**Chapter 1**

**To Use the Python 2.7 virtual environment:**

py27\_env\Scripts\activate

C:\Users\N5QC\Documents\Repositories\Python\Lessons\_and\_Logs\Neural\_Networks>

py27\_env\Scripts\activate

Deactivate

C:\Users\N5QC\Documents\Repositories\Python\Lessons\_and\_Logs\Neural\_Networks>

py27\_env\Scripts\deactivate

**Troubleshooting Option 2**

A screenshot of a computer program

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

py27\_env\Scripts\activate

A screenshot of a computer

AI-generated content may be incorrect.

**To Use the Python 2.7 virtual environment:**

py27\_env\Scripts\activate

deactivate

Python 2.7 reached its **end of life** on **January 1, 2020**, so I strongly recommend using Python 3 for security and compatibility reasons. However, if you absolutely need Python 2.7 with NumPy on Windows 10, follow these steps:

**1. Download & Install Python 2.7**

1. Download the Python 2.7 installer from the official [Python archives](https://www.python.org/downloads/release/python-2718/).
2. Run the installer (python-2.7.18.msi) and follow the installation steps.
3. **Ensure you check the box** to **add Python to PATH** during installation.

**2. Verify Installation**

Open **Command Prompt (cmd)** and type:

python --version

It should display:

Python 2.7.18

**3. Install Pip for Python 2.7**

Python 2.7 does not come with pip by default. Install it manually:

1. Download get-pip.py using:
2. curl https://bootstrap.pypa.io/pip/2.7/get-pip.py -o get-pip.py
3. Install pip:
4. python get-pip.py

**4. Install NumPy for Python 2.7**

Use the following command:

pip install numpy==1.16.6

Python 2.7 only supports NumPy **up to version 1.16.6**, so newer versions won’t work.

**5. Verify NumPy Installation**

Run:

python -c "import numpy; print(numpy.\_\_version\_\_)"

If successful, it should print:

1.16.6

**Troubleshooting**

* If pip fails to install NumPy, try installing a precompiled wheel:
  1. Download numpy-1.16.6 from [here](https://www.lfd.uci.edu/~gohlke/pythonlibs/#numpy).
  2. Install it manually:
  3. pip install path\to\numpy‑1.16.6+mkl‑cp27‑cp27m‑win\_amd64.whl
* If there are issues with dependencies, consider using **Anaconda** with Python 2.7 (it includes prebuilt NumPy).

Would you like help setting up a virtual environment for Python 2.7?

Great choice! Using a virtual environment will keep Python 2.7 isolated from your system-wide Python 3 installation. Follow these steps:

**1. Install virtualenv (if not installed)**

Since Python 2.7 is outdated, it may not come with virtualenv. First, check if it’s installed:

C:\Python27\python -m pip show virtualenv

If it's not installed, install it using Python 2.7:

C:\Python27\python -m pip install virtualenv

**2. Create a Virtual Environment with Python 2.7**

Now, create a virtual environment named py27\_env:

virtualenv --python=C:\Python27\python.exe py27\_env

This will create a folder py27\_env containing an isolated Python 2.7 environment.

**3. Activate the Virtual Environment**

Before running Python 2.7, you need to activate the virtual environment:

* **For Command Prompt (cmd):**
* py27\_env\Scripts\activate
* **For PowerShell:**
* .\py27\_env\Scripts\Activate.ps1

(If PowerShell blocks it, you may need to run Set-ExecutionPolicy Unrestricted -Scope Process first.)

Once activated, your prompt should change to something like:

(py27\_env) C:\Users\YourName>

This means the virtual environment is active.

**4. Install NumPy Inside the Virtual Environment**

Now that you’re inside the virtual environment, install NumPy for Python 2.7:

pip install numpy==1.16.6

Verify the installation:

python -c "import numpy; print(numpy.\_\_version\_\_)"

It should output:

1.16.6

**5. Using the Virtual Environment**

* When the virtual environment is active, **all python and pip commands will use Python 2.7.**
* To exit the virtual environment, type:
* deactivate
* To reactivate it later, navigate to the py27\_env folder and run:
* py27\_env\Scripts\activate

**You're All Set! 🚀**

Now, you can use Python 2.7 safely without affecting your system-wide Python 3. Let me know if you run into any issues!

It looks like your Python 3.12 installation’s virtualenv is causing issues due to syntax incompatibility with Python 2.7. The error suggests that the virtualenv package installed in your Python 3 environment is being used, and it contains syntax (\*os.environ.get(...)) that isn't valid in Python 2.7.

