Handbook For NWPU Student

handbook for Linux and Windows and Python packages and C++

good luck！link for linux tips

内容

        - CentOS
            - Install steamcmd (and avoid errors)
            - 打开端口
                - 打开一个特殊端口
                - List opened ports
    - Windows
        - How to force a program to not run as Admin
    - Python
        - 生成独立的 python 脚本 (AKA exe file)
        - 自动生成 requirements.txt
        - 向左或向右旋转字符串的字符
        - Inserting the same value multiple times when formatting a string
        - Read file lines:
        - Convert images to PDF
        - Lists
            - List comprehension
            - Extend a list
            - Index a list using a list
            - Choose a random list from a list of lists
        - Dictionaries
            - Sort a dictionary based on a value inside
            - Check if a key is in a dict
        - Tabulate
        - System related commands
            - List all immediate subdirectories
            - List all subdirectories recursively
            - List all files only
            - Move files
            - Check if a directory exists
            - Create new directory
        - Pandas
            - Filter values
            - Select by [row, col] index

- Google sheets
  - How to merge two tables and sum its content
- Excel
  - Format numbers using [K, M, G]

SSH related commands

Work for both windows and linux, if you have OpenSSH.

Connect to a remote host

The most basic one. Be aware that `server_ip` can be a domain (e.g.: `example.org`) or an ip (e.g.: `192.168.69.42`).

```
ssh user_name@server_ip
```

If you use the fancy shit like a SSH public key authentication, use the `-i` argument and provide the path to the public key file (e.g.: `/home/user_name/.ssh/my_key.pub` or `~/.ssh/my_key.pub`), just remember that is not always that the key will have the `.pub` extension.

```
ssh -i path_to_public_key.pub user_name@server_ip
```

Configuration file

You can setup a configuration file that have almost everything necessary to connect to a remote server, it is specially useful to use with vscode. Here is the link for the full set of configurations.

And here is a basic setup. Save as `config` in your `~/.ssh` folder.

```
Host a_name_for_this_setting
  HostName your_host_address_or_ip
  User your_username
  IdentityFile path_to_rsa_key_its_optional
```

Send file to remote host

To send a file to a remote host using SSH. It is almost the same as the connection, but now you need to provide a valid path in the remote host, valid means that you have permissions and exists. `path_to_folder` can be, for example, `/home/user_name/Downloads`.

```
scp path_to/my_file.txt user_name@server_ip:path_to_folder
```

To send using a public key authentication is the same argument as the connection.

```
scp -i path_to/public_key.pub my_file.txt user_name@server_ip:path_to_folder
```

Receive a file from remote host

To receive a file from the remote host is just the send but inversed.

```
scp user_name@server_ip:path_to/file.txt path_to_save/my_file.txt
```

The same is valid for the public key authentication.

```
scp -i path_to/public_key.pub user_name@server_ip:path_to/file.txt
path_to_save/my_file.txt
```

Create a public key using an existing private key

More details

```
ssh-keygen -y -f ~/.ssh/id_rsa > ~/.ssh/id_rsa.pub
```

ImageMagick

Remove alpha channel

Of course the image extension can change.

```
magick convert img.jpg -background white -alpha remove -alpha off new_image.jpg
```

Resize an image

More information about

This will resize the image to 64x64. But in fact the images were only enlarged or reduced just enough so as to best fit into the given size.

```
magick convert dragon.gif -resize 64x64 resize_dragon.gif
```

This will resize the image to 64x64 ignoring the aspect ratio.

```
magick convert dragon.gif -resize 64x64\! resize_dragon.gif
```

This will resize in a percentage, keeping the aspect ratio.

```
magick convert dragon.gif -resize 50%  half_dragon.gif
```

Batch

Basically you use the operation that you want to do, but you use the command mogrify.

Remove alpha channel in a batch:

```
magick mogrify -path tmp/ -background white -alpha remove -alpha off *.jpg
```

The first command will resize all images from the current folder to 100x100 set the jpg quality to 60% and convert the `.png` images to `jpg` and then save to `tmp/`

The second will take all png files in your current directory, resize to 60% (of largest dimension and keep aspect ratio), set jpg quality to 60 and convert to jpg and then save to `tmp/`.

```
magick mogrify -path tmp/ -resize 100x100 -quality 60 -format jpg *.png

magick mogrify -path tmp/ -resize 60x60% -quality 60 -format jpg *.png
```

Linux

Command lines for linux distributions.

