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Practical Machine Learning

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Lecture: Getting Started with Google Colab

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Getting Started with Google Colab

Google Colab is a free Jupyter notebook environment that requires no setup and runs entirely in the cloud.

- Colab provides users with a free GPU (Tesla K80 GPU) or TPU. Currently the only restriction on usage is that you there is a maximum duration of connection of a single VM instance of 12 hours.
- It comes preinstalled with essential packages such as NumPy, Pandas, Scikit-Learn, TensorFlow. You can also install additional software if needed.
- It is build on top of Juypter Notebooks and presents a similar interface consisting of cells.
- Over the next few slides I will illustrate how to create Colab Notebook from your Google Drive, upload a dataset that resides in your drive and build a Keras Tensorflow model.
- First navigate to your Google Drive using your browser. You can directly create Colab Notebooks from there.

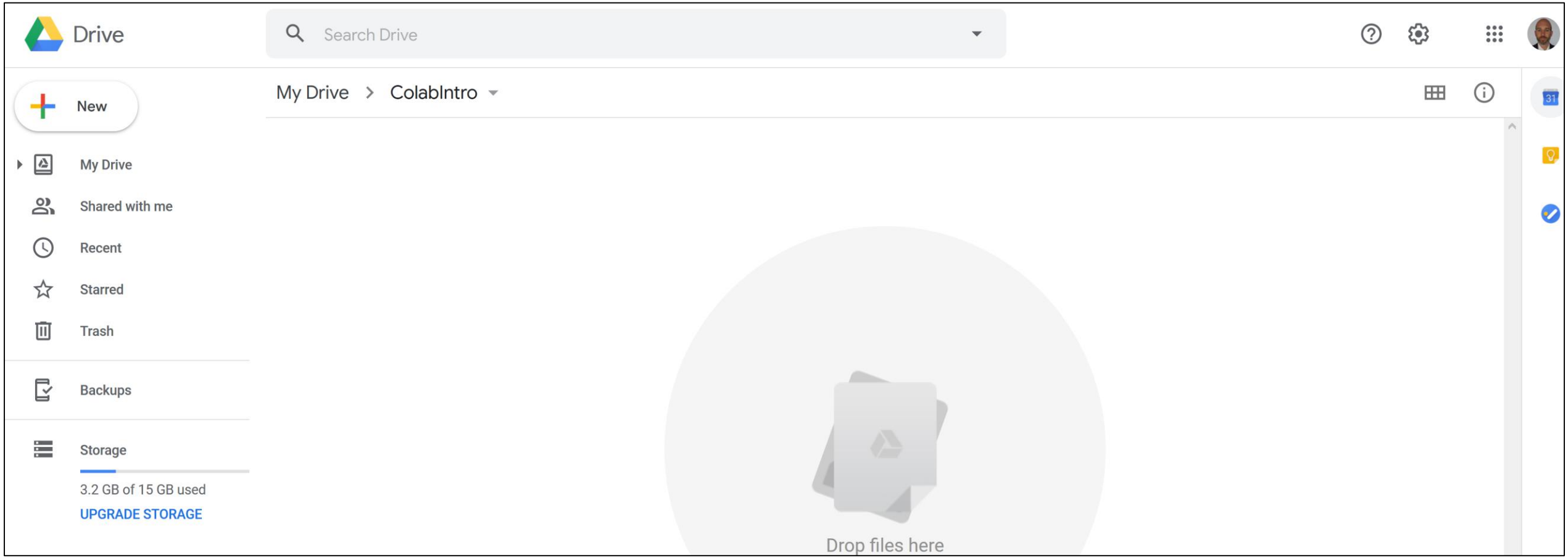
Getting Started with Google Colab

- In this short tutorial I will illustrate the following:
- Step 1. Create a Colab Notebook from your Google Drive
- Step 2: Mount a Google Drive dataset
- Step 3: Load the dataset using NumPy and perform a basic pre-processing step.