**Possible Fixes**

**Option 1: Use an Older Version of virtualenv**

Since newer versions of virtualenv may not be compatible with Python 2.7, install an older version inside Python 2.7 first.

1. **Uninstall the current virtualenv (if installed in Python 2.7):**
2. C:\Python27\python -m pip uninstall virtualenv
3. **Install an older compatible version (such as 16.7.12):**
4. C:\Python27\python -m pip install virtualenv==16.7.12
5. **Try creating the virtual environment again:**
6. C:\Python27\python -m virtualenv py27\_env

**Option 2: Run virtualenv Using Python 2.7 Explicitly**

Instead of relying on the system-wide virtualenv, try running it explicitly with Python 2.7:

C:\Python27\python -m virtualenv --python=C:\Python27\python.exe py27\_env

If that still fails, try this simpler version:

C:\Python27\python -m virtualenv py27\_env

**Option 3: Check and Downgrade virtualenv in Python 3**

If virtualenv from Python 3 is interfering, try:

1. **Check the current version of virtualenv:**
2. python -m virtualenv --version

If it's a newer version (like 20.x), downgrade it for compatibility.

1. **Uninstall the current version in Python 3:**
2. pip uninstall virtualenv
3. **Install a compatible older version:**
4. pip install virtualenv==16.7.12
5. **Try again using Python 2.7:**
6. C:\Python27\python -m virtualenv py27\_env

**Let Me Know If This Works**

If these steps don’t solve the issue, let me know what error you get after trying them. We can try another approach! 🚀

**Command Line Log**

Microsoft Windows [Version 10.0.19045.5371]

(c) Microsoft Corporation. All rights reserved.

C:\Users\N5QC>cd Documents

C:\Users\N5QC\Documents>cd Repositories

C:\Users\N5QC\Documents\Repositories>dir

Volume in drive C is WINDOWS

Volume Serial Number is C21B-31FB

Directory of C:\Users\N5QC\Documents\Repositories

10/26/2024 01:49 PM <DIR> .

10/26/2024 01:49 PM <DIR> ..

04/11/2024 10:24 PM <DIR> 2024\_04\_13\_Archive\_of\_Python

08/05/2024 08:20 PM <DIR> 2024\_08\_05\_Archive\_of\_Python

10/24/2024 11:12 AM <DIR> 2024\_10\_26\_Archive\_of\_Arduino

11/13/2024 01:16 PM <DIR> Arduino

10/23/2024 08:12 PM <DIR> Backlog

04/22/2024 12:01 PM <DIR> DigiPi

10/23/2024 08:17 PM <DIR> Git\_Education

04/11/2024 09:17 PM <DIR> Ham\_Pi

04/23/2024 11:26 AM <DIR> N5QC\_EmComm\_Tools

04/22/2024 12:08 PM <DIR> Pico\_Balloons

08/05/2024 09:06 PM <DIR> Python

04/22/2024 12:06 PM <DIR> SDR

07/18/2024 11:00 AM <DIR> Snapshot\_of\_Beginners\_Guide\_To\_Python

04/23/2024 11:01 AM <DIR> Standard\_Work

0 File(s) 0 bytes

16 Dir(s) 15,332,892,672 bytes free

C:\Users\N5QC\Documents\Repositories>git clone https://github.com/mnielsen/neural-networks-and-deep-learning.git

Cloning into 'neural-networks-and-deep-learning'...

remote: Enumerating objects: 1172, done.

remote: Counting objects: 100% (6/6), done.

remote: Compressing objects: 100% (6/6), done.

remote: Total 1172 (delta 4), reused 0 (delta 0), pack-reused 1166 (from 3)

Receiving objects: 100% (1172/1172), 20.43 MiB | 18.54 MiB/s, done.

Resolving deltas: 100% (581/581), done.

C:\Users\N5QC\Documents\Repositories>dir

Volume in drive C is WINDOWS

Volume Serial Number is C21B-31FB

Directory of C:\Users\N5QC\Documents\Repositories

02/02/2025 05:28 PM <DIR> .

02/02/2025 05:28 PM <DIR> ..

