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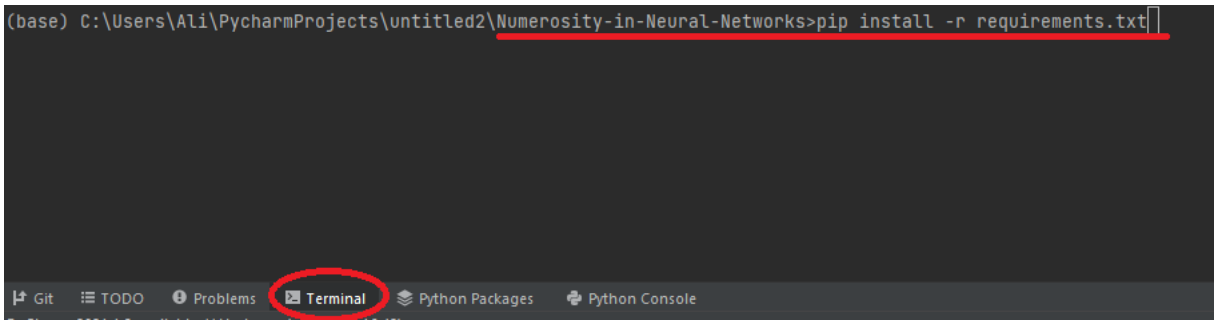
Instruction manual : Numerosity-in-Neural-Networks

This is the instruction manual for my project : Numerosity-in-Neural-Networks. Here I will explain how to install and use the program.

Option 1 : Local Setup using your favorite Python IDE (Pycharm community was used for the screenshots)

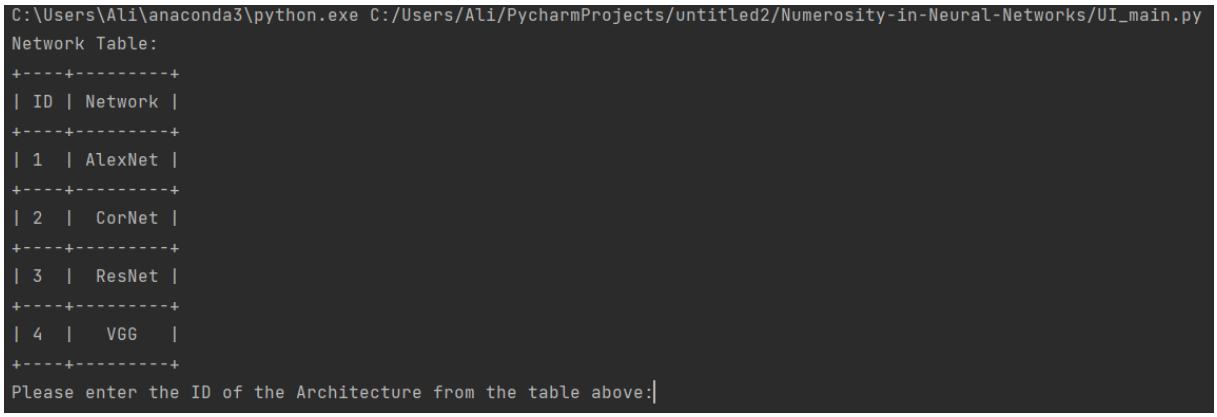
1. Installation

- First of all clone the project from GitHub : https://github.com/AliPTehrani/Numerosity-in-Neural-Networks
- Install all the needed requirements by entering the following command in the Terminal



2. Start the user interface

2.0) Run the file “UI_main.py” . The following output should be printed inside of the console



2.1) Now the program was successfully started. It can be fully controlled by the console. When executing the console, the respective steps display which input is expected. To skip a step, an empty input is sufficient, so just press Enter.

