National College of Ireland

# Configuration Manual

MSc Research Project
Data Analytics

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**MSc Project Submission Sheet**

**School of Computing**

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|---|---|---|---|
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| **Programme:** | M.Sc. Data Analytics | **Year:** | 2019-2020 |
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| **Lecturer:** | Hicham Rifai | | |
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| **Project Title:** | Weed Detection in Soybean Crops using Regression Analysis and Deep Learning. | | |
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# Configuration Manual

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# 1 Hardware and Software Requirements

## 1.1 Hardware Requirements

The following hardware requirements will ensure the smooth running of the experiment.

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|---|---|
| OS | Windows 10 |
| RAM | Minimum 8GB (2.14 from Colaboratory). |
| Hard Disk Space | 100 GB |

## 1.2 Software Requirements

| | |
|---|---|
| Programming Language and Tools | Python Version 3, Google Colaboratory which is a Jupyter notebook environment based on cloud |
| Web Browser | Mozilla Firefox or Google Chrome |
| Email | Gmail account access |

# 2 Google Colaboratory Setup

This section explains how to setup the Google Colaboratory environment which is necessary to perform the experiment. For better understanding of the process, screenshots are included for this purpose.

1. First, the user should be signed in with their Gmail account.

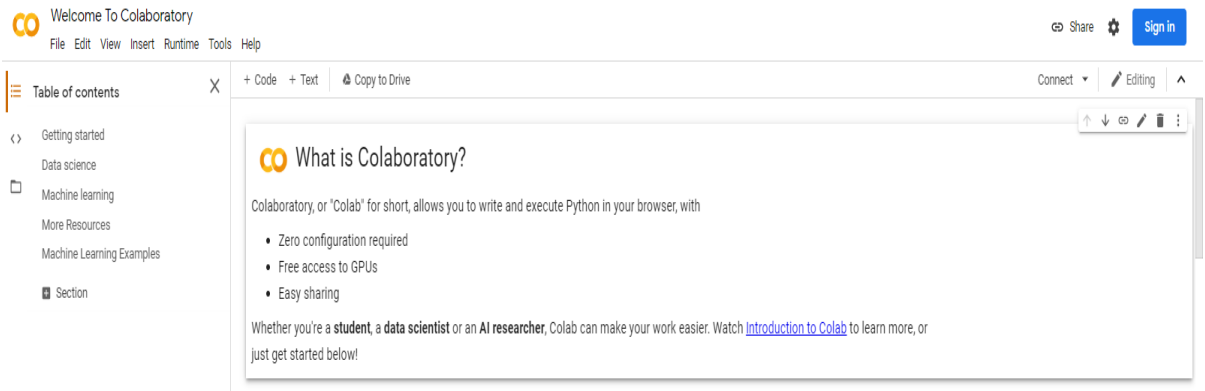


**Figure 1: Sign in page.**

2. Once you have signed in, and the notebook environment is open, the next step is to import the necessary libraries required for each model to be applied. These libraries are imported before coding the algorithms.

```
[ ] import os
    import numpy as np
    import pandas as pd
    import shutil
    import random
    import cv2
    from sklearn.model_selection import train_test_split
    from skimage import io
    from skimage.transform import rotate, AffineTransform, warp
    from skimage import img_as_ubyte
    from skimage.util import random_noise
    import  matplotlib.pyplot as plt
    from sklearn import metrics
    import itertools
    import tensorflow as tf
    from tensorflow import keras
    from tensorflow.keras.preprocessing.image import ImageDataGenerator
    from keras.models import Sequential
    from keras.optimizers import Adam
    from keras.layers import Conv2D,Dense,BatchNormalization,Dropout,Flatten,MaxPooling2D
    from keras.regularizers import l2
    from keras.callbacks.callbacks import EarlyStopping
    from keras.callbacks.callbacks import ModelCheckpoint
```

**Figure 2: Importing libraries.**

# 3 Data Preparation

This section explains the uploading the data and accessing it from Google drive onto the Colaboratory environment.