04/11/2024 10:24 PM <DIR> 2024\_04\_13\_Archive\_of\_Python

08/05/2024 08:20 PM <DIR> 2024\_08\_05\_Archive\_of\_Python

10/24/2024 11:12 AM <DIR> 2024\_10\_26\_Archive\_of\_Arduino

11/13/2024 01:16 PM <DIR> Arduino

10/23/2024 08:12 PM <DIR> Backlog

04/22/2024 12:01 PM <DIR> DigiPi

10/23/2024 08:17 PM <DIR> Git\_Education

04/11/2024 09:17 PM <DIR> Ham\_Pi

04/23/2024 11:26 AM <DIR> N5QC\_EmComm\_Tools

02/02/2025 05:28 PM <DIR> neural-networks-and-deep-learning

04/22/2024 12:08 PM <DIR> Pico\_Balloons

08/05/2024 09:06 PM <DIR> Python

04/22/2024 12:06 PM <DIR> SDR

07/18/2024 11:00 AM <DIR> Snapshot\_of\_Beginners\_Guide\_To\_Python

04/23/2024 11:01 AM <DIR> Standard\_Work

0 File(s) 0 bytes

17 Dir(s) 16,261,709,824 bytes free

C:\Users\N5QC\Documents\Repositories>cd Standard\_Work

C:\Users\N5QC\Documents\Repositories\Standard\_Work>dir

Volume in drive C is WINDOWS

Volume Serial Number is C21B-31FB

Directory of C:\Users\N5QC\Documents\Repositories\Standard\_Work

04/23/2024 11:01 AM <DIR> .

04/23/2024 11:01 AM <DIR> ..

04/23/2024 11:01 AM <DIR> Monthly

04/23/2024 11:01 AM <DIR> Quarterly

04/23/2024 11:01 AM 235 README.md

04/23/2024 11:01 AM <DIR> Status\_Notes

10/23/2024 06:10 PM <DIR> Weekly

1 File(s) 235 bytes

6 Dir(s) 16,224,739,328 bytes free

C:\Users\N5QC\Documents\Repositories\Standard\_Work>cd Status\_Notes

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>dir

Volume in drive C is WINDOWS

Volume Serial Number is C21B-31FB

Directory of C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes

04/23/2024 11:01 AM <DIR> .

04/23/2024 11:01 AM <DIR> ..

04/23/2024 11:28 AM 1,746 N5QCs\_Pi.txt

10/24/2024 11:20 AM 1,962 N5QC\_on\_HP.txt

04/23/2024 11:29 AM 1,543 Secure.txt

04/23/2024 11:01 AM 8,870 Status\_Note.txt

4 File(s) 14,121 bytes

2 Dir(s) 16,222,199,808 bytes free

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>sh

'sh' is not recognized as an internal or external command,

operable program or batch file.

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>python --version

Python 3.12.4

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>C:\Python27\python --version

Python 2.7.18

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>pip install virtualenv

Collecting virtualenv

Downloading virtualenv-20.29.1-py3-none-any.whl.metadata (4.5 kB)

Collecting distlib<1,>=0.3.7 (from virtualenv)

Downloading distlib-0.3.9-py2.py3-none-any.whl.metadata (5.2 kB)

Collecting filelock<4,>=3.12.2 (from virtualenv)

Downloading filelock-3.17.0-py3-none-any.whl.metadata (2.9 kB)

Collecting platformdirs<5,>=3.9.1 (from virtualenv)

Downloading platformdirs-4.3.6-py3-none-any.whl.metadata (11 kB)

Downloading virtualenv-20.29.1-py3-none-any.whl (4.3 MB)

---------------------------------------- 4.3/4.3 MB 9.1 MB/s eta 0:00:00

Downloading distlib-0.3.9-py2.py3-none-any.whl (468 kB)

---------------------------------------- 469.0/469.0 kB 30.6 MB/s eta 0:00:00

Downloading filelock-3.17.0-py3-none-any.whl (16 kB)

Downloading platformdirs-4.3.6-py3-none-any.whl (18 kB)

Installing collected packages: distlib, platformdirs, filelock, virtualenv

Successfully installed distlib-0.3.9 filelock-3.17.0 platformdirs-4.3.6 virtualenv-20.29.1

[notice] A new release of pip is available: 24.0 -> 25.0

[notice] To update, run: python.exe -m pip install --upgrade pip

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>python.exe -m pip install --upgrade pip

Requirement already satisfied: pip in c:\users\n5qc\appdata\local\programs\python\python312\lib\site-packages (24.0)

Collecting pip

Downloading pip-25.0-py3-none-any.whl.metadata (3.7 kB)

Downloading pip-25.0-py3-none-any.whl (1.8 MB)

