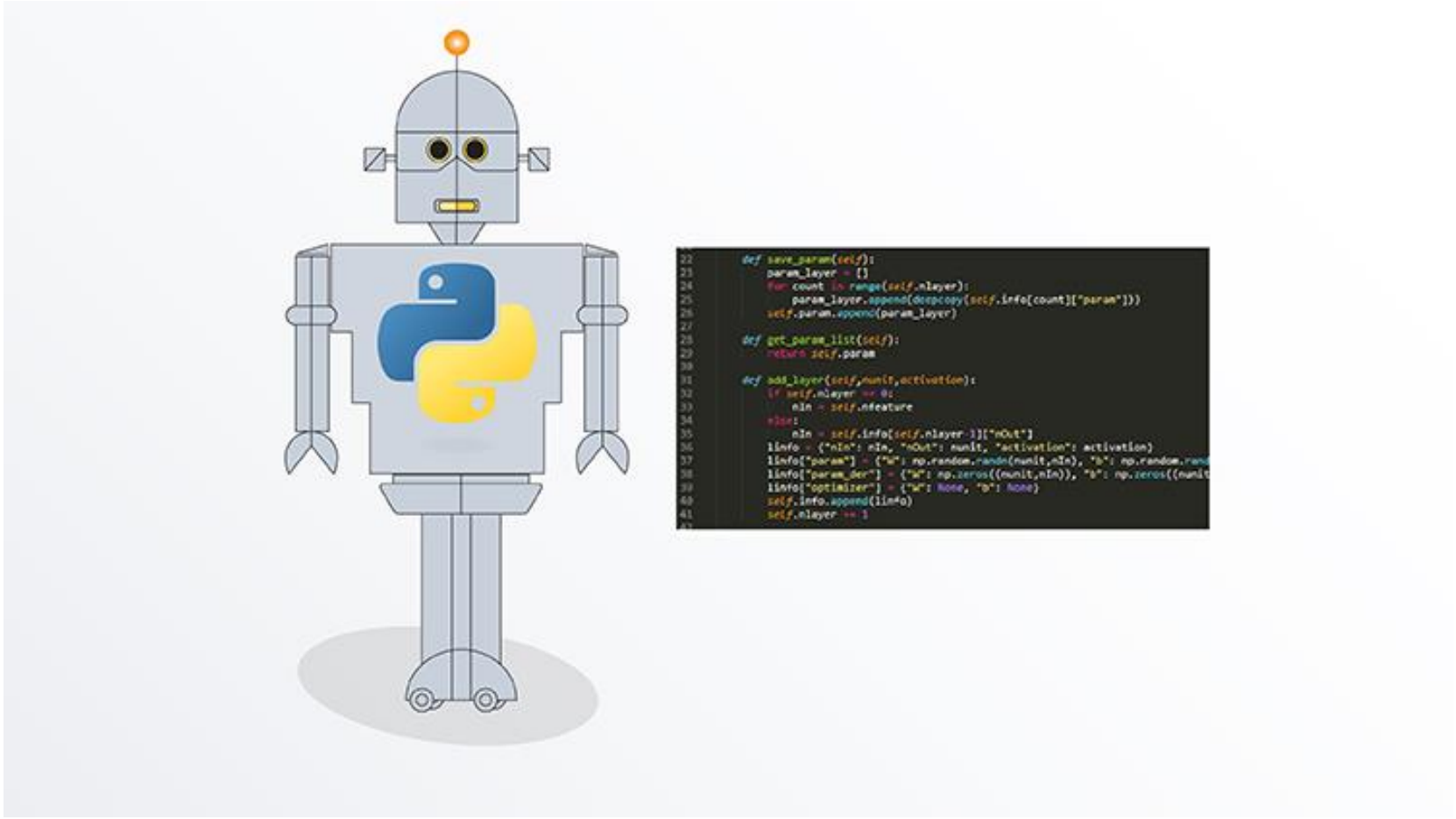
What is Machine Learning?