TMUX

[TMUX cheat sheet.]

Detach

Exit a window without quitting the terminal program.

`Ctrl` + `b` `d`

Attach/new terminal

`Ctrl` + `b` `c`

Re-attach last session

```
tmux a
```

Extract file

This one is the most searched one (for me at least).

Extract tar.gz

You also can use this one [Extract tar.xz].

Extract (and create) to a folder called `file_name`.

```
tar -xvzf file_name.tar.gz
```

Extract to a custom folder.

```
tar -xvzf file_name.tar.gz -C my_foler
```

- `f`: this must be the last flag of the command, and the tar file must be immediately after. It tells tar the name and path of the compressed file.
- `z`: tells tar to decompress the archive using gzip
- `x`: tar can collect files or extract them. `x` does the latter.

- `v`: makes tar talk a lot. Verbose output shows you all the files being extracted.
- `C`: means change to directory `DIR`. In our example, `DIR` is `my_foler`.

Extract tar.xz

This one should work for Extract tar.gz

```
tar xf archive.tar.xz
```

Extract .zip

The most simple one, but probably you need to install `unzip`. Don't worry usually it is pre-installed or in the package manager.

This will extract to a folder named `file_name`.

```
unzip file_name.zip
```

This will extract to a folder named `my_folder`.

```
unzip file_name.zip -d my_folder
```

Compress files

Commands to compress files.

Zip files and folders

Probably you need to install `unzip`. Don't worry usually it is pre-installed or in the package manager.

To compress an entire folder and its subfolders. In this case it'll compress `my_folder` to `file_name.zip`.

```
zip -r file_name.zip my_folder
```

For a single file just do that, it'll zip `my_file.txt` to `file_name.zip`. Of course it work for any extension not only `.txt`.

```
zip file_name.zip my_file.txt
```

Pandoc like a boss

Convert basically everything to PDF, merge pdf and all that good student shit.

CentOS

Commands related with CentOS.

Install steamcmd (and avoid errors)

Install as described here.

Enable a repository:

```
dnf config-manager --set-enabled PowerTools
```

[More about on why there isn't the SDL2 packages]
Install the following packages:

```
yum -y install SDL
yum -y install SDL.i686
dnf install SDL2
dnf install SDL2.i686
```

Link this fucker:

```
mkdir ~/.steam/sdk32
ln -s Steam/linux32/steamclient.so ~/.steam/sdk32/
```

Open ports

[Website with solution]

Open a specific port

```
firewall-cmd --permanent --add-port=7812358712/tcp
```

```
firewall-cmd --reload
```

List opened ports

```
firewall-cmd --list-ports
```

Windows

Windows related sttuff.

How to force a program to not run as Admin

This is a way to force a program to run without administrator privileges or UAC.

```
Windows Registry Editor Version 5.00

[HKEY_CLASSES_ROOT\*\shell\forcerunasinvoker]
@="Run without privilege elevation"

[HKEY_CLASSES_ROOT\*\shell\forcerunasinvoker\command]
@="cmd /min /C \"set __COMPAT_LAYER=RUNASINVOKER && start \"\" \"%1\"\""
```

Save this text in `name_of_file.reg` and add it to the Windows Registry. (Double-clicking on it should do the trick.)

Afterwards, right-click the app you'd like to run without administrative privileges and select "Run without privilege elevation".

Python

Python related stuff.

Generating a standalone python script (AKA exe file)

Complete answer

Short version:

```
# Install PyInstaller
pip install pyinstaller

# Create the exe file (Single file mode)
pyinstaller yourprogram.py -F
```

Auto generating the requirements.txt file

This link.

```
pip install pipreqs

pipreqs /path/to/project
```

Rotating chars of a string to the left or right

```
s = "abcd"
l_rot = 13 % len(s)
r_rot = 10 % len(s)

l = s[l_rot:] + s[:l_rot] # left rotation
r = l[-r_rot:] + l[:-r_rot] # right rotation
```

Or

```
s = "abcd"
l_rot = 13 % len(s)
r_rot = 10 % len(s)

amm = (l_rot - r_rot)
r = s[amm:] + s[:amm]
```

Inserting the same value multiple times when formatting a string

Stack overflow

```
incoming = 'arbit'
result = '{0} hello world {0} hello world {0}'.format(incoming)
```

```
incoming = 'arbit'
result = '{st} hello world {st} hello world {st}'.format(st=incoming)
```

Read file lines:

```
with open(filename) as f:
  for line in f.readlines():
    print(line)

# or

for line in open(filename):
  print(line)
```

Convert images to PDF

Use img2pdf.

