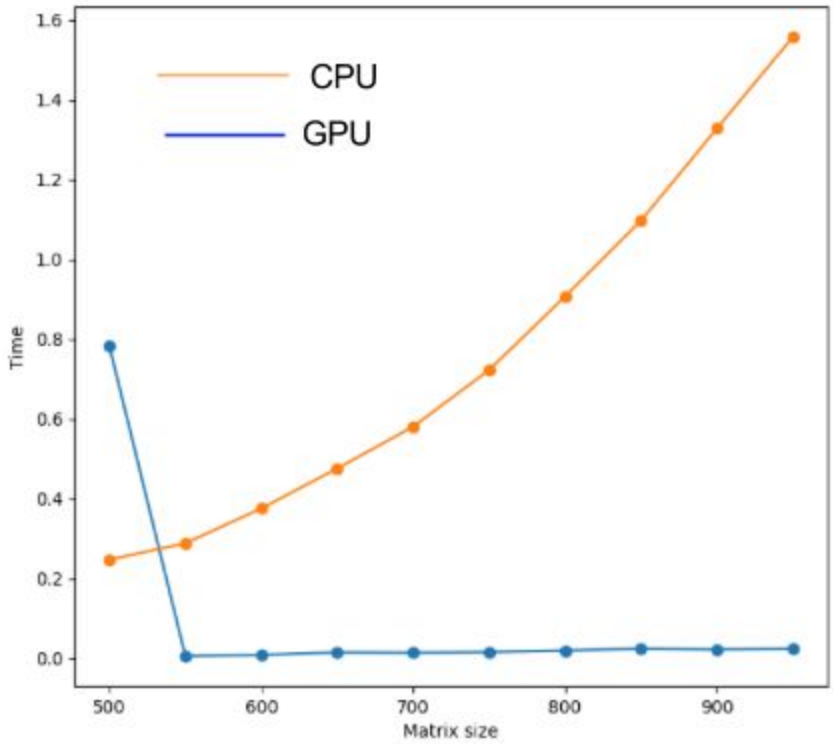
Building a GPU based Ubuntu Desktop for Deep Learning (from your existing Desktop PC)

Why GPU?
Please refer to the plot below, comparing the runtimes between a CPU (24 core, Intel® Xeon(R)) and a GPU (NVIDIA 1080 Ti). A simple matrix-multiplication is performed using two matrices of size [MxM] (X-axis value = M), and the time taken (in secs) is plotted in the Y-axis.



A. Install Ubuntu on a Windows Desktop

1. Backup all data on your existing Desktop-PC.
   Warning:
   All data will be erased with the procedure below. Windows will be erased from your HDD.
2. Create a boot-up USB:
   Save the file in this location:
   http://releases.ubuntu.com/14.04/ubuntu-14.04.5-desktop-amd64.iso
   And create a USB boot-disk using “Startup Disk Creator” from another Ubuntu machine.
3. Restart your desktop PC, and hold the F12 key to enter boot-menu. Choose USB as your startup drive.
4. Walk through the steps to install ubuntu:
   https://www.ubuntu.com/download/desktop/install-ubuntu-desktop
5. **Important**: Register your computer for White-listing using: “ise-whitelist/”
   This enables your desktop to use the wired ethernet connection at eBay.
   Make sure your desktop is connected to the ethernet during this process.
6. After installation, power-up your device and check if Ubuntu starts-up normally, and you are able to login with your username/pwd.

B. Purchase a good GPU that is compatible with your current desktop

Recommendations:

a. NVIDIA GTX 1080**Ti - USD700** -- Fastest commodity GPU

b. NVIDIA GTX 1080 - **USD550** -- 30% slower than *1080Ti*

C. Install the GPU inside your desktop

a. Power-off your desktop. Open the desktop cover.

b. Locate the on-board GPU, which is typically an NVIDIA **NVS**300.

c. Pull-out any VGA / DVI / Display-Port cables that are attached to the GPU. Pull out the GPU safely. The default GPU generally is not connected to any power source.

d. Place your new GPU in the same slot as that of the original GPU

e. Use an unused PCIe power cable from the Desktop's power-supply, and plug it into the GPU. Note that **1080Ti** needs both 8-pin and 6-pin power-inputs, so use an appropriate PCIe power cable.

(eBay link for the product)

f. Power-up your desktop, and enter the Text-only console of Ubuntu (Using Ctrl-Alt-F1)
Login to your account, and enter the console kernel. (Please do not work on the regular X-server based login)

Note: If your desktop does not show the purple screen with Login-window, and is stuck in a black-screen with a blinking cursor, do the following:
(Right after the Dell screen, keep pressing the 'Shift' key several times, to enter the Grub screen)
Select Advanced, then press 'e' to edit the Grub file for that session
Replace 'quiet splash' with 'text'
Press ctrl-x
This will start ubuntu in text-only (console) mode

D. Update Graphics Card Drivers for your Desktop (Instructions only for NVIDIA)

From the Ubuntu console, type the following, to first remove the existing drivers, and then install the latest drivers:

```
sudo add-apt-repository ppa:graphics-drivers/ppa
sudo apt-get update
sudo apt install nvidia-367
shutdown -r now
```

This should shutdown/restart your computer.
If it does not restart automatically, press the power button on the desktop
On bootup, the default purple screen should show up with the login window, using the full-resolution of your monitor.

E. Install Deep Learning framework(s)

a. Install TensorFlow (or your favourite Deep Learning Framework)
Link: **https://www.tensorflow.org/install/install_linux** (I installed TensorFlow **Using virtual-env** option)

Steps: (if you do not want to read the info in the link):
1. Please make sure that you use "`pip install --upgrade tensorflow-gpu`"

CUDA toolkit: https://developer.nvidia.com/cuda-downloads
(Note: When running the downloaded .run file, say 'No' to NVIDIA-Driver update)
+ (If you accidentally said 'Yes' for Driver update, use "sudo apt-get remove --purge nvidia-*" to delete all existing drivers. Then use "sudo apt install nvidia-367" to get your driver back)

2. cuDNN: https://developer.nvidia.com/rdp/cudnn-download
(You need to create a user/pwd with NVIDIA Dev community if you do not have one already)
Once you have un-tarred the downloaded file, copy over the files into their respective folders on /usr/local/cuda/

3. sudo apt-get install libcupti-dev

b. Install required packages:
MatPlotLib, Numpy, tkinter etc. if not installed already
sudo pip install matplotlib
sudo pip install tkinter

F. Putting it all together:

Run the Python code in the link below.
https://medium.com/@erikhallstrm/hello-world-tensorflow-649b15aed18c#.yzvu82tb6
You should be able to get a plot that was shown in the first page of this document.

Enjoy your new GPU!!