (if we want to run your code), reading the HTML output, and reading your code. We might also run other tests on your code.

4 Optional challenge: Rcpp

Use `Rcpp` to speed up your code. This makes experimenting with the code a lot less time-consuming.