1. Download the dataset from data.mendeley.com.

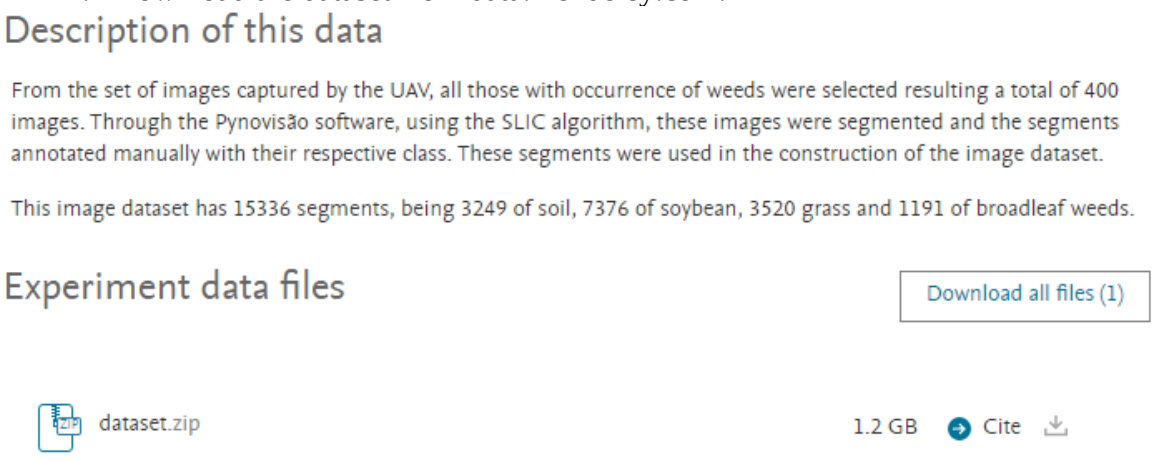


**Figure 3: Dataset on data.mendeley.com.**

2. The next step involves uploading this dataset on Google drive. As the size of this dataset is 1.2GB, you need atleast 1.5GB of free space on you Google drive account to upload this dataset.

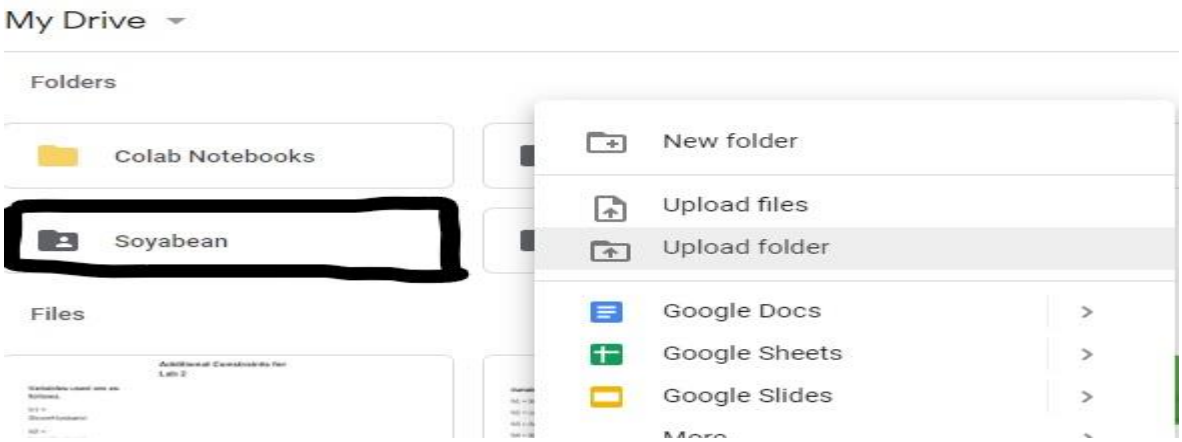


**Figure 4: Uploading dataset on Google Drive.**

3. In the third step, mount the Google Drive in the Colaboratory notebook.

```
[ ]  from google.colab import drive
     drive.mount('/content/drive')
```

**Figure 5: Mounting Google Drive.**

4. The next step is to copy the authorization code and paste it in the prompt in the notebook.

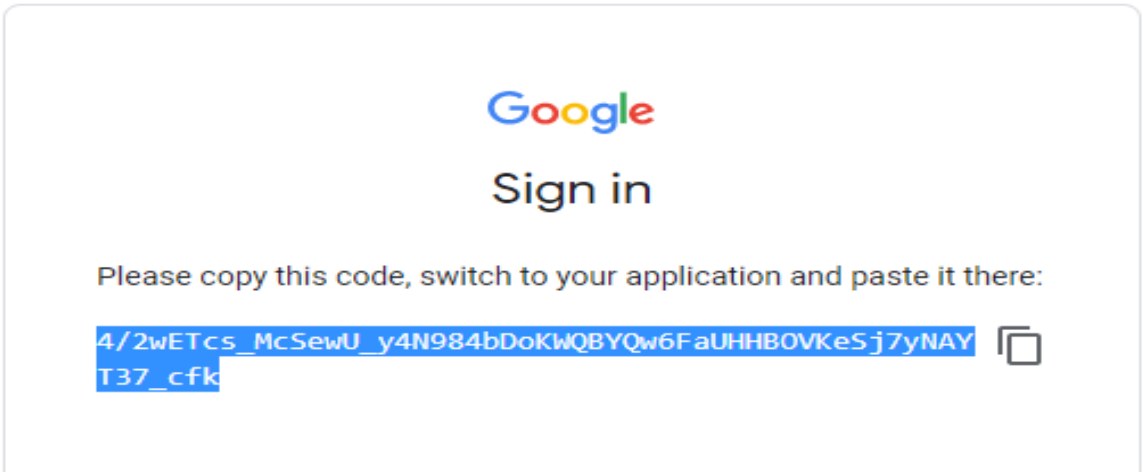


**Figure 6: Authorization Code.**


**Figure 7: Entering the authorization code.**

5. Now, extract the dataset so as to be able to access it.

```
extract_dataset('/content/drive/My Drive/Soyabean/dataset.zip')
```

**Figure 8: Dataset extraction.**

For image augmentation for the CNN model, imagedata_generator library needs to be imported.

```
from keras import models
from keras.preprocessing.image import ImageDataGenerator
import numpy as np
import os
from PIL import Image
from skimage import transform
```

**Figure 9: Image augmentation.**

# 4 Computation Time Settings for Faster Execution

1. For faster computation, there needs to be enough amount of storage available on your google drive account.

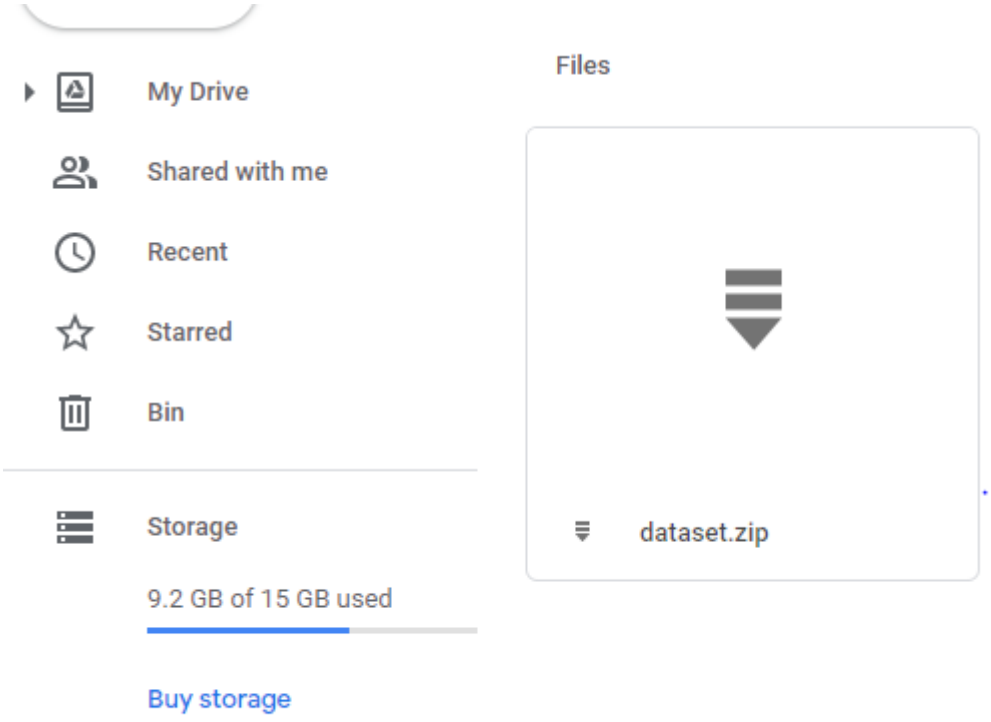


**Figure 10 Google Drive storage.**

2. For faster computation, the runtime settings need to be changed. This can be done by selecting the runtime menu and selecting the ‘change runtime type’ option.

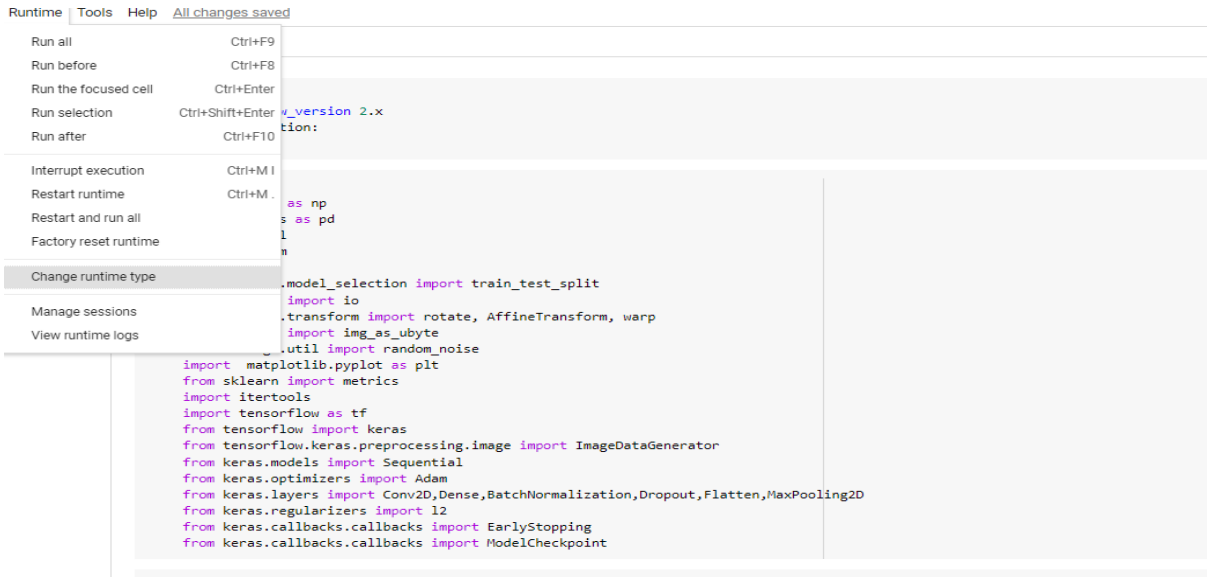


**Figure 11 Changing runtime type.**

The figure above shows the drop-down menu in the colaboratory notebook.

3. The next step is to change the hardware accelerator to GPU as demonstrated in figure 11 below.

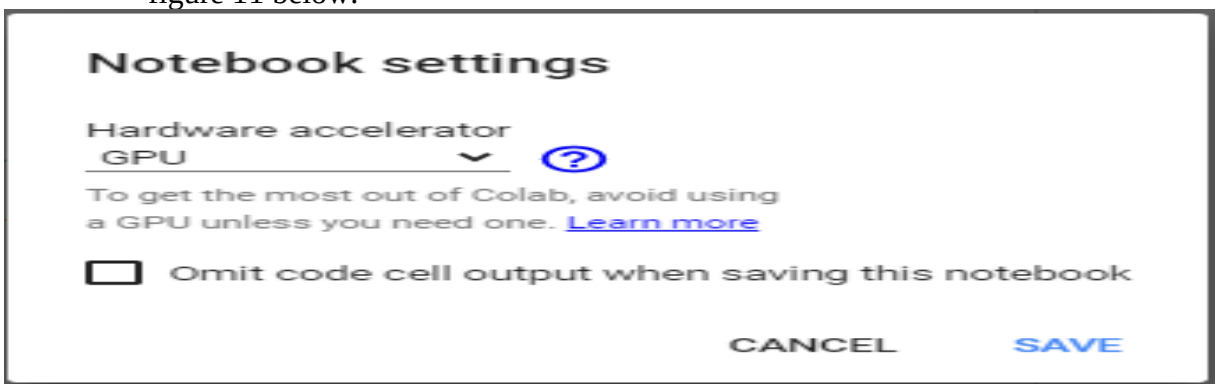


**Figure 12: Selecting GPU for hardware accelerator.**

# References

https://colab.research.google.com/notebooks/intro.ipynb

https://keras.io/guides/sequential_model/

https://scikit-learn.org/stable/

https://data.mendeley.com/datasets/3fmjm7ncc6/2