ECEN 4493 AI in Engineering
Spring 2023

Homework Assignment #3

Statement of Academic Honesty:

For this homework, I make the following truthful statements:

- I have not received, I have not given, nor will I give or receive, any assistance to another student taking this quiz.
- I will not plagiarize someone else's work and turn it in as my own.
- I understand that acts of academic dishonesty may be penalized to the full extent allowed by the University Student Conduct Code, including receiving a failing grade (F!) for the course. I recognize that I am responsible for understanding the provisions of the University Student Conduct Code as they relate to this academic exercise.

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Your Signature

Problem 1: Download the zip folder "Homework 3 Supporting Material.rar" from Canvas. It contains the MATLAB implementation of Logistic Regression. Open the "ex2.mlx" file and it will walk you through how logistic regression is coded. In Section 2.5, vary the regularization parameter γ and observe the changes to the decision boundary and the accuracy. Plot the decision boundaries for different γ and comment on why you observe such behavior.

Problem 2: In the downloaded zip folder, open the "Homework_3_Question_1.ipynb" file on Python environment of your choice (You need to upload it along with the datafile to google drive if you are using Google Colab). Complete the notebook by implementing the logistic regression functions. Upload the notebook to Canvas.

Problem 3: Now that you have coded the underlying functions of logistic regression, you can use the built-in libraries to implement it. Open the "Homework_3_Question_2.ipynb" file. You need to complete the notebook and perform the following tasks:

1) Describe the different parameters given to the *LogisticRegression* function. You can find the documentation on https://scikitlearn.org/stable/modules/generated/sklearn.linear_model.LogisticRegression.html.
2) Run the Logistic Regression for 5, 30 and 50 iterations and comment on the results and tabulate them. Provide reasoning on the behavior you have observed.
3) Upload the notebook.

Please save all submitted files (2 notebooks and 1 report) into a single standalone ZIP file and submit your ZIP file including all reference materials and citations, through ***Canvas***

Assignments folder, “4493-homework3-Spring23 (assign 2-27-23, due 3-13-23)” by the deadline, March 13, 2023, 11:59pm.