Assignment 1

Due Date: 9/21/2017

Total Points: 100

In this exercise, you will implement linear regression and get to see it works. You will implement the Gradient Descent Algorithm that we have discussed in class to find out the parameters for $\ominus$.

A good way to verify that gradient descent is working correctly is to look at the value of $J(\ominus)$ and check that it is decreasing with each iteration. For implementing some of the principles of programming, try to modularize the code as much as possible and consider **testing** your algorithm on a smaller known dataset before starting the assignment. Please note, that you can also use datasets such as here: http://data.princeton.edu/wws509/datasets to test your algorithm before testing it on the noisy Flu dataset. Assignment 1 contains three sections. Please address the subparts in **each** section to receive full credit. Also, analysis is a **crucial** aspect of the assignment, so for each subpart try to answer the question in more detail.

1. Linear Regression with One Variable
    a. Can you map the Knowledge of flu transmission (KnowlTrans) to the perceived risk (Risk) of contracting influenza? Note, here Risk is the target variable.

2. Quadratic Regression with One Variable
    a. Can you show the results of mapping the KnowlTrans to the Risk (y) using a quadratic expression?
    b. Does the quadratic expression improve the performance of the algorithm from (1)? Please use graphs or other visualization techniques to compare the performance of 1 and 2.

3. Linear Regression with Two Variables
    a. Does adding respiratory etiquette (RespEtiq) to the model improve the performance of the previous models? Please use graphs or other visualization techniques to compare the performance of 1, 2 and 3.

4. Creating a training and test dataset:
    a. Experiment using different ratios of training and test data.
    b. What was the best proportion from the set of experiments you conducted?
    c. How do you evaluate the performance for each of the three sections above?

Please make sure to submit both a hard copy (in class on the due date) as well as a zipped file in Dropbox on Pilot titled Assignment 1.

Academic Integrity

Discussion of course contents with other students is an important part of the academic process and is encouraged. However, it is expected that course programming assignments, homework assignments, and other course assignments will be completed on an individual basis (unless specified otherwise). Students may discuss general concepts with one another, but may not, under any circumstances, work together on the actual implementation of any course assignment. If you work with other students on "general concepts" be certain to acknowledge the collaboration and its extent in the assignment. Unacknowledged collaboration will be considered dishonest. "Code sharing" (including code from previous quarters) is strictly disallowed. "Copying" or significant collaboration on any graded assignments will be considered a violation of the university guidelines for academic honesty.

If the same work is turned in by two or more students, all parties involved will be held equally accountable for violation of academic integrity. You are responsible for ensuring that other students do not have access to your work: do not give another student access to your account, do not leave printouts in the recycling bin, pick up your printouts promptly, do not leave your workstation unattended, etc. If you suspect that your work has been compromised notify me immediately. If you have any questions about collaboration or any other issues related to academic integrity, please see me immediately for clarification. In addition to the policy stated in this syllabus, students are expected to comply with the Wright State University Code of Student Conduct (http://www.wright.edu/students/judicial/conduct.html) and in particular the portions pertaining to Academic Integrity (http://www.wright.edu/students/judicial/integrity.html) at all times.