---------------------------------------- 1.8/1.8 MB 5.1 MB/s eta 0:00:00

Installing collected packages: pip

Attempting uninstall: pip

Found existing installation: pip 24.0

Uninstalling pip-24.0:

Successfully uninstalled pip-24.0

Successfully installed pip-25.0

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>virtualenv --python=C:\Python27\python.exe py27\_env

RuntimeError: failed to query C:\Python27\python.exe with code 1 err: ' File "C:\\Users\\N5QC\\AppData\\Local\\Programs\\Python\\Python312\\Lib\\site-packages\\virtualenv\\discovery\\py\_info.py", line 25\n return list(OrderedDict.fromkeys(["", \*os.environ.get("PATHEXT", "").lower().split(os.pathsep)]))\n ^\nSyntaxError: invalid syntax\n'

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>pip install virtualenv

Requirement already satisfied: virtualenv in c:\users\n5qc\appdata\local\programs\python\python312\lib\site-packages (20.29.1)

Requirement already satisfied: distlib<1,>=0.3.7 in c:\users\n5qc\appdata\local\programs\python\python312\lib\site-packages (from virtualenv) (0.3.9)

Requirement already satisfied: filelock<4,>=3.12.2 in c:\users\n5qc\appdata\local\programs\python\python312\lib\site-packages (from virtualenv) (3.17.0)

Requirement already satisfied: platformdirs<5,>=3.9.1 in c:\users\n5qc\appdata\local\programs\python\python312\lib\site-packages (from virtualenv) (4.3.6)

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>virtualenv --python=C:\Python27\python.exe py27\_env

RuntimeError: failed to query C:\Python27\python.exe with code 1 err: ' File "C:\\Users\\N5QC\\AppData\\Local\\Programs\\Python\\Python312\\Lib\\site-packages\\virtualenv\\discovery\\py\_info.py", line 25\n return list(OrderedDict.fromkeys(["", \*os.environ.get("PATHEXT", "").lower().split(os.pathsep)]))\n ^\nSyntaxError: invalid syntax\n'

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>C:\Python27\python -m pip show virtualenv

DEPRECATION: Python 2.7 will reach the end of its life on January 1st, 2020. Please upgrade your Python as Python 2.7 won't be maintained after that date. A future version of pip will drop support for Python 2.7. More details about Python 2 support in pip, can be found at https://pip.pypa.io/en/latest/development/release-process/#python-2-support

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>C:\Python27\python -m pip install virtualenv

DEPRECATION: Python 2.7 will reach the end of its life on January 1st, 2020. Please upgrade your Python as Python 2.7 won't be maintained after that date. A future version of pip will drop support for Python 2.7. More details about Python 2 support in pip, can be found at https://pip.pypa.io/en/latest/development/release-process/#python-2-support

Collecting virtualenv

Downloading https://files.pythonhosted.org/packages/6f/43/df7c7b1b7a5ac4e41fac24c3682c1cc32f2c1d683d308bba2500338d1e3e/virtualenv-20.15.1-py2.py3-none-any.whl (10.1MB)

|UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU| 10.1MB 4.7MB/s

Collecting importlib-metadata>=0.12; python\_version < "3.8" (from virtualenv)

Downloading https://files.pythonhosted.org/packages/cf/b4/877779cd7b5a15536ecbe0655cfb35a0de0ede6d888151fd7356d278c47d/importlib\_metadata-2.1.3-py2.py3-none-any.whl

Collecting distlib<1,>=0.3.1 (from virtualenv)

Downloading https://files.pythonhosted.org/packages/91/a1/cf2472db20f7ce4a6be1253a81cfdf85ad9c7885ffbed7047fb72c24cf87/distlib-0.3.9-py2.py3-none-any.whl (468kB)

|UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU| 471kB 6.4MB/s

Collecting filelock<4,>=3.2 (from virtualenv)

Downloading https://files.pythonhosted.org/packages/f1/12/585c4d8bef61cd7f9497a021d935ba9fb3127f5e45593c2fcc313897f582/filelock-3.2.1-py2.py3-none-any.whl

Collecting platformdirs<3,>=2 (from virtualenv)

Downloading https://files.pythonhosted.org/packages/12/57/f4e6d433fba8bde239baa65f626a31fc6d0556a2065fcc81aaa0f4f1507b/platformdirs-2.0.2-py2.py3-none-any.whl

Collecting importlib-resources>=1.0; python\_version < "3.7" (from virtualenv)