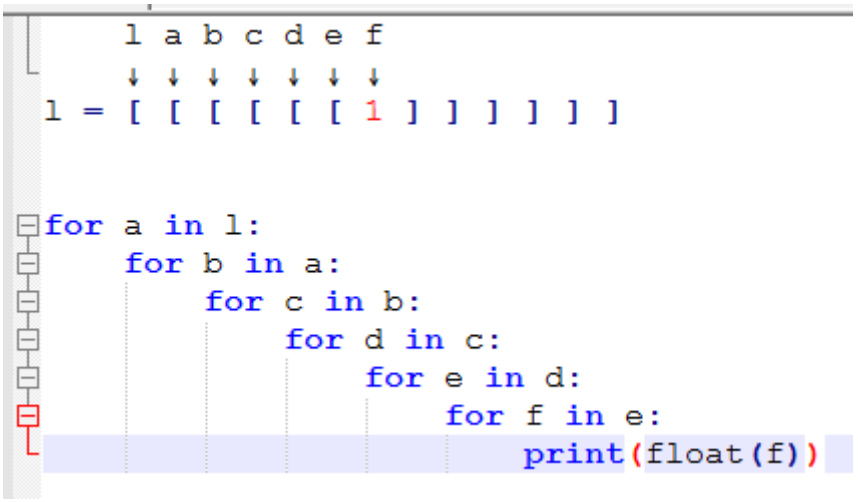
```
import img2pdf

img_list = ["a.png", "b.jpg", "x.jpg"]

with open("out.pdf", "wb") as f:
  f.write(img2pdf.convert(image_list))
```

Lists

Some list related stuff.

List comprehension

From this answer. The best explanation possible.



Extend a list

A.k.a. append the items from a list to another list.

```
x = [1, 2, 3]
x.extend([4, 5])

print (x)
```

Will result in:

```
[1, 2, 3, 4, 5]
```

Index a list using a list

You have a list of something and you want to index some elements from that list using a list.

```
lst = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h']
indexes = [0, 3, 7]
```

You can use numpy

```
import numpy as np

lst = np.array(['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h'])
indexes = [0, 3, 7]
result = lst[indexes]
```

Or list comprehension

```
lst = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h']
indexes = [0, 3, 7]

result = [lst[i] for i in indexes]
```

Choose a random list from a list of lists

Since `np.random.choice` can only choose from an 1-d array, here's the solution.

```
import numpy as np

rng = np.random.default_rng()
points = rng.random((10,2))

rng.choice(points)
```

Dictionaries

Sort a dictionary based on a value inside

```
result = {
  "item1": {"Avg":1, "Min":1, "Max":2, "n":2},
  "item2": {"Avg":1, "Min":1, "Max":2, "n":2},
  "item3": {"Avg":1, "Min":1, "Max":2, "n":2}
}

sort = sorted(result.items(), key=lambda x: x[1]["Avg"], reverse=True)
```

Check if a key is in a dict

An efficient method. As described here

```
d = {"x": 1, "y": 2}

if "x" in d:
  return d["x"]
```

Tabulate

Pretty useful to make tables in python print statements.

Example:

```
import numpy as np
from tabulate import tabulate

a = np.random.uniform(0, 10, 1000)
b = np.random.normal(10, 5, 1000)

print(tabulate([["A", a.min(), a.max(), a.mean(), a.std()],
                ["B", b.min(), b.max(), b.mean(), b.std()]],
                headers=["-", "MIN", "MAX", "MEAN", "STD_DEV"]))
```

System related commands

Commands that are related to the operating system, such as, list directories, files, create dir, remove, etc.