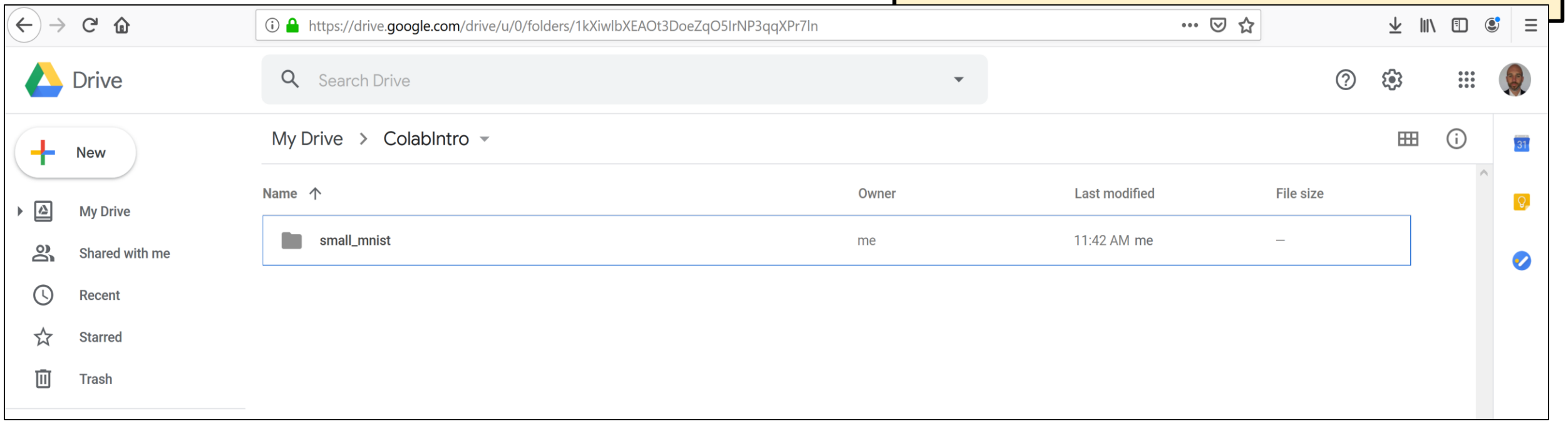
Please note you will need a Google (Gmail) account.

If you haven't used Google Drive before you can access it here.

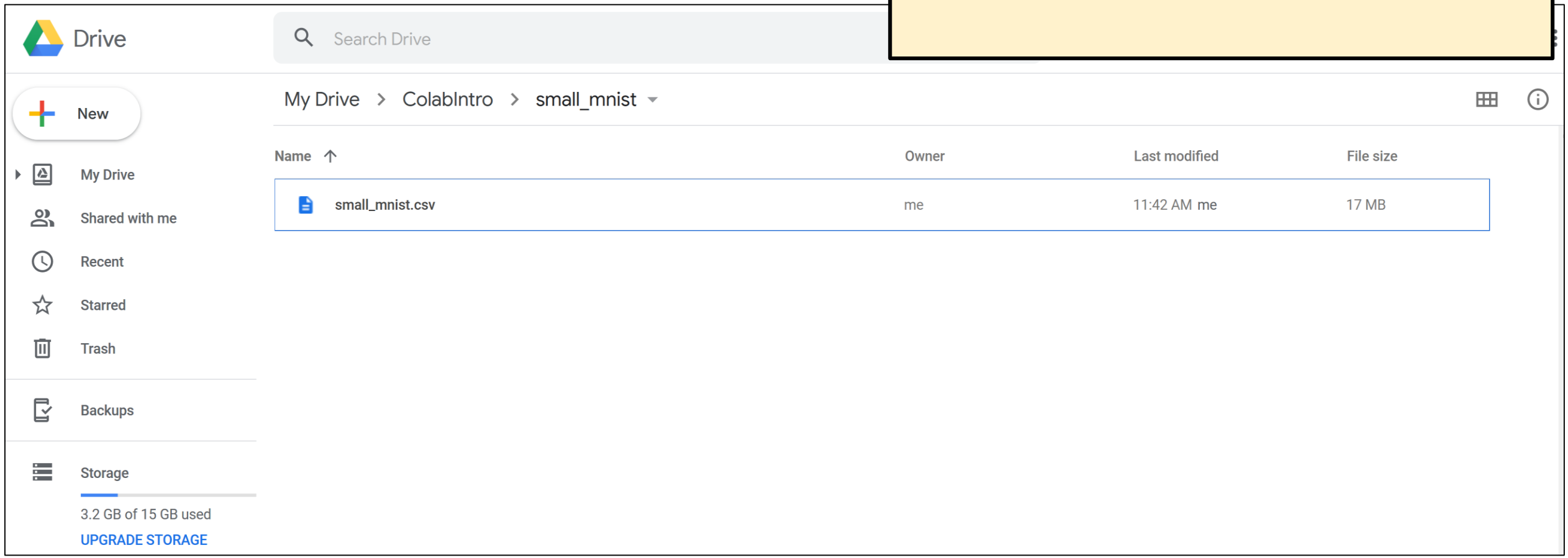
This image shows an empty folder that I have created in my Google Drive (the folder name is ColabIntro).



