

Jonathan O'Leary

11/29/2022

Project 3 (Deep Learning) – Homework journal

- I Decided to add some Bullet Point Explanations on what I did for this project.
- First, I tried to run the project given to me.

Step 1. Set up you deep learning environment (12 pts)

Set up a deep learning environment on your computer. At the end of this step, you should be able to run TensorFlow 2.x in a Jupyter notebook under Python 3. To ensure that you have a working environment, try to run the tensorflow quickstart tutorial:

<https://www.tensorflow.org/tutorials/quickstart/beginner>

The purpose of this exercise is for you to understand what is required to do this **on your own computer**. Using Google Colab or other preconfigured tools is **not** acceptable. You can use Anaconda.

If you have an Nvidia video card, configure Tensorflow to use it.

What to submit: the homework journal for this installation.

Install TensorFlow 2

TensorFlow is tested and supported on the following 64-bit systems:

- Python 3.7–3.10
- macOS 10.12.6 (Sierra) or later (no GPU support)
- Ubuntu 16.04 or later
- WSL2 via Windows 10 19044 or higher including GPUs (Experimental)
- Windows 7 or later (with C++ redistributable)

Download a package

Install TensorFlow with Python's *pip* package manager.

★ TensorFlow 2 packages require a **pip** version >19.0 (or >20.3 for macOS).

Official packages available for Ubuntu, Windows, and macOS.

[Read the pip install guide](#)

```
# Requires the latest pip
$ pip install --upgrade pip

# Current stable release for CPU and GPU
$ pip install tensorflow

# Or try the preview build (unstable)
$ pip install tf-nightly
```

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CAP4611 - Project 3: Image Classification Using Deep Convolutional Neural Networks