Downloading https://files.pythonhosted.org/packages/8d/94/2f6ceee0c4e63bff0177c07e68d27c937a19f6bc77c4739755b49f5adb04/importlib\_resources-3.3.1-py2.py3-none-any.whl

Collecting six<2,>=1.9.0 (from virtualenv)

Downloading https://files.pythonhosted.org/packages/b7/ce/149a00dd41f10bc29e5921b496af8b574d8413afcd5e30dfa0ed46c2cc5e/six-1.17.0-py2.py3-none-any.whl

Collecting configparser>=3.5; python\_version < "3" (from importlib-metadata>=0.12; python\_version < "3.8"->virtualenv)

Downloading https://files.pythonhosted.org/packages/7a/2a/95ed0501cf5d8709490b1d3a3f9b5cf340da6c433f896bbe9ce08dbe6785/configparser-4.0.2-py2.py3-none-any.whl

Collecting contextlib2; python\_version < "3" (from importlib-metadata>=0.12; python\_version < "3.8"->virtualenv)

Downloading https://files.pythonhosted.org/packages/85/60/370352f7ef6aa96c52fb001831622f50f923c1d575427d021b8ab3311236/contextlib2-0.6.0.post1-py2.py3-none-any.whl

Collecting pathlib2; python\_version < "3" (from importlib-metadata>=0.12; python\_version < "3.8"->virtualenv)

Downloading https://files.pythonhosted.org/packages/09/eb/4af4bcd5b8731366b676192675221c5324394a580dfae469d498313b5c4a/pathlib2-2.3.7.post1-py2.py3-none-any.whl

Collecting zipp>=0.5 (from importlib-metadata>=0.12; python\_version < "3.8"->virtualenv)

Downloading https://files.pythonhosted.org/packages/96/0a/67556e9b7782df7118c1f49bdc494da5e5e429c93aa77965f33e81287c8c/zipp-1.2.0-py2.py3-none-any.whl

Collecting typing; python\_version < "3.5" (from importlib-resources>=1.0; python\_version < "3.7"->virtualenv)

Downloading https://files.pythonhosted.org/packages/0b/cb/da856e81731833b94da70a08712f658416266a5fb2a9d9e426c8061becef/typing-3.10.0.0-py2-none-any.whl

Collecting singledispatch; python\_version < "3.4" (from importlib-resources>=1.0; python\_version < "3.7"->virtualenv)

Downloading https://files.pythonhosted.org/packages/3f/09/2a17c6505a8373229cb3de6161e3af74ff90afcf4516719aa6cf32fad151/singledispatch-3.7.0-py2.py3-none-any.whl

Collecting scandir; python\_version < "3.5" (from pathlib2; python\_version < "3"->importlib-metadata>=0.12; python\_version < "3.8"->virtualenv)

Downloading https://files.pythonhosted.org/packages/f9/d0/6b7b38eaf9964510f5c32aa5aaf9f419864d2e0ebe34274e6cba5689a0c5/scandir-1.10.0-cp27-cp27m-win\_amd64.whl

Installing collected packages: configparser, contextlib2, typing, scandir, six, pathlib2, zipp, importlib-metadata, distlib, filelock, platformdirs, singledispatch, importlib-resources, virtualenv

WARNING: The script virtualenv.exe is installed in 'C:\Python27\Scripts' which is not on PATH.

Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.

Successfully installed configparser-4.0.2 contextlib2-0.6.0.post1 distlib-0.3.9 filelock-3.2.1 importlib-metadata-2.1.3 importlib-resources-3.3.1 pathlib2-2.3.7.post1 platformdirs-2.0.2 scandir-1.10.0 singledispatch-3.7.0 six-1.17.0 typing-3.10.0.0 virtualenv-20.15.1 zipp-1.2.0

WARNING: You are using pip version 19.2.3, however version 20.3.4 is available.

You should consider upgrading via the 'python -m pip install --upgrade pip' command.

