ML-Ops Homework #2: Neptune.ai
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Model provenance

- Tracking model inputs is easy with Neptune.ai:

```
run['my_model/saved_model'].upload(output_file)   # capture the saved model weights and upload
run['my_model/emissions'].upload('emissions.csv') # track carbon emissions for each run
run['parameters'] = {'activation': 'ReLu and Sigmoid',        # Capture model params and store in Neptune
                     'Layers': 4,
                     'epochs': user_epochs,
                     'batch_size': 64
                    }
```

Ease of reproducing experiments

- Neptune.ai allows you to easily see what parameters and dataset you used for an experiment
- There did not appear to be a way to reference specific experiment ID's to rerun them. Instead, you will update the python code in the notebook with the same parameters tracked in the neptune history if you want to run the same experiment.
- Ease of reproducing is not perfect but it is fairly easy if you saved off the model and tracked its parameters appropriately

Side-by-side comparison of different experiments (quantitative and qualitative)

- View quantitative metrics you set to be captured (accuracy, MAE, etc.) in the Compare Runs section
- View plots for multi-epoch runs with algorithms like neural networks (plots) to track learning rate and loss over time

Support for standard ML libraries you used (such as scikit-learn/TensorFlow/PyTorch)

- There are 2 ways to use external libraries:
    - The first is just in your code normally and then send the results in the Neptune Run (whatever you want to capture)

    - The second is to import separate extensions Neptune.ai has developed to capture additional metrics around algorithms.
        - Example:
            - pip install -U neptune-xgboost
            - from neptune.integrations.xgboost import NeptuneCallback

Overall

- Easy to understand
- Good UI
- Cheap (has not cost us anything unlike AWS which goes through credits quickly)
- Integrates well with other libraries
- Compared to HW1 it does not appear to allow you to reference ID's in your code to switch things as easily as GitHub or LakeFS
- HW1 tool did not have the capability to compare experiments