This project requires you to experiment with a deep convolutional network to classify images of squirrels, raccoons and wombats.

```
In [1]: import os
import pathlib
import random
import datetime
import functools

import numpy as np
# imports for visualization
import matplotlib.pyplot as plt
#import PIL
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Conv2D, Flatten, Dropout, MaxPooling2D, Softmax
from tensorflow.keras.preprocessing.image import ImageDataGenerator

from tensorflow.keras.applications.inception_v3 import InceptionV3
from tensorflow.keras.preprocessing import image
from tensorflow.keras.models import Model
from tensorflow.keras.layers import Dense, GlobalAveragePooling2D

from ImageDataset import DatasetCfg, create_dataset

import pickle

-----
ModuleNotFoundError                                Traceback (most recent call last)
Input In [1], in <cell line: 11>()
      9 import matplotlib.pyplot as plt
     10 #import PIL
--> 11 import tensorflow as tf
     12 from tensorflow.keras.models import Sequential
     13 from tensorflow.keras.layers import Dense, Conv2D, Flatten, Dropout, MaxPooling2D, Softmax

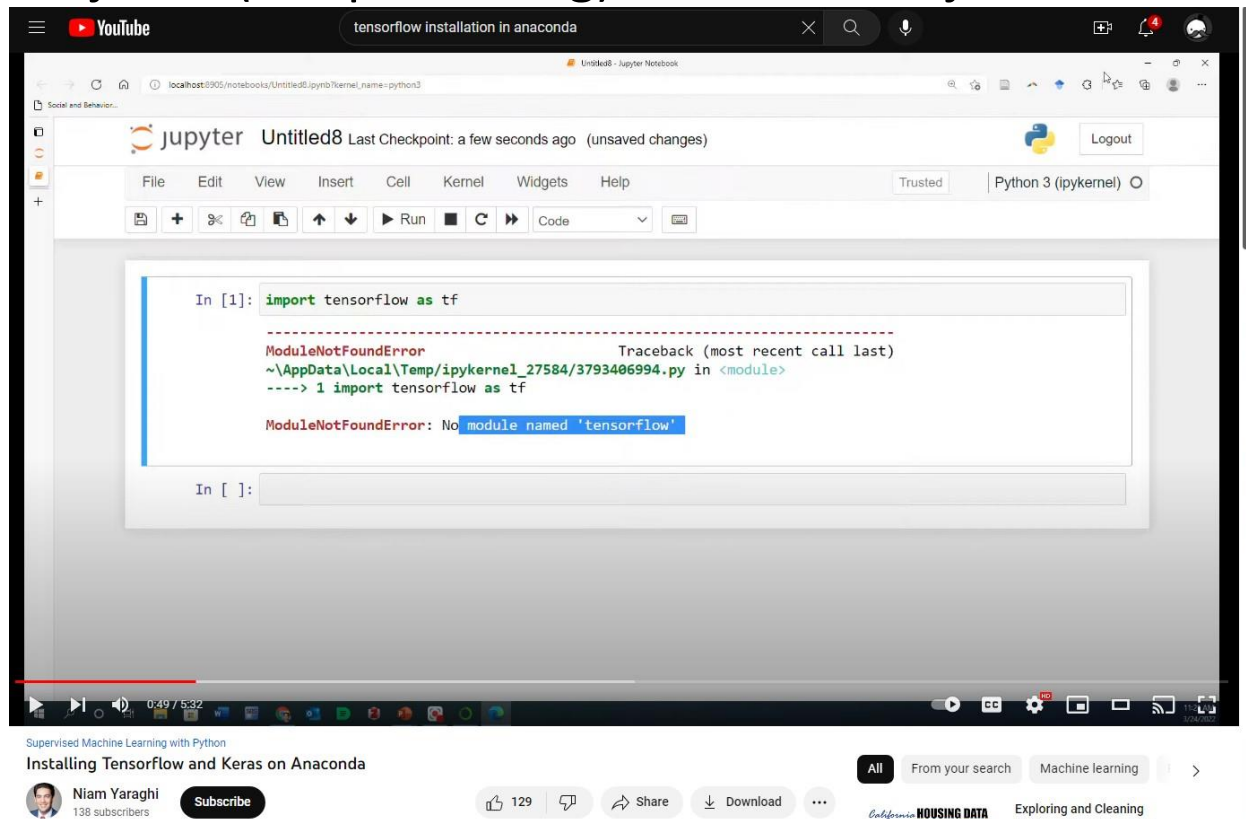
ModuleNotFoundError: No module named 'tensorflow'
```

- I ran into an issue where I run into the error “No Module named ‘tensorflow’”
- I then YouTube how to install tensorflow for Anaconda (And since the first part of the project is setting up a deep learning environment)