Add a new folder called small_mnist to your Google drive folder. This folder will contain a training set called small_mnist.csv
(You can find the small mnist folder and csv file on Canvas Week 1 unit. Just unzip the folder and drag to Google Drive)

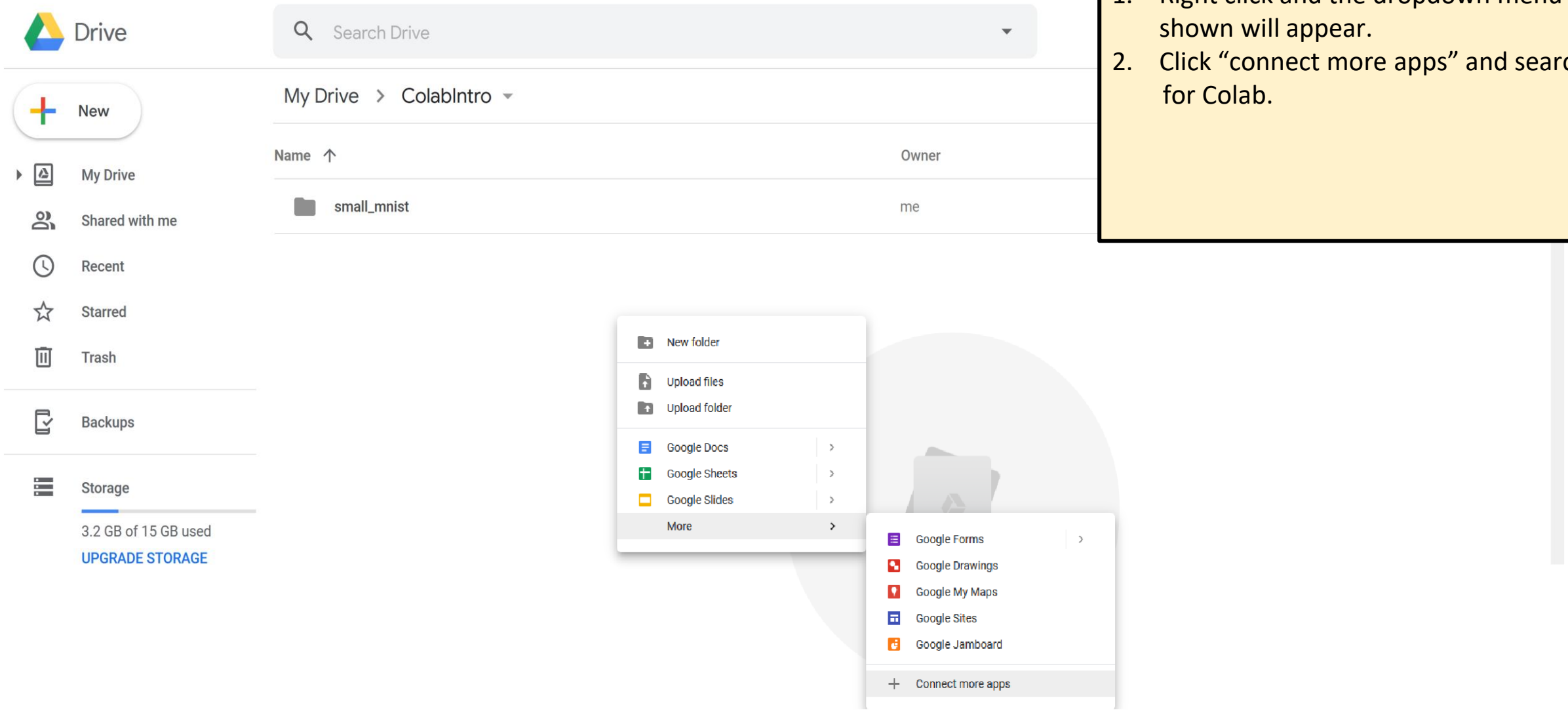


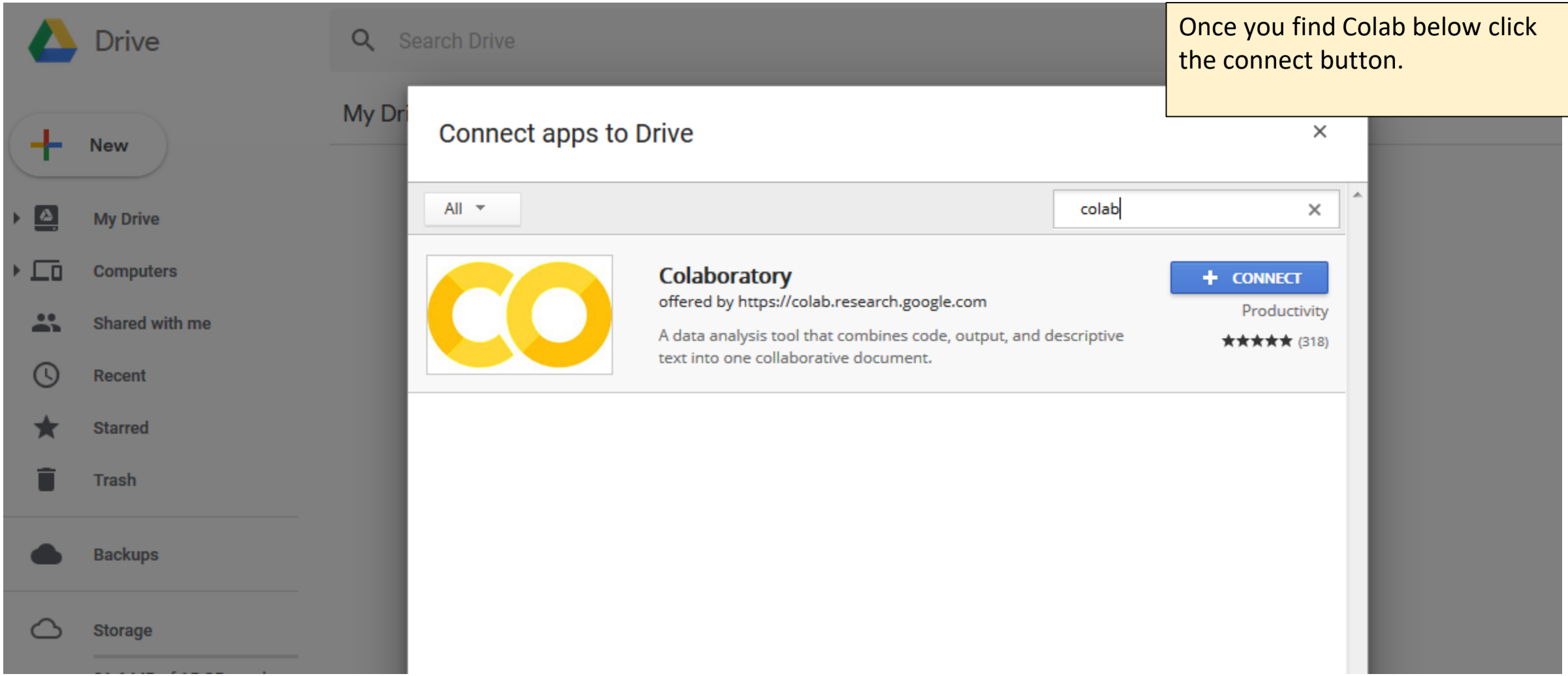
Shows the small_mnist.csv training file in the small_mnist folder.



