Tutorial 1: course environment

CIT-690E: Deep Learning, Spring 22

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March 7, 2022

[1] This is an adapted presentation from Eng. Ahmed Hosny, GitHub

Outline

Contacts

- Lab Session: after the lecture
- Q&A on Teams, or Moodle
- Office Hours: room 220 on Tuesday 16:30
  online: confirmation via email
- Email: ASherif [at] nu.edu.eg

What is Google Colab?

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Cloud-based notebook service hosted by Google, which is equivalent to **Jupyter Lab**. It enables you write and execute your code on pre-configured machines.

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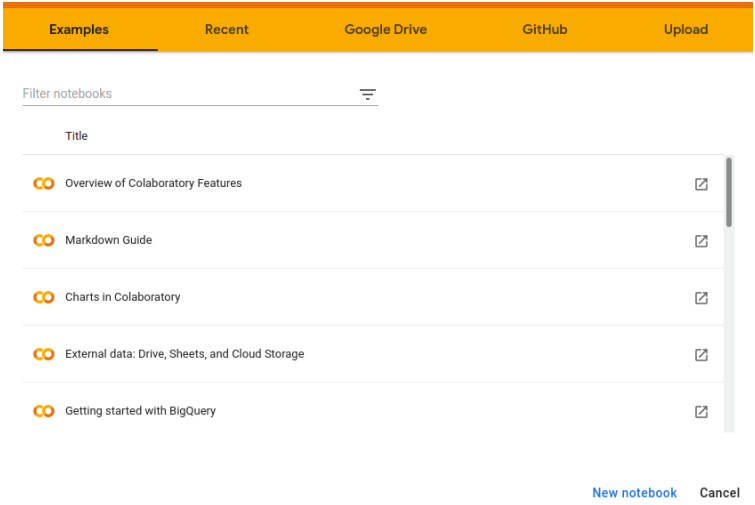
- Notebooks
- Access to Google Drive
- Free GPUs and TPUs
- pre-installed packages for DL: `PyTorch`

Creating a Notebook

You can create a notebook via `https://colab.research.google.com/`.



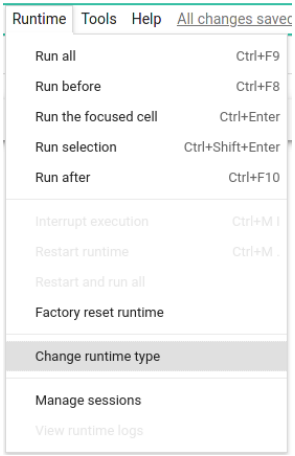
Creating a Notebook

You can create a notebook via `https://colab.research.google.com/`.

- Create a new notebook using `New notebook`
- Open a notebook hosted on your `Google Drive`
- Open a notebook from GitHub
- Upload a local notebook

Runtime Environments

1. Click `Runtime -> Change runtime type`



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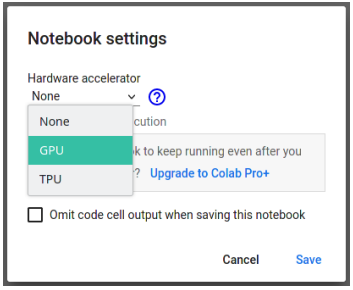

Runtime Environments

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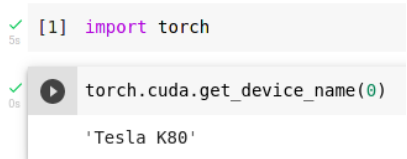
2. Choose your runtime type
3. Try it out printing the GPU device. This need not be the same for you.



Performance Comparison

As shown in [Colab vs Laptop (Radečić, 2020)], **Fasion-MNIST** dataset was used for comparison between training on local laptops and Colab on the below architecture, of $\approx 150K$ trainable parameters:

```
CNN(
  (conv1): Conv2d(1, 8, kernel_size=(3, 3), stride=(1, 1))
  (conv2): Conv2d(8, 20, kernel_size=(3, 3), stride=(1, 1))
  (fc1): Linear(in_features=500, out_features=256, bias=True)
  (fc2): Linear(in_features=256, out_features=64, bias=True)
  (fc3): Linear(in_features=64, out_features=10, bias=True)
)
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)
```

Laptops used

- Lenovo ThinkPad T480s: Intel i7–8550U @ 1.8 GHz, 16GB RAM
- Lenovo Legion Y540: Intel i5–9300H @ 2.4 GHz, Nvidia GeForce 1650 4GB, 16GB RAM
- MacBook Pro 2019 13":Intel i5-QC @ 1.4 GHz, 8GB RAM

Performance Comparison

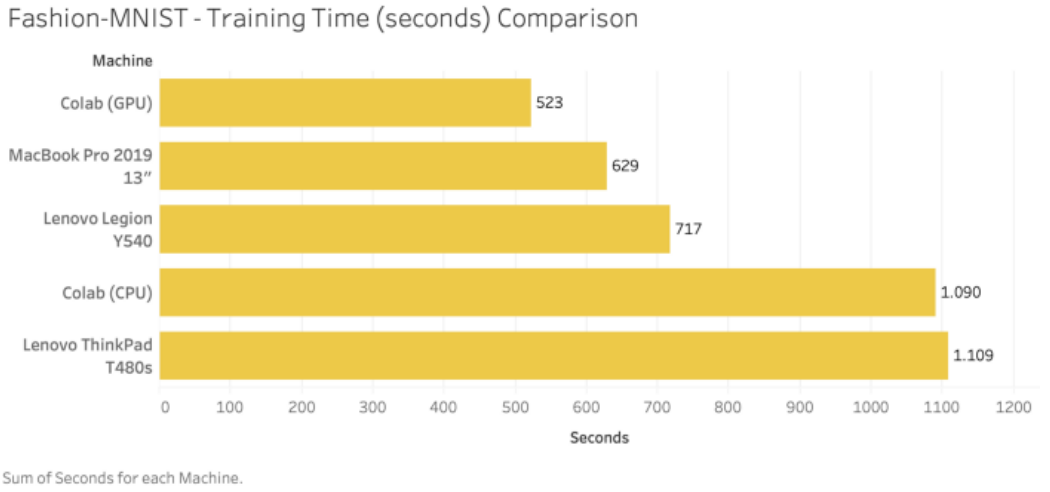

Figure: Results from [Colab vs Laptop (Radečić, 2020)]

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Radečić in [Colab Pro (Radečić, 2020)] compared between both using Pneumonia Dataset from Kaggle.