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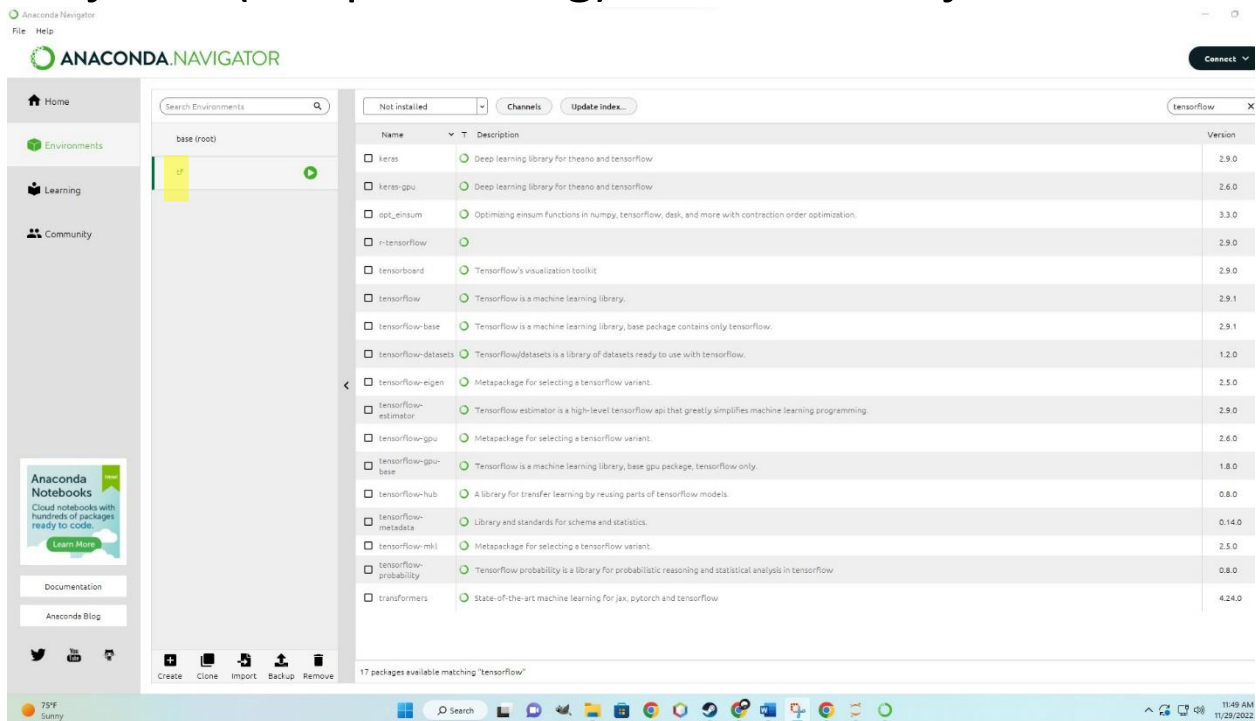
- **Bingo!** (*Shoutout to Niam Yaraghi*)

- I create A new environment in Anaconda and call it “**tf**”, then I install **TensorFlow**, **matplotlib**, and **Keras**.

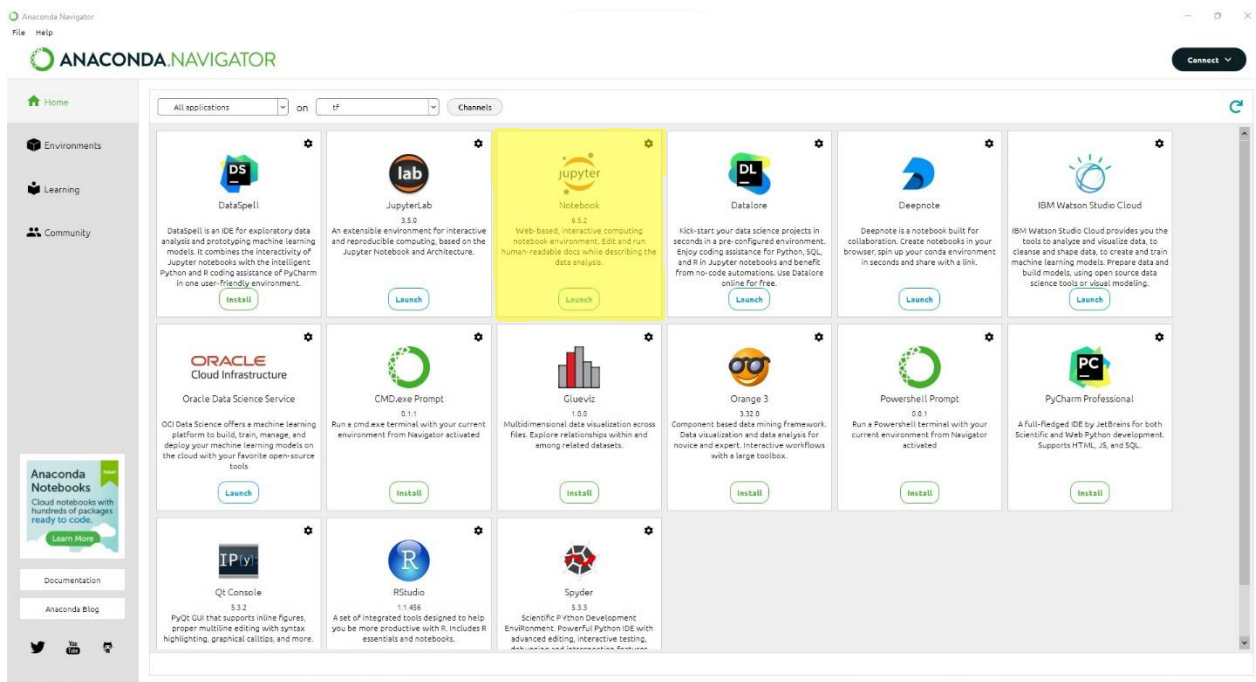
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- I then use the **Anaconda Navigator** to launch from my created environment

