

Day 2 - Practical

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General Instructions:

Download all files from the Day 2 shared folder. Make a copy on your computer.

Practical Exercise 1:

Access <https://playground.tensorflow.org>.

Use the graphical interface to see how the neural network results changes when you modify the number of neurons, the input features, and the number of hidden layers.

Compare the learning capacity when using a sigmoid and a ReLU activation. We will talk about these functions later

Practical Exercise 2:

Access <https://poloclub.github.io/cnn-explainer/>

Scroll down to the Understanding hyperparameters section. Try to understand what is kernel size, padding, and stride.

Use the graphical interface to try to better understand how convolutions work and what features are being extracted from the images.

You can also upload the alignment images from different scenarios (but notice the network was not trained with that type of image). Does the network give an output prediction for the alignments?

Practical Exercise 3:

- Scenario 1:

```
./ms 270 1000 -s 1 -t 0.280081 -I 2 160 110 -n 2 1.875624 -en 0.001289 1 35.544203 -en 0.001289 2 79.531376 -em 0.001289 1 2 1.263896 -em 0.001289 2 1 1.919980 -eg 0.017061 1 38.360445 -eg 0.017061 2 43.970864 -em 0.017061 1 2 0.301733 -em 0.017061 2 1 3.967323 -eg 0.127240 1 0 -eg 0.127240 2 0 -ej 0.293251 1 2
```

- Scenario 2:

```
./ms 270 1000 -s 1 -t 0.197474 -I 2 160 110 -n 2 1.881221 -en 0.000138 2 13.295751 -em 0.000138 1 2 3.076617 -em 0.000138 2 1 3.641901 -eg 0.010041 2 23.017965 -em 0.010041 1 2 2.368179 -em 0.010041 2 1 0.699033 -eg 0.130037 2 0 -ej 0.756109 1 2
```

Scenario 3:

```
./ms 270 1000 -s 1 -t 0.388039 -I 2 160 110 -n 2 1.378919 -em 0.000606 1 2 3.543538 -em 0.000606 2 1 1.884716 -em 0.006555 1 2 1.994695 -em 0.006555 2 1 3.124491 -ej 0.237054 1 2
```

Copy the commands in PopPlanner and try to visualize what is being simulated (you can change the Max Time if you need).

Is it difficult to see the scenario in PopPlanner? Do you have any thoughts about why simulations show like that?

Now visualize the segregating sites and the trees using `-T >> trees.tre`. Can you see a difference in the output of these simulations compared to the simulations from Exercise 2?

Add trees from different scenarios into FigTree and see if you can see any similarities or differences.