

# Assignment 1

[New Attempt](#)

**Due** Apr 13 by 5:59pm    **Points** 6    **Submitting** a text entry box or a file upload

Posting the homework now: the invitation to "Register for Lab - Deep Learning DSVM" should go out this morning ...

Question 1 (1 point):

Suppose we have scaled the inputs for a one parameter linear regression problem and ...

```
x = -0.10      # our input variable
y = -0.10      # our output variable
w = 1.00       # the actual parameter
w_hat = 1.10   # our current estimate of the parameter
learning_rate = 0.1
```

a) If our prediction is  $y_{\text{hat}} = w_{\text{hat}} * x$  [i.e. we're using a linear activation function], what is the value of the mean squared error loss function for this example?

b) What is the gradient of the mean squared error loss with respect to the weight estimate  $w_{\text{hat}}$ ?

```
Don't forget to use the chain rule:
gradient = (partial derivative of loss with respect to activation)
          * (partial derivative of activation with respect to product)
          * (partial derivative of product with respect to weight)
```

c) What is the updated estimate of  $w_{\text{hat}}$ ? We are using gradient descent, so  $\text{new\_weight} = \text{old\_weight} - \text{learning\_rate} * \text{gradient}$ .

d) What is the value of the mean squared error loss function for this example, after updating the weight? Has "learning" reduced the loss function?

Model 1 (5 points):

Navigate to <https://www.kaggle.com> and register an account with your [name@uw.edu](mailto:name@uw.edu) email address. For your display name, pick the name of your favorite city [or one of these:

[https://en.wikipedia.org/wiki/List\\_of\\_largest\\_cities](https://en.wikipedia.org/wiki/List_of_largest_cities) ]. Please include your display name when submitting your homework answer.

After you have registered with Kaggle, please navigate to the following URL to accept the invitation for this Kaggle task:

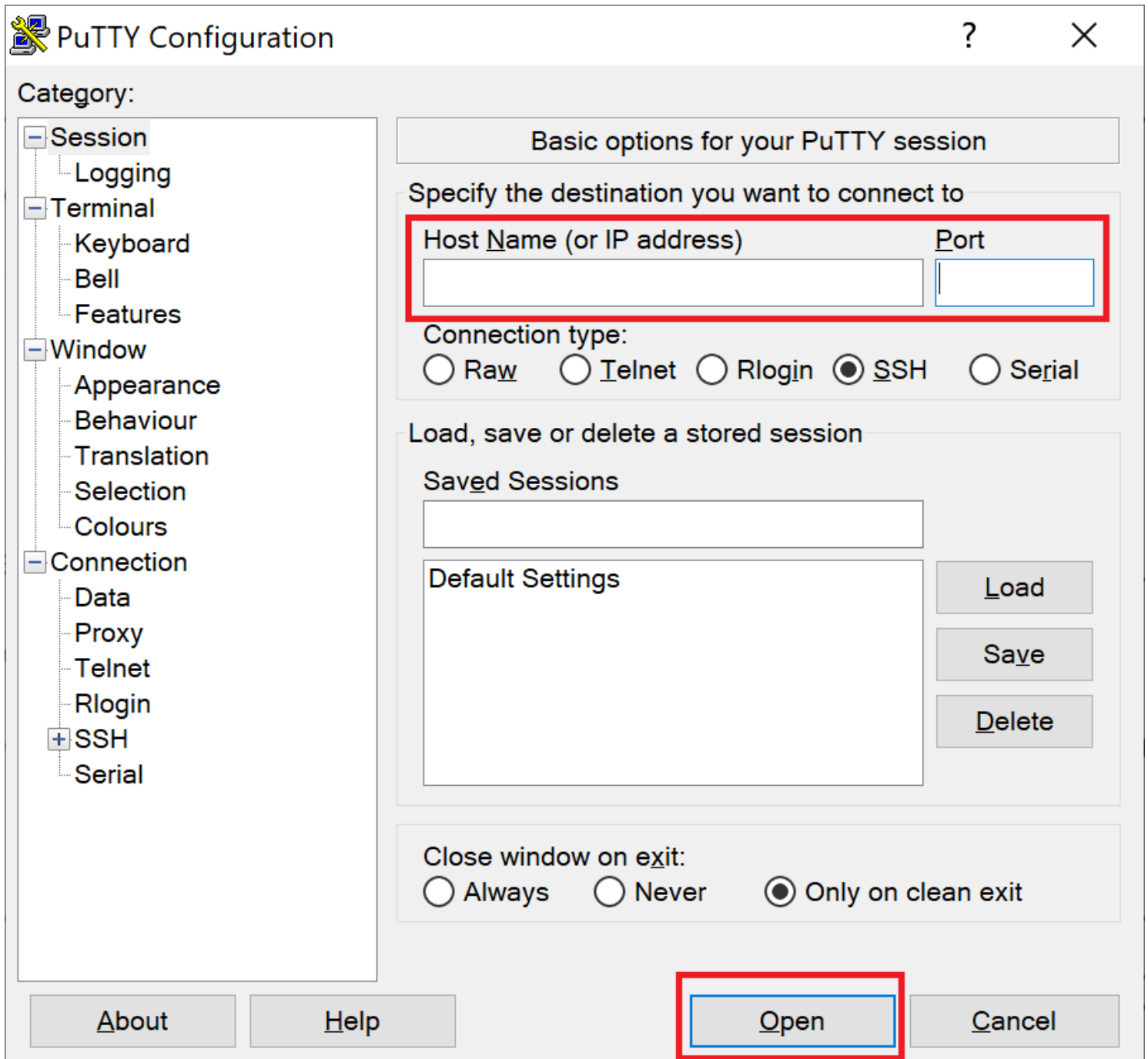
<https://www.kaggle.com/t/5d6ba9f21ff34e17b69cb0b8b1c425cc>