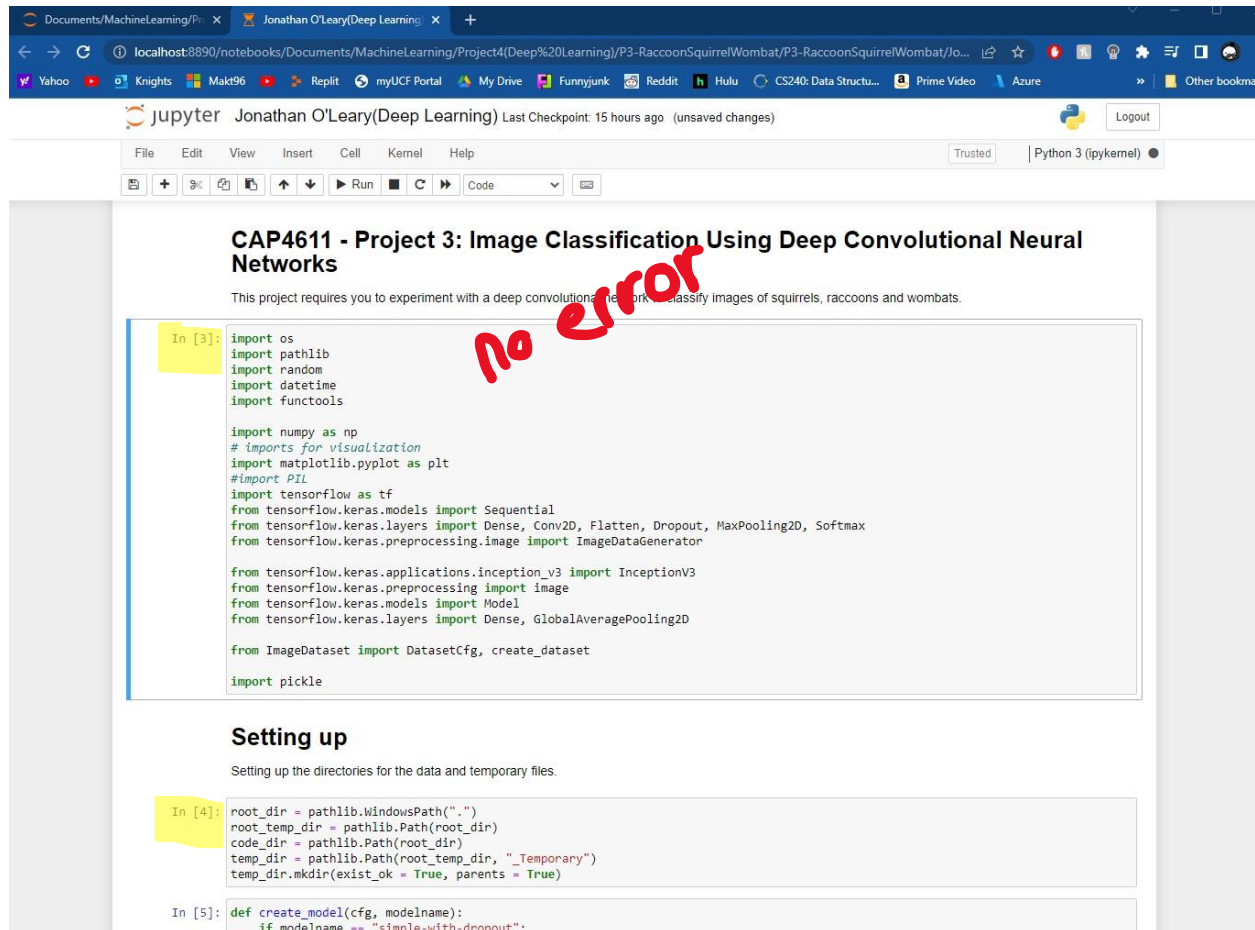


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- I am now able to run the python file provided.



