Assignment 6
Multimodal Registration

CS 473/673: Medical Image Processing

Due 4:00pm Friday 25 March 2016

1. [7 marks] **Multimodal Registration**
   Write a multimodal 2D rigid-body registration function that registers two images by maximizing mutual information (MI). Your method should use gradient ascent (gradient descent is described in L21 for the Reblurring algorithm). You may use the supplied function, `mi`, to evaluate the MI cost function. Use 64 intensity bins for each axis. Your function should be called `RigidRegMI` and have the prototype

   ```
   function p = RigidRegMI(f, g, p0)
   ```

   where `f` and `g` are the images to be registered, and `p0` is the vector of motion parameters for the initial guess (see the function's help file for more information). The returned set of motion parameters, `p`, are those that move `f` into register with `g`. The motion parameters should be a 1×6 array in the same format as the input for the `p2m` function. Rotations are about the image centre. Stop the iteration if the magnitude of the gradient of the cost function is smaller than 0.01, or if it reaches 100 iterations. All resampling should be done using linear or cubic interpolation, avoiding sequential resampling where possible. Use central-differencing to compute the gradient of the cost function. Note that the gradient descent/ascent method includes a parameter (β in the notes). Try different values until you find one that works.

   You can test your function with the supplied `test_reg_mi.m` script, but it should also be capable of working on other images.

What do I submit?

Your submission should consist of only one file:

1. `RigidRegMI.m`

Submit the file to the Drop Box.