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>virtualenv --python=C:\Python27\python.exe py27\_env

RuntimeError: failed to query C:\Python27\python.exe with code 1 err: ' File "C:\\Users\\N5QC\\AppData\\Local\\Programs\\Python\\Python312\\Lib\\site-packages\\virtualenv\\discovery\\py\_info.py", line 25\n return list(OrderedDict.fromkeys(["", \*os.environ.get("PATHEXT", "").lower().split(os.pathsep)]))\n ^\nSyntaxError: invalid syntax\n'

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>C:\Python27\python -m virtualenv --python=C:\Python27\python.exe py27\_env

created virtual environment CPython2.7.18.final.0-64 in 10261ms

creator CPython2Windows(dest=C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes\py27\_env, clear=False, no\_vcs\_ignore=False, global=False)

seeder FromAppData(download=False, pip=bundle, wheel=bundle, setuptools=bundle, via=copy, app\_data\_dir=C:\Users\N5QC\AppData\Local\pypa\virtualenv)

added seed packages: pip==20.3.4, setuptools==44.1.1, wheel==0.37.1

activators NushellActivator,PythonActivator,FishActivator,BatchActivator,PowerShellActivator,BashActivator

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>py27\_env\Scripts\activate

(py27\_env) C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>pip install numpy==1.16.6

DEPRECATION: Python 2.7 reached the end of its life on January 1st, 2020. Please upgrade your Python as Python 2.7 is no longer maintained. pip 21.0 will drop support for Python 2.7 in January 2021. More details about Python 2 support in pip can be found at https://pip.pypa.io/en/latest/development/release-process/#python-2-support pip 21.0 will remove support for this functionality.

Collecting numpy==1.16.6

Downloading numpy-1.16.6-cp27-cp27m-win\_amd64.whl (11.9 MB)

|UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU| 11.9 MB 4.7 MB/s

Installing collected packages: numpy

Successfully installed numpy-1.16.6

(py27\_env) C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>python -c "import numpy; print(numpy.\_\_version\_\_)"

1.16.6

(py27\_env) C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>deactivate

C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>py27\_env\Scripts\activate

(py27\_env) C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>python -c "import numpy; print(numpy.\_\_version\_\_)"

1.16.6

(py27\_env) C:\Users\N5QC\Documents\Repositories\Standard\_Work\Status\_Notes>

class Network(object):

def \_\_init\_\_(self, sizes):

self.num\_layers = len(sizes)

self.sizes = sizes

self.biases = [np.random.randn(y, 1) for y in sizes[1:]]

self.weights = [np.random.randn(y, x)

for x, y in zip(sizes[:-1], sizes[1:])]

This Python class defines a simple **neural network** structure. Here's a breakdown of what each part does:

**Class Definition**

class Network(object):

* Defines a class named Network, which models a neural network.
* The (object) is optional in Python 3+ but explicitly shows it inherits from object.

**Constructor (\_\_init\_\_ method)**

def \_\_init\_\_(self, sizes):

* This method initializes an instance of Network.
* The parameter sizes is expected to be a list of integers, where each integer represents the number of neurons in each layer of the network.

Example:

net = Network([3, 5, 2])

Here, sizes = [3, 5, 2], meaning:

* **Input layer** has 3 neurons
* **Hidden layer** has 5 neurons
* **Output layer** has 2 neurons

**Number of Layers**

self.num\_layers = len(sizes)

* Stores the total number of layers in the network, including input, hidden, and output layers.

**Biases Initialization**

self.biases = [np.random.randn(y, 1) for y in sizes[1:]]

* The network assigns **random biases** to each neuron **except in the input layer**.
* np.random.randn(y, 1) generates a column vector of y random values drawn from a normal distribution.
* sizes[1:] ensures biases are only created for hidden and output layers.

Example for sizes = [3, 5, 2]:

* biases will have:
  + A (5,1) matrix for the hidden layer
  + A (2,1) matrix for the output layer

**Weights Initialization**

self.weights = [np.random.randn(y, x) for x, y in zip(sizes[:-1], sizes[1:])]

* Initializes **random weights** for connections between layers.
* Each weight matrix connects one layer to the next.
* zip(sizes[:-1], sizes[1:]) pairs consecutive layers:
  + For sizes = [3, 5, 2], it pairs (3,5) and (5,2).
* np.random.randn(y, x) generates a matrix of shape (y, x), where:
  + y is the number of neurons in the next layer.
  + x is the number of neurons in the current layer.

Example for sizes = [3, 5, 2]:

* weights will have:
  + A (5,3) matrix connecting input (3 neurons) to hidden (5 neurons).
  + A (2,5) matrix connecting hidden (5 neurons) to output (2 neurons).

**Summary**

This initializes a simple **fully connected feedforward neural network**, with:

* **Randomized weights and biases** using a normal distribution.
* **Layers structured as per sizes list**, determining the architecture.

Let me know if you need a deeper explanation! 🚀