CSCI 350: Data Analytics
Spring 2017
Exam#2

Correspondence via Correlation
Total: 85 points
Out: 13-April-2017
Due: 20-April-2017@11:59:59pm

This is an Individual Assignment

Name:

Note:

- Your solution will not be accepted unless it is accompanied by a scanned copy of the honesty statement bearing your signature.
- This is an individual exam representing your individual work. It is painfully obvious when this is violated. Don't put yourself at risk of a zero, do your own work.
- Instances of collaboration will result in a zero for all parties involved, no questions asked. Do your own work!
- Follow instructions!!
- As your questions to me via the Discussion Forum on Blackboard

Description:

In this exam we will exercise the implementation and application of correlation for solving the correspondence problem in computer vision. In preparation for this assignment, review the slides for modules "Lecture 17" and "Lecture 18" and consult the web and texts for a refresher on correlation.

Assignment

You are provided example code and images:

- `correspondenceFinder.m`: MATLAB code for finding correspondences
- `myCorrelationMatch.m`: MATAB code in which you will implement correlation
- `HarryWilliamsCroppedHead.jpg`: cropped image of El Presidente De DSU
- `HarryWilliamsBigCheck.jpg`: image of Pres. Harry Williams accepting bick check

Note that in `myCorrelatonMatch.m` a function call to MATLAB's correlation API `corr(.)` is made. This is for benchmark purposes to demonstrate to you that correlation works as a

match score solving the correspondence problem in Computer Vision. For your implementation, you must craft your own implementation for correlation without using any MATLAB APIs. You are to use `myCorrelatonMatch.m` along with any other MATLAB files you write.

Remember this is an individual assignment. Your tasks are:

1. Review the slides for module "Lecture 17" and "Lecture 18" paying attention to what an image representation is.
2. Refresh your memory on correlation using the text and available sources on the web
3. Take the time to understand what the code provided for you does. This means changing a constant here and there to see how it changes the behavior. You will notice that the code runs significantly faster when the cropping search visualization is turned off. Moreover, you will also notice a significant difference in runtime as you change the search method (refer back to slides for the discussion from class). Studying the code is part of your assignment.
4. Create your implementation for correlation
5. Design and time a series of experiments that test the tradeoff between speed and resolution. Lookup how to perform timing measurements in MATLAB (i.e. Google "timing in MATLAB").

Answer the following questions:

1. Describe how the run-time changes as a result of changes to resolution?
2. Describe how the resolution changes the quality of the correspondence (finding the correct match)?
3. At what point in the tradeoff between resolution and performance do you feel the increase in performance is more desirable than the associated change in quality of the correspondence?

Submitting your work

When submitting your work make sure your submission is a self-contained running system. That means, DO NOT ASSUME, that I will add your code to the example code distributed with the assignment. You must include every file needed to run your code. The instructor will not construct your project for you, rather you will receive a zero if your submission cannot be run from the files you have submitted.

If you include pictures describing what your program does, these must be included in a single document (MS-Word or PDF only). Your project must include the data files `HarryWilliamsBigCheck.jpg` and `HarryWilliamsCroppedHead.jpg`. Your project must include `correspondenceFinder.m`, `myCorrelationMatch.m`, and any other MATLAB file you create as part of your solution.

- Write a single MS-Word or PDF file with your report
- Include every MATLAB file you write along with the data files and MATLAB provided.
- Include your signed scanned honesty statement
- Assemble a single archive of the aforementioned files (ZIP only!!!)
- Upload via Blackboard ONLY!!! Email will not be accepted.

Assessment:

MATLAB Code design**: 20 points**
design of experiments: **20 points**
interpretation of experimental results**: 20 points**
Answers to question: **25 points**
Total: **85 point**s