List all immediate subdirectories

Link to the solution

```
import os

subdirs = [f.path for f in os.scandir(parent_folder_path) if f.is_dir()]
```

List all subdirectories recursively

Link to the solution

```
import os

subdirs = [f[0] for f in os.walk(directory)]
```

List all files only

```
import os

subdirs = [f.path for f in os.scandir(folder) if not f.is_dir()]
```

Move files

Link to the solution

```
import shutil
import os

source_file = '/path/to/source_folder/file.txt'
target_dir = '/path/to/dest_folder'

for file_name in file_names:
  shutil.move(source_file, target_dir)
```

Check if a directory exists

```
import os

os.path.exists(direcotry_path)
```

Create new directory

```
import os

os.makedirs(newdir)
```

Pandas

Commands for pandas dataframe

Filter values

Filtering a dataframe. Here is a more complete guide, a.k.a. I stole some good shit from there.

About the function contains

```
import pandas as pd

def some_bool_expression(x):
  return x < 10
```

```
# using a function
df = df[some_bool_expression(df["foo"])]

# using a lambda expression
df = df[lambda x: df["foo"] < 10]

# just an expression
df = df[df["foo"] < 10]
df = df[df.foo < 10]

# Filtering out null values
df = df[df.foo.notnull()]

# filtering using list
df = df[df.foo.isin(["a", "b"])]

# if not in the list
df = df[~df.foo.isin(["a", "b"])]

# using expressions
df = df[df.foo.str.contains("regex")]
```

Select by [row, col] index

For more information Here

```
dataFrame.loc[<ROWS RANGE> , <COLUMNS RANGE>]

# Select a single column by Index position
dfObj.iloc[ : , 2 ]

# Select multiple columns by Index range
dfObj.iloc[: , [0, 2]]

# Selecting a Single Column by Column Names
columnsData = dfObj.loc[ : , 'Age' ]

# Select only 2 columns from dataFrame and create a new subset DataFrame
columnsData = dfObj.loc[ : , ['Age', 'Name'] ]

# select single row
rowData = dfObj.loc[ 'b' , : ]
```

```
# Select multiple rows by Index labels
rowData = dfObj.loc[ ['c' , 'b'] , : ]
```

Print interesting data

Use describe() function.

```
import pandas as pd

print(a.describe()[["foo", "bar"]].transpose()[["mean", "min", "max"]])
```

Append a dataframe to another dataframe

```
import pandas as pd
a = pd.read_csv("some_file.csv")
b = pd.DataFrame(data=some_data)

# append returns a new dataframe
a = a.append(b)
```

Format float

Below we have some samples of rounding a float number.

```
a = 13.949999999999999

print("Value of a: {0:.4f}".format(a))

print("Value of a: %.2f" % a)

print("Value of a: %.4f" % round(a, 4))
```

JSON file operations

Save to JSON file

Saving data to json file.

```
import json

with open('data.json', 'w') as fp:
  json.dump(data, fp)
```

Load from JSON file

Load and read data from JSON file

```
import json
```

```
with open('data.json', 'r') as fp:
    data = json.load(fp)
```

Append data to JSON

It'll depend on the data that you have inside the file, let's say that it is a list of dictionaries.

```
# The data will look like this

data = [{
    "date": "2020-01-01",
    "message": "a message"
  }, {
    "date": "2019-12-31",
    "message": "hello"
  }]
```

```
import json

with open('data.json', 'r+') as fp:
    data = json.load(fp)
    data.append({"date": "2018-11-15", "message": "append message"})
    json.dump(data, fp)
```

Matplotlib

Setting custom labels on the axis (xticks or yticks)

Using subplots

```
import matplotlib.pyplot as plt
import numpy as np

fig, ax = plt.subplots(1)

labels = ["a", "b", "c", "d", "e", "f", "g", "h", "i", "j"]

x = np.linspace(0, 10, num=10)
y = np.linspace(0,10, num=10)

ax.plot(x, y)

ax.set_xlim(min(x), max(x))
ax.set_ylim(min(y), max(y))

ax.set_xticks(range(len(labels)))
ax.set_yticks(range(len(labels)))
```

```
ax.set_xticklabels(labels)
ax.set_yticklabels(labels)

fig.show()
```

Without subplots

```
import matplotlib.pyplot as plt
import numpy as np

labels = ["a", "b", "c", "d", "e", "f", "g", "h", "i", "j"]

x = np.linspace(0, 10, num=10)
y = np.linspace(0,10, num=10)

plt.plot(x, y)

plt.xlim(min(x), max(x))
plt.ylim(min(y), max(y))

plt.xticks(range(len(labels)), labels=labels)
plt.yticks(range(len(labels)), labels=labels)

plt.show()
```