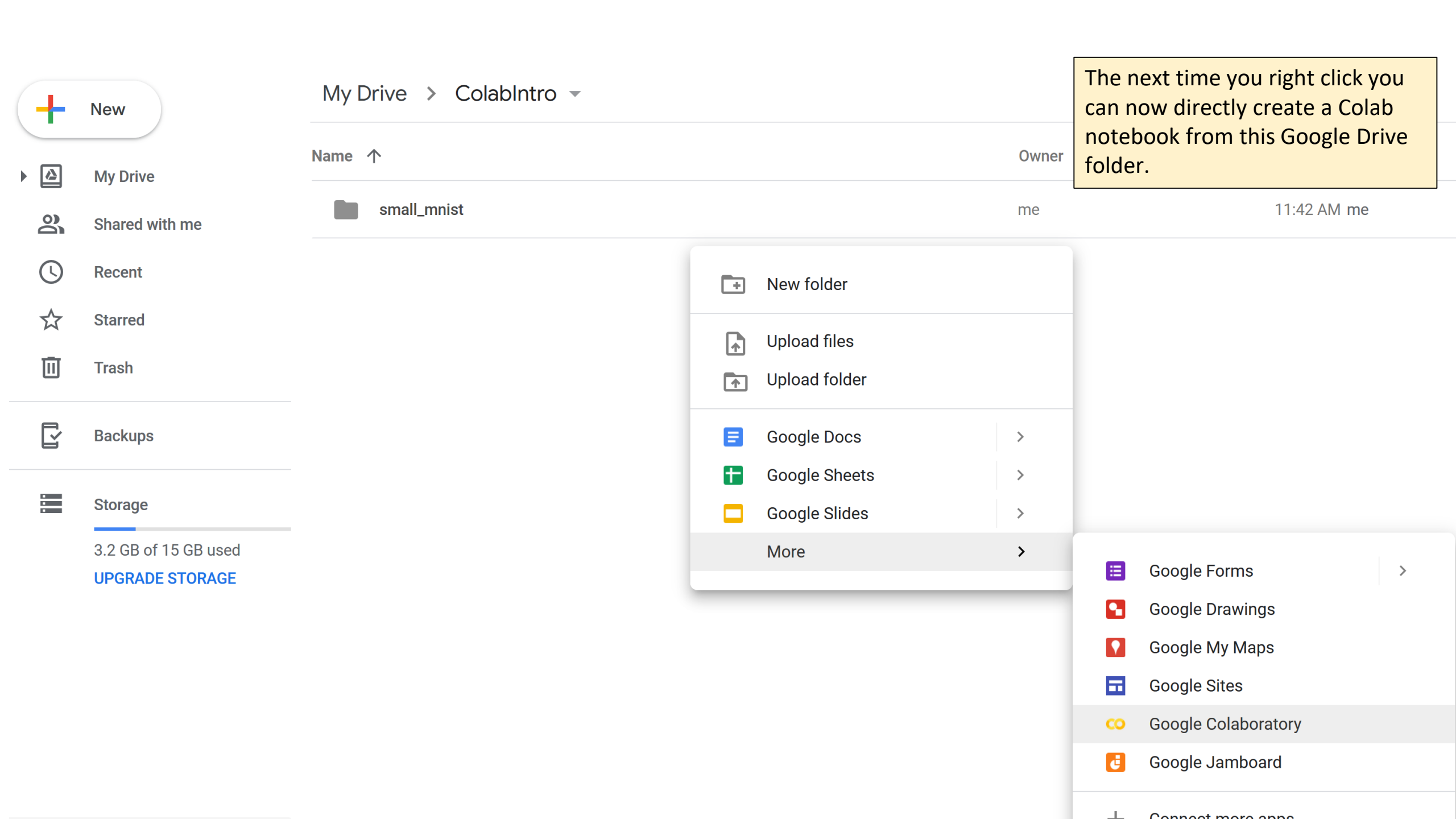
To create Colab notebooks we must add it as an app first as shown.

