Process to run inverse halftone algorithm on this computer

1st) First connect to the internet.

2nd) Go to e-mail and download the fixed version of InverseHalftone and tensorflow.yml I sent you in e-mail titled (**FIXED INVERSE HALFTONE PACKAGE 1.1.1**)

3rd) Unzip into home directory. This is for ease of setting up, and not crucial but will simplify things. For instance, my InverseHalftone unzip path is at:

```
~/InverseHalftone
```

My InverseHalftone Train_mode directory (where we train a model) is at:

```
~/InverseHalftone/Train_mode
```

Similarly my InverseHalftone Test_mode directory (where we test a pre made model) is at:

```
~/InverseHalftone/Test_mode
```

4th) Install Anaconda3:

A. get python 3.7 version from link: https://www.anaconda.com/distribution/#linux

B. Go to Downloads directory with the following command (or whichever directory you downloaded Anaconda3 script too):

```
cd Downloads
```

C. Run script you downloaded using bash (for example the following command worked with the Anaconda3 shell script I downloaded):

```
$ bash Anaconda3-2019.10-Linux-x86_64.sh
```

5th) Hit yes to everything during installation.

6th) Type the following commands in order:

```
$ cd ~
$ source .bashrc
```

7th) Close terminal and open it.

8th) If conda was initiated type the following command.

```
$ conda init
```

9th) Install curl

```
$ sudo apt install curl
```

10th) Install pip using the following 2 commands

```
$ curl https://bootstrap.pypa.io/get-pip.py -o get-pip.py
$ python3 get-pip.py
```

11th) Install modules (this can be done using conda as well, but to be thorough let's install in python3 and also get a few modules via conda) using following command.

```
$ python3 -m pip install --user numpy scipy matplotlib ipython jupyter
pandas sympy nose tensorflow Pillow
```

12th) Let's make sure some things are installed using conda. Run the following commands.

```
$ conda install spyder
$ conda install pysocks
$ conda install tensorflow
```

13th) Run the following commands to setup tensorflow environment. This also may not be needed at this point, but it's better to make sure all modules are subsequently to the dated versions this algorithm runs in. The InverseHalftone algorithm was written before tensorflow 2 (TODO: Update code to work in newest Anaconda libraries):

```
$ conda env create -f tensorflow.yml
$ conda activate tensorflow (will see tensorflow pop up in terminal)
```

14th) Navigate to your python3.6 numpy library and open up format.py. For instance my format.py file is located at:

```
~/.local/lib/python3.6/site-packages/numpy/lib/format.py
```

15th) Go to your read_array function. For instance, mine is at line 678.

```
def read_array(fp, allow_pickle=False, pickle_kwargs=None):
```

16th) Add the following line under the function comments I did mine at line 710. Be careful of spacing. Python uses white space to decide where functions end. Make sure spacing is inline with the rest of the function:

```
allow_pickle = True
```

17th) Open up the following 2 files:

```
~/InverseHalftone/Train_mode/main.py
~/InverseHalftone/Test_mode/main.py
```

18th) For main.py in Train_mode directory go to the following lines and replace the directory username or directory with the proper location.

```
 57  vgg19_api = VGG19("~/InverseHalftone/Train_mode/vgg19.npy")
244  train_list = gen_list('~/InverseHalftone/Train_mode/input/train/')
255  val_list = gen_list('~/InverseHalftone/Train_mode/input/val/')
```

19th) For main.py in Test_mode directory go to the following lines and replace the directory username or directory with the proper location.

```
 58  vgg19_api = VGG19("~/InverseHalftone/Test_mode/vgg19.npy")
248  train_list = gen_list('~/InverseHalftone/Train_mode/input/train/')
```

20th) You can run by either going to the Train_mode or Test_mode directory and using the following command:

```
$ python3 main.py
```

Or I suggest running spyder3 by typing the following command:

```
$ spyder3
```

Spyder3 will help debug any problem you may run into, and you can use import pdb and pdb.set_trace() to put breakpoints in the python script if something goes wrong. Easier to debug.

21st) All images must be 256 by 256 and uniform. To change that open up model.py in the Test_mode and Train_mode directories and adjust IMG_WIDTH and IMG_HEIGHT located at lines 8 and 9.

22nd) Explanation of where to put training pictures.

A. The directory where you place the halftone images that you want the algorithm to learn from is at:

```
~/InverseHalftone/Train_mode/input/train/raw/
```

B. The directory where you put in the normal images before they go through a halftoning process or the sharper images is at:

```
~/InverseHalftone/Train_mode/input/train/target/
```

(That is to say we want the algorithm to take the halftone images in raw and learn how to become the normal images in target)

C. After training the model the algorithm in the Train_mode directory automatically uses that model to invert the halftone images you place in:

```
~/InverseHalftone/Train_mode/input/val/raw/
```

```
And when done processing them output them to
```

```
~/InverseHalftone/Train_mode/output/
```

```
The trained model is stored in:
```

```
~/InverseHalftone/Train_mode/model/
```

23rd) There is already a trained model in the Test_mode directory, but you can copy over the model you train by deleting the files in:

```
~/InverseHalftone/Test_mode/model/
```

And replacing them with the trained model from:

```
~/InverseHalftone/Train_mode/model/
```

24th) To test your model put the halftone pictures you wish to test in:

```
~/InverseHalftone/Test_mode/input/raw/
```