Chapter 5: Demo of Python Codes



```
    def save_param(self):
        param_layer = []
        for count in range(self.nlayer):
            param_layer.append(deepcopy(self.info[count]["param"]))
        self.param.append(param_layer)

    def get_param_list(self):
        return self.param

    def add_layer(self,nunit,activation):
        if self.nlayer == 0:
            nin = self.nfeature
        else:
            nin = self.info[self.nlayer-1]["nOut"]
        linfo = {"nIn": nIn, "nOut": nunit, "activation": activation}
        linfo["param"] = {"W": np.random.randn(nunit,nIn), "b": np.random.ran
        linfo["param_der"] = {"W": np.zeros((nunit,nIn)), "b": np.zeros((nunit
        linfo["optimizer"] = {"W": None, "b": None}
        self.info.append(linfo)
        self.nlayer += 1
```

Demo of Python Codes

Purpose of this section:

- Show students how to generate the examples presented in course
- Allow students to experiment with Python codes
  - Will show what settings to change and suggest cases to investigate
  - Knowledge of Python is not required

Options for Demo of Python Codes

Option	Approach	Details and Requirements
1	Run online yourself using Google Colab	• Google Colab link: https://colab.research.google.com/notebooks/intro.ipynb • Will provide links to individual notebook • Will show how to run notebooks • Requirement: a Google account • Best option if you are new to Python
2	Run on your Local Machine using Python via Anaconda Platform	• Will show how to run programs in Anaconda Prompt window • Will show how to run notebooks in Jupyter • Requirement: Anaconda platform https://www.anaconda.com/
3	Run on your Local Machine	• Run codes using Python on your machine (without Anaconda) • Requirement: Python on your machine and pandas, matplotlib, numpy packages

Demos

Section	Details
5.1	Linear Regression in Colab
5.2	Binary Classification in Colab
5.3	Multi-class Classification in Colab
5.4	MNIST Digits Classification in Colab
5.5	K Means Clustering in Colab
5.6	PCA in Colab
5.7	K Bandit in Colab
5.8	Maze Strategy in Colab
5.9	Running on Local Machine using the Anaconda Platform

What is Machine Learning?

Chapter 5.1: Demo of Linear Regression in Google Colab

Link to Notebook in Colab

- Link to Linear Regression notebook using Resources link for section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Supervised/notebook_supervised_regression_linear.ipynb

What is Machine Learning?

Chapter 5.2: Demo of Binary Classification in Google Colab

Link to Notebook in Colab

- Link to Binary Classification notebook using Resources link for section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Supervised/notebook_supervised_classification_binary.ipynb

What is Machine Learning?

Chapter 5.3: Demo of Multi-Class Classification in Google Colab

Link to Notebook in Colab

- Link to multi-class classification notebook using Resources link for this section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Supervised/notebook_supervised_classification_multi.ipynb

What is Machine Learning?

Chapter 5.4: Demo of MNIST Digits Classification in Google Colab

Link to Notebook in Colab

- Link to MNIST classification notebook using Resources link for section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Supervised/notebook_supervised_mnist.ipynb

What is Machine Learning?

Chapter 5.5: Demo of K Means Clustering in Google Colab

Link to Notebook in Colab

- Link to K means notebook using Resources link for this section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Unsupervised/notebook_unsupervised_kmeans.ipynb

What is Machine Learning?

Chapter 5.6: Demo of PCA in Google Colab

Link to Notebook in Colab

- Link to PCA notebook using Resources link for this section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Unsupervised/notebook_unsupervised_pca.ipynb

What is Machine Learning?

Chapter 5.7: Demo of K Bandit in Google Colab

Link to Notebook in Colab

- Link to K Bandit notebook using Resources link for this section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Reinforcement/notebook_reinforcement_kbandit.ipynb

What is Machine Learning?

Chapter 5.8: Demo of Maze Strategy in Google Colab

Link to Notebook in Colab

- