Welcome!

This notebook introduces and explains the purpose of the COMP700 project for Alexander Goudemond

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The honours project that the author focusses on is titled:

Deep Learning for Tracking Moving Cells in Time-Lapse Video Sequences

The purpose of the project is to explore deep learning techniques for the segmentation and tracking of biological cells. The datasets used are taken from the Cell Tracking Challenge Website: http://celltrackingchallenge.net/2d-datasets/

A proposal was created by the author and will be available in the same directory of this Jupyter Notebook

In addition tho the proposal, the final paper will be available as well

In order to conduct the programming aspects of the project, the author did the following setup:

- A loan laptop was acquired from UKZN with a powerful GPU (NVIDA 1660 Ti)
- On that loan laptop, the author setup (in this order): Python, Nvidia Driver (Current), Visual Studio Community (C++ dependencies), CUDA Toolkit v11.6, CuDNN v11.7, Anaconda
- Inside Anaconda, an environment called *python_gpu* was created, which had tensorflow, jupyter notebook, matplotlib, opencv, moviepy, Pillow, google-api, graphviz, scikit, protobuf, patchify, pickle loaded onto it
- The IDE of choice is Visual Studio Code, with several extensions used for easy use: 3x Jupyter extensions, Prettier Code Formatter, 2x Python extensions, TIF-Preview, vscode-icons, vscode-pdf, MPEG-4 Preview
- For the Neural Networks, Google Drive and Google Colab were used

A breakdown of the timeline of the project and the goals set by the author can be found in the Proposal document. For now, several other Jupyter Notebooks will be created and used to learn information about the datasets

The project file heirarchy follows this pattern:

I.e. :

```
Documents
|_______ ...
```

```
|_______Comp700_DataSets
        |_______Extracted
                |_______BF-C2DL-HSC
                |_______BF-C2DL-HSC (1)
                |_______ ...

        |_______OriginalZipped
                |_______BF-C2DL-HSC.zip
                |_______BF-C2DL-HSC (1).zip
                |_______ ...
|_______ ...

|_______Github
        |_______Comp700
                |_______ COMP700 Welcome and Setup.ipynb
                |_______ ...

|_______ ...
```

The other files present in the documents folder will be generated each time the notebooks are run, but a breakdown of the final layout of the documents are:

... Documents > Comp700_DataSets

... Documents > Comp700_Processed_DataSets_1

... Documents > Comp700_Processed_DataSets_2

... Documents > COMP700_Processed_Training_GT

... Documents > COMP700_Processed_Training_ST

... Documents > COMP700_Raw_Training_GT

... Documents > COMP700_Raw_Training_ST

... Documents > Comp700_Segmented

... Documents > COMP700_Training_Videos

... Documents > Comp700_VideosOfDataSets_BlurAdaptiveThreshold

... Documents > Comp700_VideosOfDataSets_Colour

... Documents > Comp700_VideosOfDataSets_Grayscale

... Documents > Comp700_VideosOfDataSets_Greys

... Documents > Comp700_VideosOfDataSets_Opened

... Documents > Comp700_VideosOfDataSets_Seismic

... Documents > Comp700_VideosOfSegmentation

... Documents > Github > COMP700

The cumulative size of the folders, not including Github, are: 37.6 GB

The cumulative size of the files inside the COMP700 Folder, are: 1.17 GB

The most import default files are:

(

... Documents > Comp700_DataSets

)

In addition to that, please ensure Google Drive is setup with the following folders, if intending on verifying the results:

Please ensure the following folders containg images exist:

drive > MyDrive > COMP700_Images > COMP700_Processed_Training_GT

drive > MyDrive > COMP700_Images > COMP700_Processed_Training_ST

drive > MyDrive > COMP700_Images > COMP700_Raw_Training_GT

drive > MyDrive > COMP700_Images > COMP700_Raw_Training_ST

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_128_GT

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_256_GT

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_512_GT

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_128_ST

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_256_ST

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_512_ST

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_Processed_Images_GT

drive > MyDrive > COMP700_Images > COMP700_Patchify_Images_Processed_Images_ST

Then, please ensure a seperate folder with the notebooks and text files exists:

drive > MyDrive > COMP700_Neural_Network_Code

The first 4 image folders were generated offline by the other notebooks and then uploaded to Google Drive, whereas the next 6 were generated by the notebook 011. The final 2 were generated by 015

The cumulative size of the files located on drive is: 2.09GB

The most import default files are:

(

drive > MyDrive > COMP700_Images > COMP700_Processed_Training_GT

drive > MyDrive > COMP700_Images > COMP700_Processed_Training_ST

drive > MyDrive > COMP700_Images > COMP700_Raw_Training_GT

drive > MyDrive > COMP700_Images > COMP700_Raw_Training_ST

)

If the reader wishes to reproduce this environment, the

Thank you!