1. Right click and the dropdown menu shown will appear.
2. Click “connect more apps” and search for Colab.





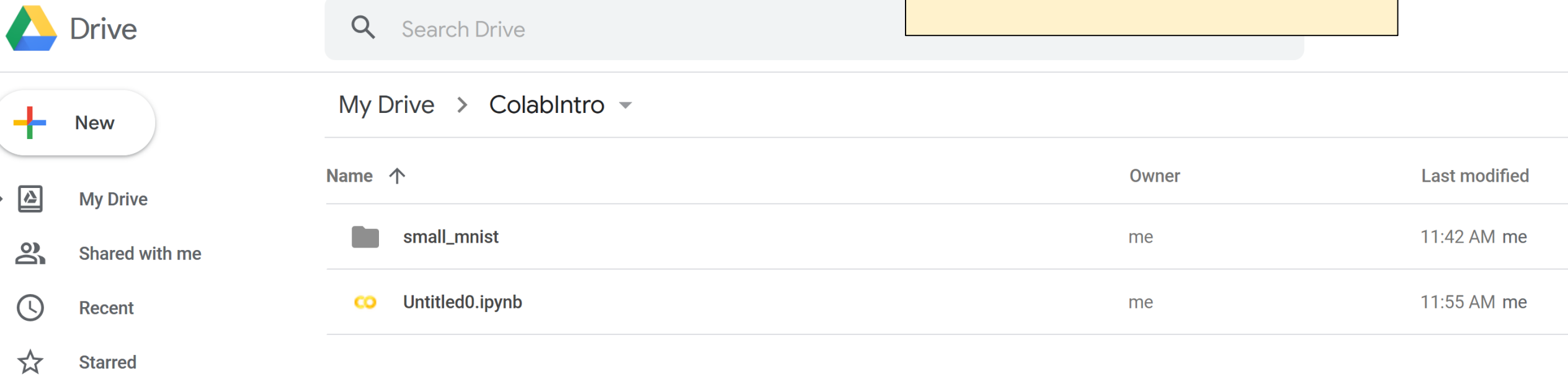
Once you find Colab below click the connect button.


New
My Drive
Shared with me
Recent
Starred
Trash
Backups
Storage
3.2 GB of 15 GB used
UPGRADE STORAGE
My Drive > ColabIntro
Name
Owner
small_mnist
me
11:42 AM me
The next time you right click you can now directly create a Colab notebook from this Google Drive folder.
New folder
Upload files
Upload folder
Google Docs
Google Sheets
Google Slides
More
Google Forms
Google Drawings
Google My Maps
Google Sites
Google Colaboratory
Google Jamboard

The new Google Colab notebook opens automatically.

The notebook is given a default name (in this case Untitled0.ipynb). You can change this name by clicking on the title.

If you go back to your Google Drive you will now see the dataset folder and the Colab notebook.



Components of Colab

- Colab is organized in a similar way to Jupyter notebooks. We can insert code or text cells in your notebook.

- Useful shortcuts include:
  - Running the currently selected cell is CTRL+Enter
  - CTRL+F9 will run all cells in the notebook

