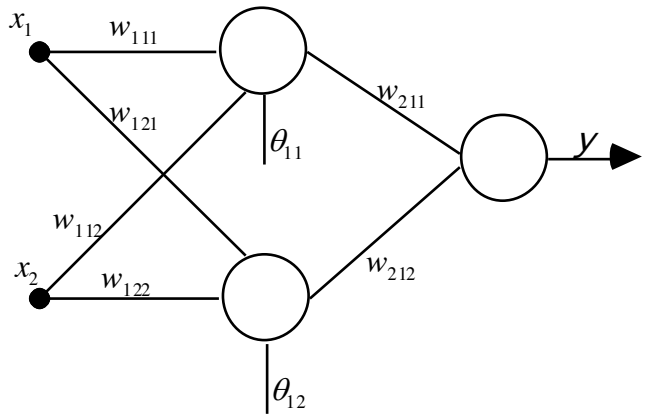
Rose-**H**ulman **I**nstitute of **T**echnology
Department of Mechanical Engineering

ME 536 Comput Intell in Control Engr

Assignment 3: Deadline: Apr. 3, 2020
Course Value: 100 points

Exclusive OR:
Train a two-layer network to solve the XOR problem. The network must have the following architecture, where the hidden units are logsig activation function and the output unit is identity activation function. Note: you will need to write your own backpropagation and Levenberg-Marquardt code for this assignment (no Matlab toolbox). The first major project will leverage this code, so make it expandable.



a) Write your own Matlab code to implement back-propagation for this problem. Train the network using error backpropagation and incremental updates. See below for suggested learning rates and momenta.

b) Write your own Matlab code to implement the Levenberg-Marquardt algorithm. Train both networks (2 hidden units and 3 hidden units) using LM.

c) Plot the network total squared error versus epoch on log-log. Compare convergence of the fastest back-propagation algorithm with the LM algorithm.

Training / Testing Data		
x_1	x_2	y
0	0	0
1	0	1
0	1	1
1	1	0

For the network with two hidden units, try all possible combinations of the following learning rates & momenta:

Learning Rates	Momenta
0.25	0.7
0.30	0.8

Now add a third hidden neuron, and try all of the following learning rates
0.55 0.60 0.65

Again, determine the number of epochs for convergence in each case that converges in 60000 epochs or less.