

Hands-on Steps for Fine-tuning a CNN:

1. Make sure you have completed the module steps available here:
https://github.com/norawebbwiliams/cambridge_elements/blob/master/notes/01-launch-use-ec2-aws-instances.md
2. Keep the above module open in a browser -- you will probably want it for reference.
3. Log in to your AWS account and start your EC2 instance. Then ssh in to the instance (see **Step 3** of the the online module for details). Remember that the ip address will be different every time you stop and restart the instance.
4. If the instance says "restart required," or something similar, type the following, where the \$ indicates that you've entered a command:

```
$ sudo reboot
```

wait a minute, and then ssh in again.

5. Clone the github repo for this workshop. In your connected bash terminal, type

```
$ git clone https://github.com/norawebbwiliams/images_as_data.git
```

and hit enter. It may take a minute for all the files to be copied over. You can check to see if the repo was properly cloned by typing 'ls' which should return:

```
$ ls
anaconda3  cambridge_elements  Nvidia_Cloud_EULA.pdf  src
tutorials
```

6. Start a jupyter notebook in the EC2 instance by typing:

```
$ jupyter notebook
```

7. Connect to the notebook from your computer (follow **Step 5** of the online module).
8. Once the notebook has opened in your web browser, navigate to `cambridge_elements/notebooks/` and open '01_fine_tune_binary_models.ipynb'
9. At the top of the notebook, select 'Kernel', and then 'Change kernel'. Choose 'Environment (conda_pytorch_p36)'.
10. In order for the code to work, you may need to first adjust the two **paths** in the **Paths & Constants** section. Comment out the instructor's data paths by adding a # to the relevant lines, then uncomment out the cloned EC2 instance paths by removing the #.
11. In the **Choices about which models to run and hyperparameters** you unsurprisingly have some choices to make. You can play around with these as you'd like. Keep the `set_iterations` low or the models may run for a very long time.

12. Try running the chunks of code! You may see some warnings along the way, but everything *should* work. You'll see reports of the model accuracy pop up. Note that if you run multiple models (e.g. 'protest' and 'sadness') the plot and sample images will be drawn from the last model in the list (e.g. 'sadness' in this case).
13. You can also check out the multiclass classifier in '02-fine-tune-multiclass-model.ipynb', repeating steps 9 to 12 in this handout. There are differences between these notebooks!
14. When you are done, you can save your jupyter notebook(s) to keep the paths you set and any other changes you made to the code. The fine-tuned models have already been saved for you in the data/MODELS directory.
15. **MAKE SURE YOU STOP YOUR EC2 INSTANCE!!!** See **Step 6** of the online module.