

Assignment 1: Fundamentals of Neural Networks

For the data below, build a neural network using MATLAB or Java to estimate the MPG (Miles per Gallon) based on some information about the car

Database: <https://archive.ics.uci.edu/ml/datasets/Auto+MPG>

The Auto miles per gallon data set is commonly used for regression problems.

Car input data:

1. Car weight
2. Engine displacement
3. Cylinder count
4. Horse power
5. Hybrid or gasoline

Car output data: Miles per gallon

For classification, you can use feed forward neural network or backpropagation neural network with 5 inputs and 1 output. After training with 70 % of data, you have to test your network with the rest of the database (30%).

Your training accuracy should be more than 85%.

Tips:

1. <https://kunuk.wordpress.com/2010/10/11/neural-network-backpropagation-with-java/> in this link you can find ready to use java code for backpropagation neural network. You need to modify it and use these 5 inputs and one output in the code.
2. <http://code-spot.co.za/2009/10/08/15-steps-to-implemented-a-neural-net/> this link shows all steps of making a neural network.
3. You can find some function in MATLAB about feedforward network. You also can use MATLAB functions for this homework.
4. For using MATLAB you can download it from Myasu page. It is in “myapps” part on the left of the page.

Deliverable: put the three items below in one zip file and upload it to the blackboard.

- 1- The source code
- 2- Screenshots showing the results
- 3- Technical report explaining all the details, learning rate, hidden layers, activation function, bias, and any necessary diagrams (1-2 page)

Important: This is **individual assignment**. Students are not expected to work on it collectively.

Describe all parts that are now your own code, and use proper referencing for them.

Cheating and Ethics Policy

Cheating is strictly forbidden in this class. Cheating is defined as “presenting someone else’s work as your own”. The Department of Engineering has a 2-strike policy for repeat offenders. In this class, any cases of suspected violations will be turned over to the department who will track violations and determine additional punishment for students and repeat offenders. Punishment can include a record on the student's transcripts, an EX in the course, and/or dismissal from the department. ASU’s academic integrity policies and the ASU Student Code of Conduct are provided on ASU’s website.

The penalty for cheating in this class is immediate failure of the course. There will be no warnings or exceptions. You are required to work in teams on large projects during this academic year. Each individual on your team comes from different cultural and professional backgrounds, and possesses different levels of skill. However, ALL students must participate in the team’s project work to the best of her/his ability. Failure to conduct your work responsibly and to the best of your personal ability is an ethics violation, and punishable under this policy.