DPUDS Project Meeting 3 Notes – EverybodyDanceNow –

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Review Questions from our last meeting

- GANs stands for _____
- What are the two main components ("learning things" a.k.a. neural networks) of GANs?
    - _____
        - learns how to tell if the image is fake or real
    - _____
        - learns how to generate a realistic fake image

- How do these ideas apply to this project?

But what *is* a Neural Network? – Learning the structure –
([video](#) by 3Blue1Brown)

1. Draw how a neural network is represented in the video. (You don't need to understand what's going on yet.)

2. What is a neuron in this context (for now)?

3. What does the number in each neuron represent?

4. Why does the first layer of our neural network model have 784 neurons? Where did the 784 come from?

5. Why does the last layer of our neural network model have 10 neurons? What does each number in neuron signify?

6. How does the neural network model decide on which digit to pick as the answer given the handwritten digit image? Can you describe this in mathematical notation? Let the vector $\vec{y}$ be the last layer.

7. What are we "expecting" or "hoping" when we introduce hidden layers in our neural network? Explain in your own words.

8. How does the connections between neurons work? What kind of calculation is happening here?

9. How do you "squish" the weighted sum?

10. Optional math exercise: Take a derivative of Sigmoid function $\sigma(x) = \frac{1}{1+e^{-x}}$ with respect to x.

11. Another form of "squishification" function is Rectified Linear Unit (ReLU), which is defined as $\max(0, a)$ where a is the activation number. Sketch a graph and write a pseudocode for this function.

12. How do you set a certain threshold in a neuron so that it only gets activated when it reaches above the threshold?

13. What do we really mean when we say, "Oh, my neural networks are learning well!"

14. Write down the notation for the first neuron in the second layer using linear algebra.

15. Now, again, what is a neuron? What does the whole network do essentially?

In the next meeting, we will go over a little bit more in detail about **how neural networks actually learn.**