



**Machine
Vision and Learning Lab
NUST-SEECs**

Google Colab Workshop

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CS867 Computer Vision (Fall 2020)

Introduction

- Google Research and its most Popular AI framework called TensorFlow.
- Along with TensorFlow, Collaboratory was developed, now known as Google Colab.
- Most Attractive feature of Google Colab, yes GPU and its totally free.

- Pre-requisites:

It is assumed you are already aware of:

- Jupyter notebook
- Github
- Basics of Python
- And some other programming language
- Basic Linux command line/Terminal operations.

What Colab Offers you?

- Write and execute code in Python
- Document your code that supports mathematical equations
- Create/ Upload/Share notebooks
- Import/Save notebooks from/to Google Drive
- Import/Publish notebooks from GitHub
- Import external datasets e.g. from Kaggle
- Integrate PyTorch, TensorFlow, Keras, OpenCV
- Free Cloud service with free GPU

Notebook Creation (and their demo)

As Colab implicitly uses Google Drive for storing your notebooks, ensure that you are logged in to your Google Drive account before proceeding further.

- Open the following URL in your browser – <https://colab.research.google.com> Your browser would display the following screen
- Click on the NEW PYTHON 3 NOTEBOOK link at the bottom of the screen. A new notebook would open up.
- By default, the notebook uses the naming convention UntitledXX.ipynb. To rename the notebook, click on this name and type in the desired name.
- Entering and executing code in cell block.
- Documenting your code using Markdown.
- Some Python examples.
- Other Packages i.e. NumPy, Matplotlib examples.

Invoking System Commands

Colab's Backend is All linux, So feel free to use any linux commands here.

(We will need to use `!` symbol before these commands to execute on colab)

Jupyter includes shortcuts for many common system operations. Colab Code cell supports this feature.

- Echo messages
- Getting Remote Data (with wget)
- List files and folders
- Current working Directory
- Make directory, Copy and Move files
- magics

Executing External Python Files

- Upload or Create python scripts in colab
- Code editor
- Code execution

Graphical Outputs

- OpenCV function `cv2.imshow(image)` doesn't work in Colab or jupyter notebook. That's why Colab introduced `Cv2_imshow()` function
- Or Use Matplotlib.

Installing Packages/Libraries

- Colab supports most of machine learning libraries available.
- Colab already has most of the libraries pre-installed but you might need to upgrade or downgrade package based on your requirements.
- You can install using:

`!pip install xyz`

Mounting Google Drive

- There are two options to mount google drive:
 - Mount using Mount Drive button in Files section.
 - Or Use code
- You need to give permission to modify files in Google Drive.
- Best practices while working with datasets.

Using GPU

Now you can develop **deep learning** applications with [Google Colaboratory](#) -on the **free Tesla K80 GPU , Tesla T4** using [Keras](#), [Tensorflow](#) and [PyTorch](#).

- **Colab** provides GPU and is totally free.
- Enabling / Disabling GPU
 - To enable GPU in your notebook, select the following menu options – Runtime / Change runtime type
- Testing for GPU
- Listing Devices
- Checking RAM

Using a notebook from Github

Demo:

https://github.com/visionatseecs/keras-starter/blob/main/keras_intro_cnn.ipynb

Downloading Kaggle Dataset in Colab

Demo:

https://github.com/visionatseecs/keras-starter/blob/main/keras_intro_cnn.ipynb

Saving and sharing Your Work

- Download “*.ipynb” or “*.py” files.
- Save a Copy in Google Drive
- Save a copy as Gist.
- Save a Copy or commit into your Github Repositories.
- Share Just like you share your Google Drive files.

Questions?

References

1. <https://colab.research.google.com/>
2. ComputerVision@SEEECS (<https://github.com/visionatseecs/>)