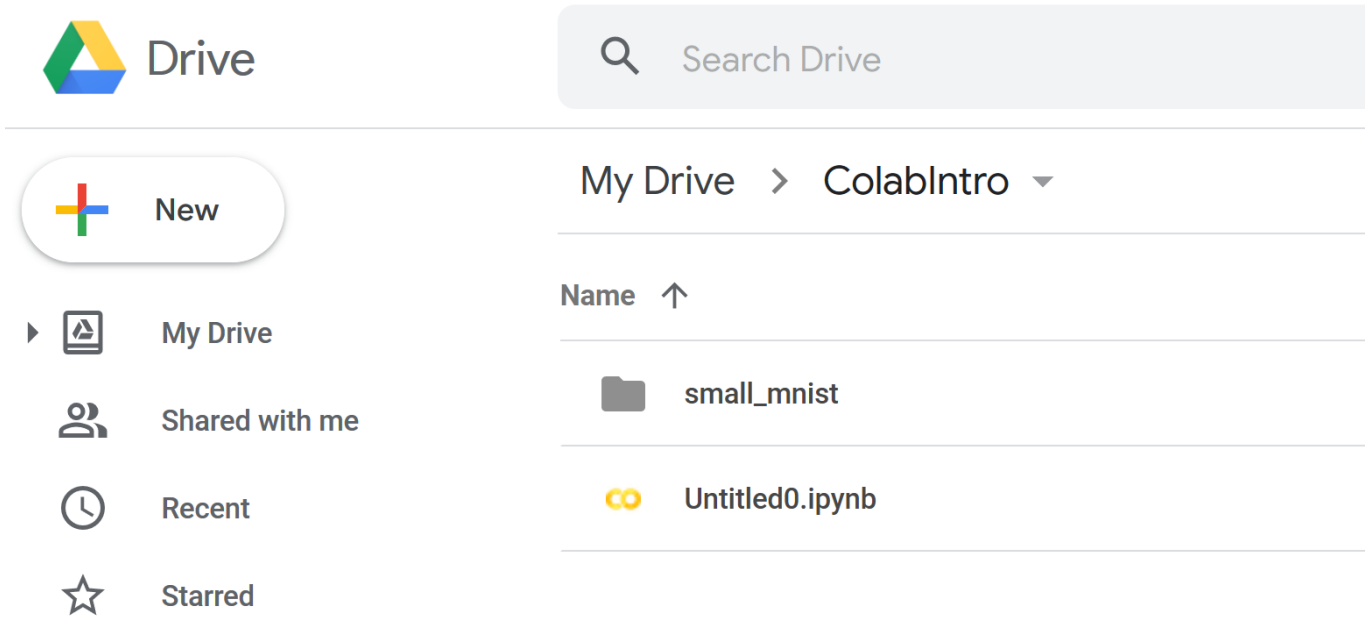
- We can also basic linux command line instructions such as pwd, ls, cd but putting a ! before the command

```
!ls
```

The next step is to mount the small mnist csv data file from Colab.

Mounting Google Drive using Colab

- Over the next few slides we will cover how to mount your Google drive and directly access data files on your drive from Colab.
- We will use the small MNIST dataset that I have stored in my Google Drive.
- You can mount your Google Drive in your Colab virtual machine using an authorization code. Once executed, you should then be able to access the data files on your Google Drive.
- The full Colab code for the following example can be obtained here.



Mounting Google Drive

- Enter the following code into your Colab notebook to mount your Google Drive.

```
from google.colab import drive

drive.mount('/content/gdrive')
```

- It will ask you to authenticate (click on the URL), once you do you should see a message as below that you drive has been mounted. You now be able to access your file

Mounting Google Drive and Reading Data

- Now that the drive is mounted we can read in our data file using the following code (notice NumPy is already installed).
- Notice I use NumPy below to open this file in Colab.

```
import numpy as np

data = np.genfromtxt("/content/gdrive/My Drive/ColabIntro/small_mnist/small_mnist.csv", delimiter=",",skip_header=1)
```

Mounting Google Drive and Reading Data

- The labels are the first column in the CSV file so in the code below we separate the features (all columns except the first) from all other data.
- We then normalize the feature data. If you haven't heard of normalization, don’t worry. We will be covering this later in the module.

```
# print the shape of the data
print (data.shape)

# extract the feature training data
dataFeatures = data[:, 1:]
print (dataFeatures.shape)

# normalize the data
dataFeatures = dataFeatures/255.0
```

Untitled0.ipynb

File Edit View Insert Runtime Tools Help

+ Code + Text

[1]
```
from google.colab import drive

drive.mount('/content/gdrive')
```

```
Go to this URL in a browser: https://accounts.google.com/o/oauth2/auth?client_id=947318989803-6bn6qk8qdgf4n4g

Enter your authorization code:
··········
Mounted at /content/gdrive
```

[6]
```
import numpy as np
data = np.genfromtxt("/content/gdrive/My Drive/ColabIntro/small_mnist/small_mnist.csv", delimiter=",",skip_header=1)
```

```
# print the shape of the data
print (data.shape)

# pull out the feature training data
dataFeatures = data[:, 1:]
print (dataFeatures.shape)

# normalize the data
dataFeatures = dataFeatures/255.0
```

```
(10000, 785)
(10000, 784)
```