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Option 2 : Using Google Colab

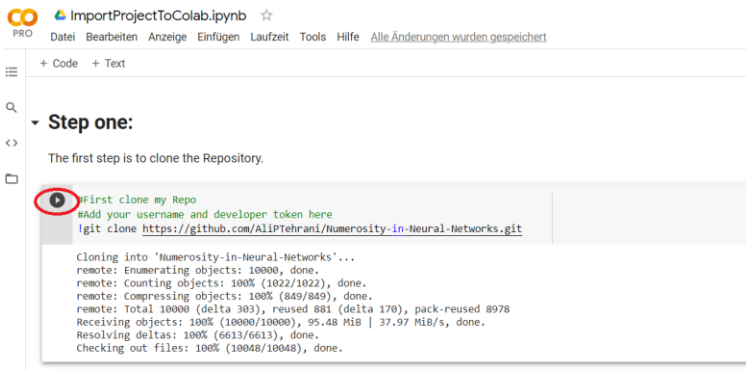
Everything you will need to run the project on Google colab is an google account (Google Email).

GOOGLE COLAB FAQ LINK: https://research.google.com/colaboratory/faq.html

GOOGLE COLAB LINK : https://colab.research.google.com/

1.) Open the Google Colab Notebook which can be found in : “Numerosity-in-Neural-Networks-Google Colab/ImportProjectToColab”
2.) To open the notebook in Google Colab there are many different ways.
    a. One option is to clone the project and then to just upload it on google colab (Colab : File -> Open Notebook -> Upload)
3.) Now you should see the following page :

Just use the play buttons to run the code cells in the notebook.



4.) The first two code cells will clone the project from GitHub into your google colab file system and install all needed dependencies.
5.) The third cell will start the User Interface
6.) Afterwards there are two more cells. The first cells can be used to connect Google Colab to your Google Drive so the generated results can be exported from Colab. To use this cells the save path has to been adapted to the correct result directory.

```
from google.colab import drive
import shutil

# 1.)Connect google drive to colab
drive.mount('/content/gdrive')
# 2.) Move the directory with the results into google drive
# 2.1 ) Evaulation results
evalutaion_results_path = "/content/Numerosity-in-Neural-Networks/Resnet34 random results/RDM_Evaluation_Results"
shutil.move(evalutaion_results_path, "/content/gdrive/MyDrive")
```

Delete the directory to save space in Google Colab (again make sure to adapt the path):

Delete the Model result directory to save space.

```
# delete folder if space is needed
path = "/content/Numerosity-in-Neural-Networks/Resnet34 random results"
path = "/content/gdrive/MyDrive/RDM_Evaluation_Results"
shutil.rmtree(path)
```

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Please note that the User Interface is implemented as an iterative sequence so please, therefore select all models and options with patience otherwise it has to be manually restarted.

The sequence will be :

1.) Choose model(s)
    a. Please note : The CorNet models need an CUDA device to be executed! If this doesn't work on your computer please use the Setup Option 2 (Google Colab) !
2.) Generate features (activation patterns of the chosen models)
3.) Generate RDM's
    a. The RDM's and features should be generated otherwise the next steps cant be executed! If they were already performed step 1 and 2 can be skipped.
4.) Multiple regression
    a. Option 1 : Perform multiple regression on the average Layer RDMs (These are the average RDMs across all 20 subjects
    b. Option 2: Perform multiple regression for all 20 subjects and average the results afterwards
5.) RSA (Comparing Model layer RDMs to Brain Region RDMs)
    a. TaskBoth: Average brain RDMs from the number and the size decision task
    b. TaskNum: RDMs from the fmRI data that resulted from the number task
    c. TaskSize : RDMs from the fmRI data that resulted from the size task
6.) Noise ceiling
    a. Again all three options like the RSA are available. But only one can be chosen since too many graphs would have to be generated. TaskBoth should be used for the most meaningful results.

7.) Delete npz files : At the end the npz files can be deleted. This might be necessary since the model activations and RDMs will take a lot of space to save. Please make sure that these files will not be needed again.