Setting numbers on the axis (xticks or yticks)

How to set specific numbers on the X/Y axis, e.g.: 0.5 in 0.5 increments.
More info

```
import matplotlib.pyplot as plt
import numpy as np
import math

def g(x):
  return math.sin(x)

fx = np.vectorize(g)

x = np.linspace(-5,5, 1000)
y = fx(x)

# evenly spaced by 1
plt.xticks(np.arange(x.min(), x.max() + 1, 1))
```

```
# spaced by 0.5
plt.yticks(np.arange(y.min(), y.max()+1, 0.5))

plt.plot(x, y)
plt.grid(axis='y', linestyle='-')
plt.show()
```

Linewidth

Set the linewidth

```
import matplotlib.pyplot as plt
import numpy as np
import math

def f(x):
  return 1/(1+math.e**(-x))

fx = np.vectorize(f)
x = np.linspace(-5,5, 1000)
y = fx(x)

plt.plot(x, y, linewidth=4)
plt.show()
```

Remove top and right axis

To just leave the x and y axis.
Solution A
Documentation
Solution B

```
ax = plt.subplot(111)
ax.plot(x, y)

# Hide the right and top spines
ax.spines['right'].set_visible(False)
ax.spines['top'].set_visible(False)
```

```
# Solution B
plt.gca().spines['right'].set_visible(False)
plt.gca().spines['top'].set_visible(False)
```

Change font size

Quick answer in the code, longer version

```
import matplotlib.pyplot as plt

SMALL_SIZE = 8
MEDIUM_SIZE = 10
BIGGER_SIZE = 12

plt.rc('font', size=SMALL_SIZE)          # controls default text sizes
plt.rc('axes', titlesize=SMALL_SIZE)     # fontsize of the axes title
plt.rc('axes', labelsize=MEDIUM_SIZE)    # fontsize of the x and y labels
plt.rc('xtick', labelsize=SMALL_SIZE)    # fontsize of the tick labels
plt.rc('ytick', labelsize=SMALL_SIZE)    # fontsize of the tick labels
plt.rc('legend', fontsize=SMALL_SIZE)    # legend fontsize
plt.rc('figure', titlesize=BIGGER_SIZE)  # fontsize of the figure title
```

Legends

Quick answer below, docs

```
import matplotlib.pyplot as plt

plt.plot(x, y, label="inline label")

labels = ["a", "b", "c"] # must be the same size of the bars
bar_plt = plt.bar(x, y)
plt.legends(bar_plt, labels)
```

Colors

This one have a whole subset.

Color for each bar in a bar/histogram plot

You can set for each individually.

```
import matplotlib.pyplot as plt

bar_plt = plt.bar(x, y)

bar_plt[0].set_color("r") # of course you can arrange a loop
```

You can use a color map, list of color maps.

Stack overflow answer

If you are using a dictionary that have a counter.

```
import matplotlib.pyplot as plt
import matplotlib.cm as cm
from matplotlib.colors import Normalize

d = {"a":10, "b":5, "c":19}

lst = [i for i in range(len(d))] # this will map the keys to a number

# option 1, if you choose a color map that has gradients
jet_map = cm.get_cmap('jet')
norm = Normalize(vmin=0, vmax=len(lst))
bar_plt = plt.bar(d.keys(), d.values(), color=jet_map(norm(lst)))

# option 2, if you choose a color map that is a qualitative
q_map = cm.get_cmap('tab10')
bar_plt = plt.bar(d.keys(), d.values(), color=q_map(lst))
```

Remove X or Y ticks

Quick answer below, longer version

If you are using the subplots, and also, here is the doc.

```
from matplotlib import pyplot as plt

plt.plot(range(10))
plt.tick_params(
    axis='x',          # changes apply to the x-axis
    which='both',      # both major and minor ticks are affected
    bottom=False,      # ticks along the bottom edge are off
    top=False,         # ticks along the top edge are off
    labelbottom=False) # labels along the bottom edge are off
```

