Neural Networks using TensorFlow

There are objectives in this week's lab exercise. The first objective is to get up and running with Google Colab. The second is write a basic TensorFlow program to solve a minimize a specific cost function using Colab. The third objective, which is optional is to launch a Datalab Google Cloud VM with a GPU backend. Each objective is described in more detail below.

Objective 1: Using Google Colab.

In Canvas you should see a unit called "Guide to Using Colab". Within this unit there is:

1. A tutorial on getting started with Colab
2. A zip file containing a basic dataset
3. Finally a link to a Colab notebook, which contains all the code for the exercise.

Please follow the steps outlined in the tutorial "Guide to Getting Started with Colab". This will take you through the process of uploading the dataset to your Google Drive and mounting your Google Drive on a Colab instance. You will next read in your Colab code and build a basic model.

If you have any difficulty with this exercise please post a question to the discussion forum or come to the lab support session on Weds.

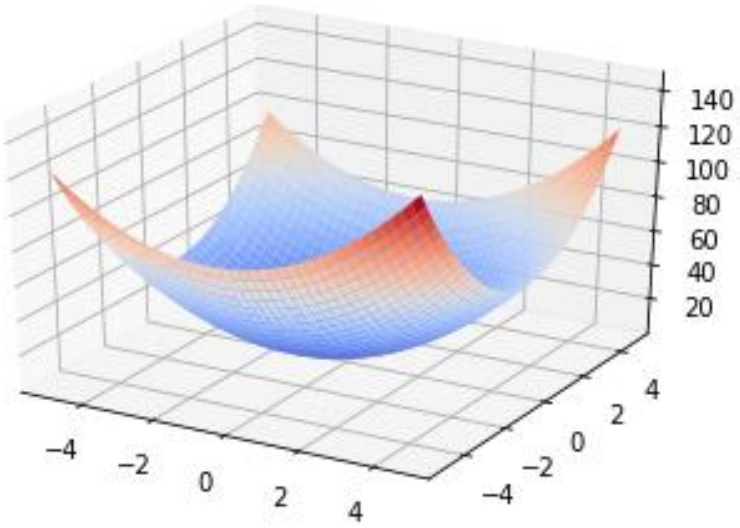
Objective 2: Using Tensorflow to minimize an objective cost function.

The objective of this exercise is to build a TensorFlow program in Colab to minimize a cost function using GradientTape.

The cost function you are trying to minimize is the following:

$$2x^2 + 3y^2 + 3x - 2y + 3$$

The function, which is depicted below, is a convex function. There are two trainable variables in the function (x and y). You should use TensorFlow to identify the values of x and y that will minimize this cost function. More specifically you should implement Gradient Descent in order to iteratively update x and y in order to minimize the function. You should use GradientTape to calculate the relevant partial derivatives you will need in order to update x and y appropriately.



Objective 3: Using Google Cloud Deep Learning VM.

In Canvas you should see a unit called “Guide to Using Google Cloud Deep Learning VM”. The guide (which is significantly longer than the Colab tutorial) will allow you to create and deploy a Google Cloud Deep Learning VM with a GPU backend. Please note there is a step in the process that requires approval from Google (you have to request that they increase your GPU quota). The approval can take up to two workings days (although I typically find that they are much quicker).

This environment is a Jupyter notebook style environment, very similar to Colab. You will have 50 dollars of credit available for usage on this VM. Please monitor your usage carefully.