The screenshot shows a Jupyter Notebook interface with the following content:

CAP4611 - Project 3: Image Classification Using Deep Convolutional Neural Networks

This project requires you to experiment with a deep convolutional neural network to classify images of squirrels, raccoons and wombats.

```
In [3]: import os
import pathlib
import random
import datetime
import functools

import numpy as np
# imports for visualization
import matplotlib.pyplot as plt
# import PIL
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Conv2D, Flatten, Dropout, MaxPooling2D, Softmax
from tensorflow.keras.preprocessing.image import ImageDataGenerator

from tensorflow.keras.applications.inception_v3 import InceptionV3
from tensorflow.keras.preprocessing import image
from tensorflow.keras.models import Model
from tensorflow.keras.layers import Dense, GlobalAveragePooling2D

from ImageDataset import DatasetCfg, create_dataset
import pickle
```

Setting up

Setting up the directories for the data and temporary files.

```
In [4]: root_dir = pathlib.WindowsPath(".")
root_temp_dir = pathlib.Path(root_dir)
code_dir = pathlib.Path(root_dir)
temp_dir = pathlib.Path(root_temp_dir, "_Temporary")
temp_dir.mkdir(exist_ok = True, parents = True)
```

```
In [5]: def create_model(cfg, modelname):
    if modelname == "simple-with-dropout":
```


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- So now that I created my TensorFlow environment, on to step 2 of the project.

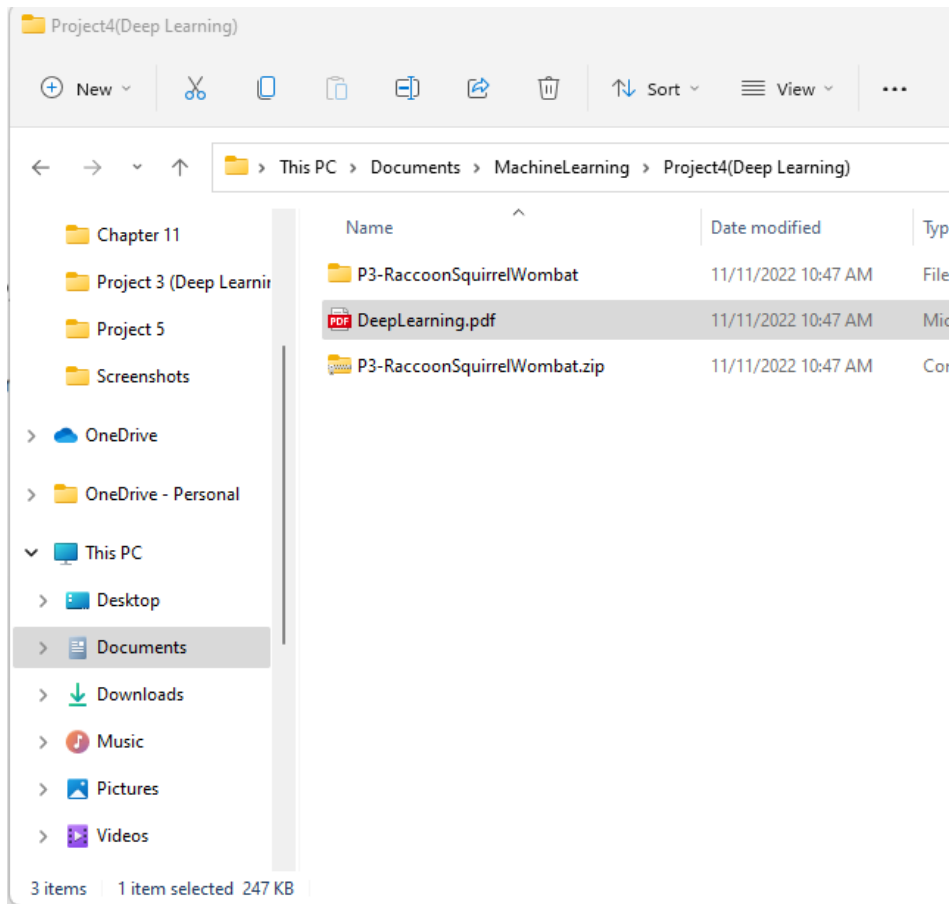
Step 2: Set up training for RaccoonSquirrelWombat (18 pts)

