# Yes activity first

# Activity: Introductory 3 Blue 1 Brown Videos

## BACKGROUND

For this activity, you will watch some YouTube videos created by 3 Blue 1 Brown to get a basic introduction to neural networks. You are only required to watch the first 3 videos, the fourth is optional but still a really fun thing to watch! Once you finish all of the videos you will take a short quiz to check your understanding! While you are watching these videos, you are asked to take notes and get definitions. **DO NOT FORGET THE QUIZ AT THE BOTTOM!**

## TASK

1. ANNOTATE: the following list of terms. You should write down notes and definitions for each term while watching the videos (at a minimum):

|  |  |  |
| --- | --- | --- |
| * Input:   The information (784 pixels) ,the weights, the biases | * Hidden:   Layers between input and output. How these layers are activated in conjunction (the pattern) leads to specific outputs. | * Output:   The output the 10 numbers |
| * MLP:   Machine learning program? | * Neuron:   A thing that holds a number. Function that takes all the outputs of the previous layer and spits out a new output. | * Activation:   Number inside the neuron that corresponds to how “lit up” it is. |
| * Weights:   Associate with pixels to give their values more or less importance | * Bias:   A value you add to your weighted sum calculated to dictate when you want to consider activation | * Cost:   A function that adds up the squares and difference of the trash values vs what you want them to have. Small when the network does it right, large when wrong |

2. WATCH: the first three of the following videos (the Deep Learning, Chapter 4 video is optional)!

|  |  |
| --- | --- |
| [Deep Learning, Chapter 1 (What is a Neural Network?)Links to an external site.](https://www.youtube.com/watch?v=aircAruvnKk)[A black and grey play button  Description automatically generated](https://www.youtube.com/watch?v=aircAruvnKk) | [Deep Learning, Chapter 2 (Gradient descent)Links to an external site.](https://www.youtube.com/watch?v=IHZwWFHWa-w)[A black and grey play button  Description automatically generated](https://www.youtube.com/watch?v=IHZwWFHWa-w) |
| [Deep Learning, Chapter 3 (Backpropagation )Links to an external site.](https://www.youtube.com/watch?v=Ilg3gGewQ5U) | [Deep Learning, Chapter 4 (Backpropagation calculus)Links to an external site.](https://www.youtube.com/watch?v=tIeHLnjs5U8)[A black and grey play button  Description automatically generated](https://www.youtube.com/watch?v=tIeHLnjs5U8) |

3. COMPLETE: this [Introduction to Neural Networks (3 Blue 1 Brown Videos) Quiz](https://elearning.mines.edu/courses/52392/quizzes/74258) to reinforce your understanding of the terminology and concepts of a basic neural network.

Check out that guys videos on linear algebra

Cost functions help find a minimum (derivatives!) local minimums are easier than global. In multi variable, gradient of decent is used to find the most negative slope to tell you the correct direction to go

Instructional Videos & Learning Materials: Introduction to Neural Networks

WATCH

Watch this week's videos, download the working files so you can follow along and experiment with the platform we'll be using for the course.

**Introduction to Neural Networks Video**

**Convolutional Neural Networks Video**

WORKING FILES

You will need the following files to get set up for this week. They include the following:

* Jupyterhub notebooks (download to a personal device then upload to your Jupyterhub). Also, download the images and place them in the same directory in your Jupyterhub notebooks.
  + Introduction to Neural Networks
    - [Introduction to Neural Networks Jupyter Notebook](https://elearning.mines.edu/courses/52392/files/5459132/download?wrap=1)[Download Introduction to Neural Networks Jupyter Notebook](https://elearning.mines.edu/courses/52392/files/5459132/download?download_frd=1)
  + Convolutional Neural Networks
    - [Convolutional Neural Networks Jupyter Notebook](https://elearning.mines.edu/courses/52392/files/5458996/download?wrap=1)[Download Convolutional Neural Networks Jupyter Notebook](https://elearning.mines.edu/courses/52392/files/5458996/download?download_frd=1)
    - [Supporting Image 1](https://elearning.mines.edu/courses/52392/files/5459179/download?wrap=1)[Download Supporting Image 1](https://elearning.mines.edu/courses/52392/files/5459179/download?download_frd=1)
    - [Supporting Image 2](https://elearning.mines.edu/courses/52392/files/5459004/download?wrap=1)[Download Supporting Image 2](https://elearning.mines.edu/courses/52392/files/5459004/download?download_frd=1)
  + PDF files that contain the same information as the Jupyterhub notebooks, in case your Juypterhub is not yet working.
    - [Introduction to Neural Networks PDF](https://elearning.mines.edu/courses/52392/files/5459142/download?wrap=1)[Download Introduction to Neural Networks PDF](https://elearning.mines.edu/courses/52392/files/5459142/download?download_frd=1)
    - [Convolutional Neural Networks PDF](https://elearning.mines.edu/courses/52392/files/5459234/download?wrap=1)[Download Convolutional Neural Networks PDF](https://elearning.mines.edu/courses/52392/files/5459234/download?download_frd=1)
  + This [Types of Neural Networks](https://elearning.mines.edu/courses/52392/files/5459012/download?wrap=1)[Download Types of Neural Networks](https://elearning.mines.edu/courses/52392/files/5459012/download?download_frd=1)chart is a good reference sheet for understanding the different types of Neural Networks.

ADDITIONAL RESOURCES

The links below are supplementary resources to help you review or strengthen the topics we have discussed:

* [Deep Dive into Neural NetworksLinks to an external site.](https://mlfromscratch.com/neural-networks-explained/#/)
* [Quick Introduction to Neural NetworksLinks to an external site.](https://developers.google.com/machine-learning/crash-course/introduction-to-neural-networks/anatomy)
* [Interactive Neural Network (Super Cool!)Links to an external site.](https://playground.tensorflow.org/#activation=relu&batchSize=9&dataset=xor&regDataset=reg-plane&learningRate=0.003&regularizationRate=0&noise=0&networkShape=5,5,5,5,5,2&seed=0.20732&showTestData=false&discretize=false&percTrainData=50&x=true&y=true&xTimesY=false&xSquared=false&ySquared=false&cosX=false&sinX=false&cosY=false&sinY=false&collectStats=false&problem=classification&initZero=false&hideText=false)
* [CNN OverviewLinks to an external site.](https://www.ibm.com/cloud/learn/convolutional-neural-networks)
* [CNN with Great Hyperparameters VisualizationLinks to an external site.](https://poloclub.github.io/cnn-explainer/)
* [CNN Visualization for Handwritten Digits (CNN starts at the bottom)Links to an external site.](https://www.cs.ryerson.ca/~aharley/vis/conv/)