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- Intel(R) Xeon(R) CPU @ 2.20GHz

Colab Pro

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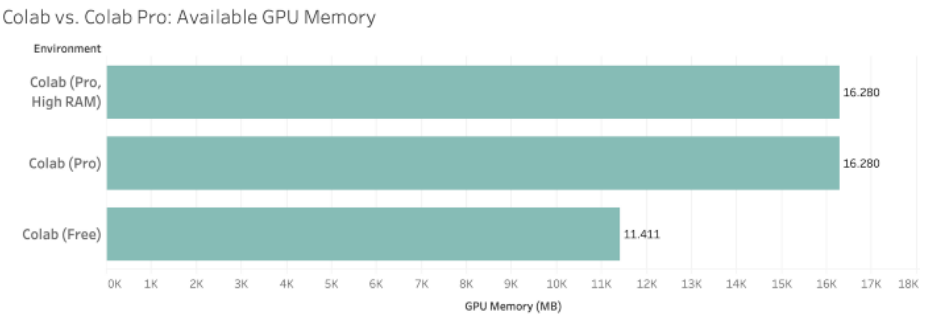

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- Disk Size: 34GB
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- GPU: Tesla P100-PCIE-16GB
- RAM: 12GB (Default) - 26GB (High-RAM)

Colab Pro Comparison

Radečić in [Colab Pro (Radečić, 2020)] compared between both using Pneumonia Dataset from Kaggle. He, also used a pre-trained **DenseNet201**, modifying last layer, and the below custom architecture to compare between them

```
CustomModel(
  (conv1): Conv2d(3, 32, kernel_size=(3, 3), stride=(1, 1))
  (conv2): Conv2d(32, 64, kernel_size=(3, 3), stride=(1, 1))
  (conv3): Conv2d(64, 64, kernel_size=(3, 3), stride=(1, 1))
  (conv4): Conv2d(64, 128, kernel_size=(3, 3), stride=(1, 1))
  (conv5): Conv2d(128, 256, kernel_size=(3, 3), stride=(1, 1))
  (fc1): Linear(in_features=6400, out_features=128, bias=True)
  (out): Linear(in_features=128, out_features=2, bias=True)
)
```

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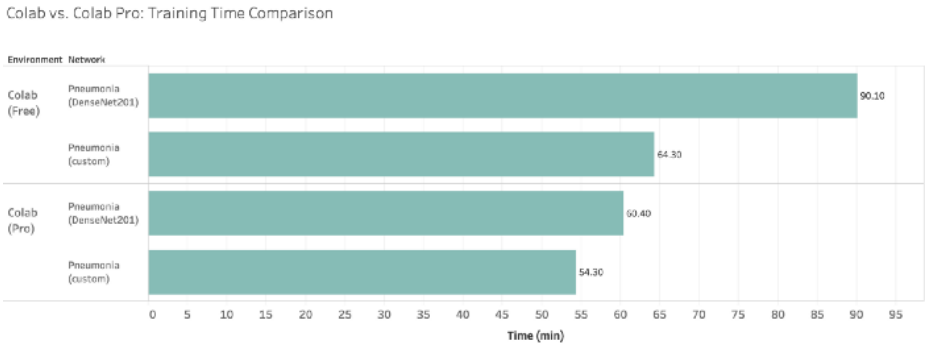

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Colab Pro+

Google recently, started offering `Colab Pro+`, where your notebook can run even while you are ofline, for $50/mo, for 24 Hours max. Neverthless, still, the notebook disconnects when idle, no cells running.

Git & GitHub

Git

It is a Version Control system.

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It is used for the below cases:

- Synchronization and Collaboration

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- Branching and Merging

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Installing Git

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- `clone`: clone a remote repository
- `log`: show the log of project

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- `pull`: pull changes from remote repository
- `clone`: clone a remote repository
- `reset`: revert commits (soft, hard)

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Further Resources

- `https://git-scm.com/docs`, the official documentation of `git`
- `https://docs.github.com/en`, the official documentation of `GitHub`
- `https://training.github.com/downloads/github-git-cheat-sheet.pdf`, cheat sheet for git while using GitHub.

PyTorch

- open-source Deep Learning library

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- optimized for GPU and CPU
- supports Python, C++, and Java
- Other products built upon it: Tesla Autopilot, Uber's Pyro, Hugging Face's Transformers, PyTorch Lightning, and Catalyst.
- Primary data type: Tensors

References

Dario Radečić (2020)

Google Colab: How does it compare to a GPU-enabled laptop?

url: https://towardsdatascience.com/google-colab-how-does-it-compare-to-a-gpu-enabled-laptop-851c1e0a2ca9.

Dario Radečić (2020)

Colab Pro: Is it Worth the Money?

url: https://towardsdatascience.com/colab-pro-is-it-worth-the-money-32a1744f42a8.

Thank You