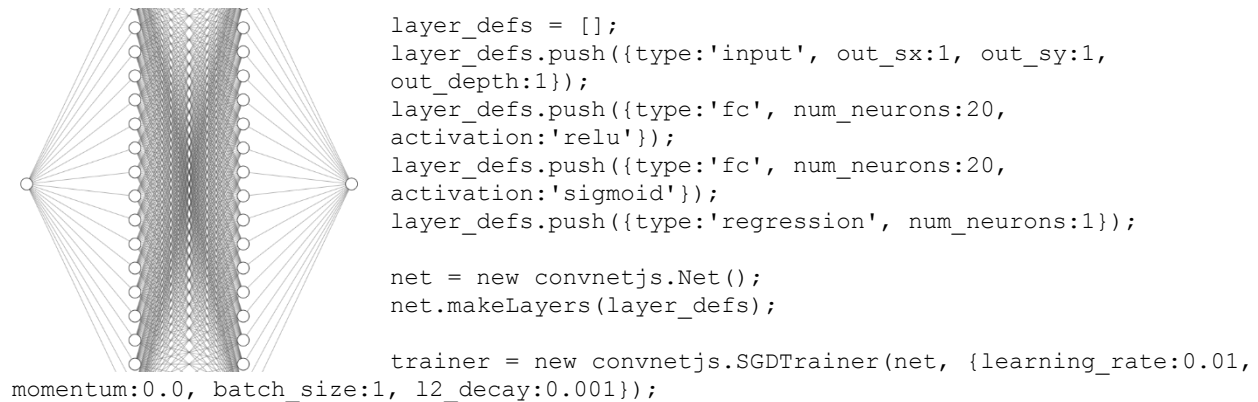


In Class Activity – Intro to Deep Learning (ICA 18)

Please solve the following problems and enter your responses at <https://tinyurl.com/AIF19-ICA18>

Navigate to <https://cs.stanford.edu/people/karpathy/convnetjs/demo/regression.html> and read the description. The default code below consists of a network with one input node connected to one hidden layer with 20 neurons and an relu activation function, which is then connected to a second hidden layer with 20 neurons but with a sigmoid activation function, which is subsequently connected to an output layer with a single neuron.



The graph at the bottom shows the resultant model learned (black line) to fit the data points, error (average loss), and activation of the neurons in each layer (fc) before and after running it through the activation function (sigmoid). Select the “Also draw outputs of a layer (click layer button below) in red.”

You can alter the structure of the network by modifying the code snippet. The key parameters of interest are `num_neurons` (number of neurons in the hidden layer) and `activation` function (relu – rectified linear unit and sigmoid). You can also remove a layer by deleting it or add a layer by using `layer_defs.push`. You click the “change network” button for the changes to take effect.

Please complete the following activities and submit your responses.

1. Change the number of neurons in each layer to 2 and change the activation to sigmoid. Then click change network. Give it a bit of time for the training to complete (i.e., only small changes in the loss are noted). *What can you conclude about what the neurons in each layer are doing?*
2. Now change the activation function to relu. *What can you conclude about the two activation functions and how does the choice activation function influences performance (loss)?*
3. Return to sigmoid activation. Remove one of the layers and experiment with varying the number of neurons (from 1 to 5). *How does this affect the loss?*
4. Keep the number of neurons constant at 3, but increase the number of layers from 1 to 3. *What is each layer doing? How does this affect the loss?*