Download from the class webpage the P3-RaccoonSquirrelWombat file. Unzip it in a convenient location on your computer.

Orient yourself in the content of the unzipped directory:

- CAP4611-P3-DeepLearning.ipynb contains the code for the training framework as a notebook. Basically, the content of this file trains a number of different networks as classifiers for the raccoon-squirrel-wombat dataset and compares them.
- ImageDataset.py contains several auxiliary functions for loading the training data. You should not change this.
- The data subdirectory contains the training and validation data (as directories). Each of these have subdirectories for raccoons, squirrels and wombats.

- I followed instructions and unzipped the file.



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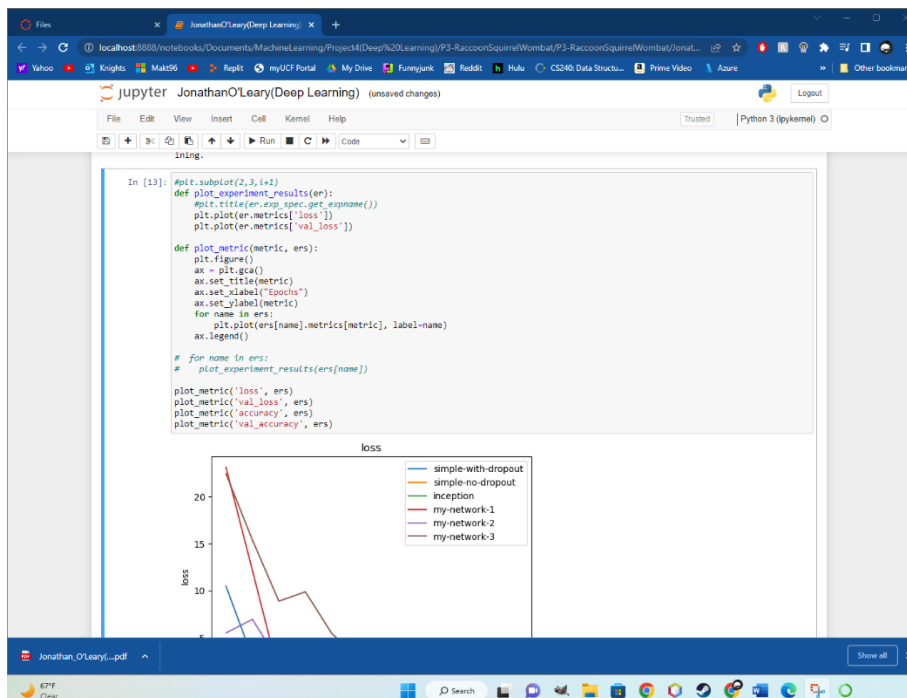
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- Under the _Temporary directory, the training will create checkpoints of the trained networks as the training proceeds. Each of the networks is saved in its own directory. If the network already exists, it will not train the network again, just loads it.

Run all the cells of CAP4611-P3-DeepLearning.ipynb in Jupyter. Perform the necessary configurations fixes that might be necessary. As a note: depending on the performance of your computer, this training might take some time (from maybe 30 seconds to tens of minutes). Should you need to interrupt the training or the system crash, the next time you run it, it will start from where you left it. If all the networks are trained, it will skip the training and will just plot the comparison.