Create a custom histogram

Sometimes you just want a histogram that have custom bins, for example the NPS score board.

```
import matplotlib.pyplot as plt
import collections as col

df = pd.read_csv("./NPS.csv") # just to illustrate

hist = col.Counter()

# here go your "bin" width or logic for each value
for score in df["Scores"]:
```

```
  if sc <= 6:
    hist["Detractors"] += 1
  elif sc <= 8:
    hist["Neutral"] += 1
  elif sc <= 10:
    hist["Promoters"] += 1

# give a nice color if you want (there is a topic about colors around here)
bar_plt = plt.bar(hist.keys(), hist.values(), color=["g", "r", "y"])
plt.show()
```

Date and time

Get a list of months

```
import datetime

months = [(i, datetime.date(2008, i, 1).strftime("%B")) for i in range(1,13)]
```

Random date

Generate a random date.

```
import time

def random_date(start="1990-01-01", end=None):
  """
  Returns a random date between [start, end] in the format of %Y-%m-%d.
  start and end needs to be in the same format.
  If end is None then it'll use the current date.
  """
  start = [int(x) for x in start.split("-")]
  start = time.mktime((start[0], start[1], start[2], 0, 0, 0, 0, 0, 0))

  if end != None:
    end = [int(x) for x in end.split("-")]
    end = int(time.mktime((end[0], end[1], end[2], 0, 0, 0, 0, 0, 0)))
  else:
    end = int(time.time())

  d = random.randint(start, end)
  return datetime.date.fromtimestamp(d).strftime("%Y-%m-%d")
```

Psycopg2 and postgresql python module

Things about postgres (pg) and Psycopg2.

Using the same variable multiple times in a SQL query

From the docs

```
cur.execute(
    """INSERT INTO some_table (an_int, a_date, another_date, a_string)
        VALUES (%(int)s, %(date)s, %(date)s, %(str)s);""",
    {'int': 10, 'str': "O'Reilly", 'date': datetime.date(2005, 11, 18)})
```

So, for the same variable

```
cur.execute(
    """INSERT INTO some_table (an_int, a_date, another_date, a_string)
        VALUES (%(name)s, %(name)s, %(name)s, %(name)s);""",
    {'name': "batata"})
```

Remove the quotes from a string for SQL query

Stack overflow and merge with the solution at Inserting the same value multiple times when formatting a string

```
from psycopg2 import sql
...

cur.execute(sql.SQL('INSERT INTO {}
VALUES(...)').format(sql.Identifier(database_name)))
```

Insert if value doesn't exists

Use ON CONFLICT clause.

```
INSERT INTO table (foo, bar)
VALUES ('value for foo', 'value for bar')
ON CONFLICT (foo) do nothing
```

C++

You know that this list will be gigantic when it just started as a "compilation of linux commands".

Iterators

I'll just add this topic as a big one because there is a lot to remember here.

Get the iterator index

Accordingly to this, you have two options, consider `it` an iterator of `vec`.

```
int index = it - vec.begin();
```

```
int index = std::distance(vec.begin(), it);
```

Check if a value is inside a container

For `std::vector`:

```
auto found = std::find(vec.begin(), vec.end(), value);

if (found != vec.end())
  return true; // found (duh)
else
  return false; // not found (duh)
```

To check if a key is inside a `std::map`, you have 2 options:

```
if (my_map.count(key) > 0)
  return true;
```

Or maybe you want to save the iterator for later.

```
auto found = my_map.find(key);

if (found == my_map.end())
  return false; // not found

return true; // found, or do something else with found
```

Nice way to write a for loop

Shortest and cool (I think) way to write a reverse `for loop`:

```
// consider something.size() the size of the array/vector/list/etc
for (auto i = something.size(); i-->0;)
  // do something
```

Spreadsheets

Commands related to spreadsheets (google, excel or calc). Probably one can be used in another, e.g.: an Excel command can be used in google sheets.

Google sheets

About google sheets

How to merge two tables and sum its content

Quite useful if you have a scoreboard of somekind. Link.

Excel

About Excel.

Format numbers using [K, M, G]

To format numbers using the kilo [K], mega [M], giga [G], etc.

Format -> Custom format

```
[>=1000000]#,##0,,"M";[>=1000]#,##0,"K";0
```

To append more units just use the same principle and append the formats with the semicolon. The first condition that evaluates to TRUE will win and the format will be applied. For example:

```
[>=1000000]#,##0,,"M";
```