After you have accepted the invitation, you should create an authentication token [you only have to do this once for the class]:

- Click on the picture of the goose in the upper, righthand corner
- Select Account from the menu
- Click the button that says "Create New API Token": it downloads kaggle.json

Now you should go to <https://gmail.uw.edu> and find your invitation to "Register for Lab - Deep Learning DSVM":

- Click the "Register for the lab" button in the email
- Turn your Data Science Virtual Machine (DSVM) on [by clicking the button]
- Select "Reset password" [from the "More actions menu" (3 vertical dots)] to assign the password for the username "deeplearning"
- Select "Connect via ssh" [from the "Connect menu" (connector icon)] to get the hostname and port number for your Virtual Machine (VM)
- Install the "PuTTY" secure shell (ssh) client software; e.g. choose "MSI (Windows Installer)" if you're using Windows [Ubuntu and MacOS already has an ssh command]: [Download PuTTY: latest release \(0.74\) \(greenend.org.uk\)](#)
- Use the putty ssh client to connect to your VM [fill in the "Host Name" and "Port" values for your VM, then click the "Open" button]:



The image shows the PuTTY Configuration window. On the left is a tree view of categories: Session, Logging, Terminal, Keyboard, Bell, Features, Window, Appearance, Behaviour, Translation, Selection, Colours, Connection, Data, Proxy, Telnet, Rlogin, SSH (selected), and Serial. The main area is titled 'Basic options for your PuTTY session'. It contains a section 'Specify the destination you want to connect to' with a red box around the 'Host Name (or IP address)' and 'Port' input fields. Below this is the 'Connection type' section with radio buttons for Raw, Telnet, Rlogin, SSH (selected), and Serial. Further down is a section 'Load, save or delete a stored session' with a 'Saved Sessions' list box, a 'Default Settings' text area, and buttons for Load, Save, and Delete. At the bottom is the 'Close window on exit' section with radio buttons for Always, Never, and Only on clean exit (selected). At the very bottom are buttons for About, Help, Open (highlighted with a red box), and Cancel.

PuTTY Configuration

Category:

- Session
  - Logging
- Terminal
  - Keyboard
  - Bell
  - Features
- Window
  - Appearance
  - Behaviour
  - Translation
  - Selection
  - Colours
- Connection
  - Data
  - Proxy
  - Telnet
  - Rlogin
  - SSH
  - Serial

Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address) Port

Connection type:

☐ Raw ☐ Telnet ☐ Rlogin ☒ SSH ☐ Serial

Load, save or delete a stored session

Saved Sessions

Default Settings

Load Save Delete

Close window on exit:

☐ Always ☐ Never ☒ Only on clean exit

About Help Open Cancel

Once you are logged into your VM [using the username "deeplearning" (without the quotes) and the password you just created], you should:

- Activate the py37\_tensorflow environment [you will need to do this each time you login]

```
conda activate py37_tensorflow
```

- Install the keras-tuner; install the kaggle API; and create your kaggle.json file [you will only need to do this once for this class]

```
pip install keras-tuner
pip install kaggle
mkdir ~/.kaggle
```

```
nano ~/.kaggle/kaggle.json
{"username":"UserNameGoesHere","key":"KeyGoesHere"}
# To save: Ctrl+X > "Y" > Enter
chmod 600 ~/.kaggle/kaggle.json
```

- Download the data and the example script; install the keras-tuner package; run the example script; upload your predictions to kaggle; and check the public leaderboard

```
kaggle competitions download ml530-2021-sp-mnist
wget http://cross-entropy.net/ml530/mnist-search.py.txt
python mnist-search.py.txt
kaggle competitions submit ml530-2021-sp-mnist -f predictions.csv -m "MLP submission"
kaggle competitions leaderboard ml530-2021-sp-mnist -s
```