What to submit: the homework journal for this step. Make sure that you screenshot the results, which should look like this:

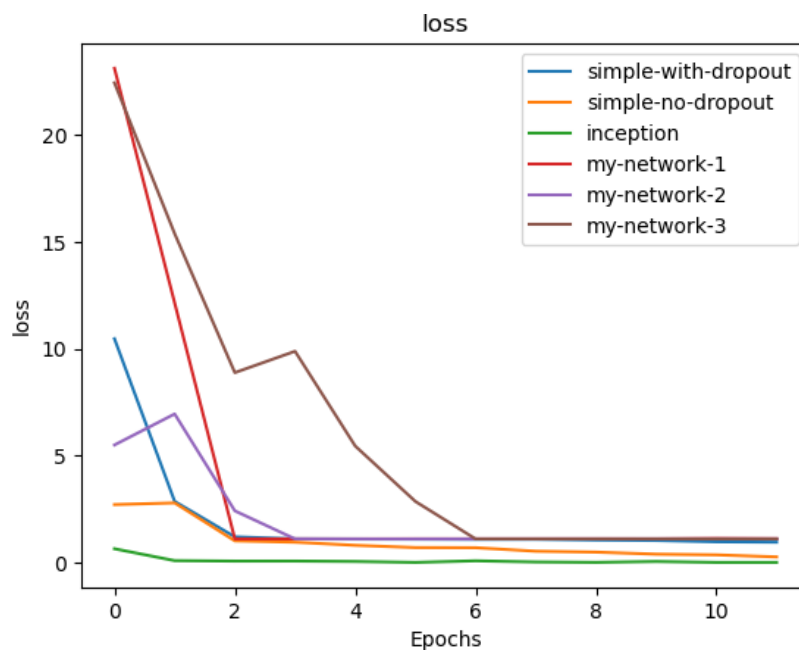
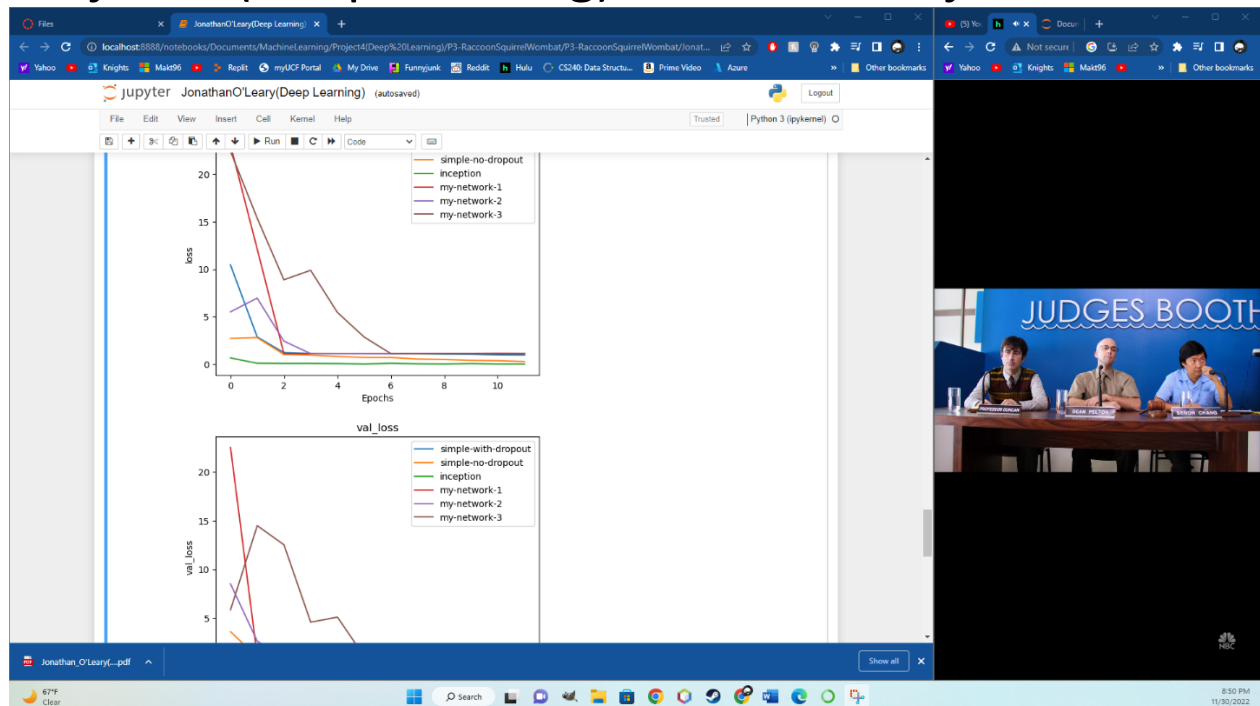
- I am Then Asked to screenshot the results from my journal



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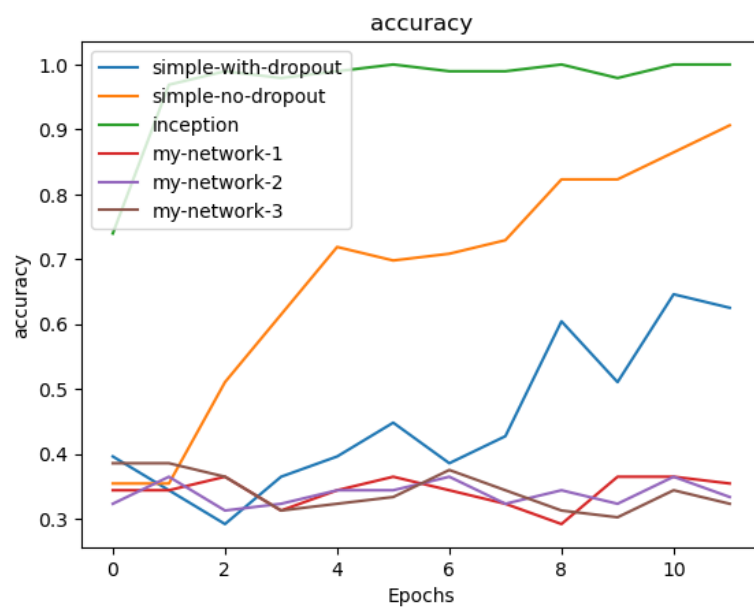
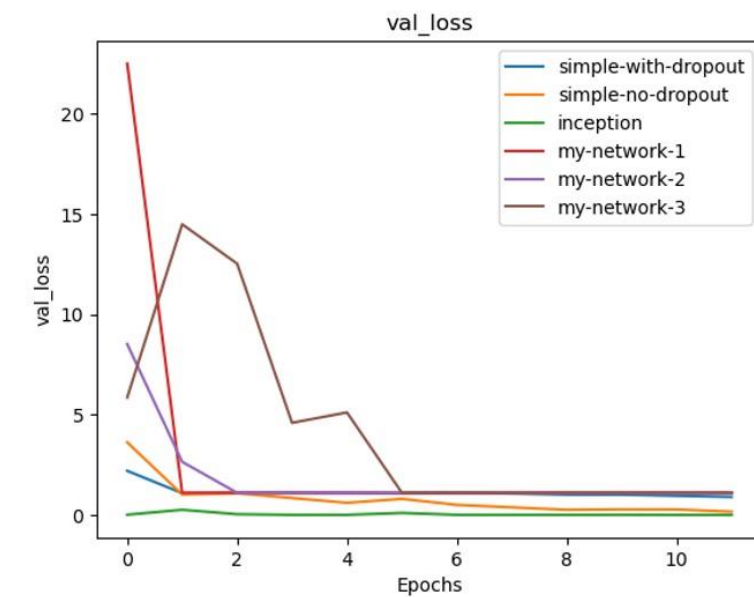
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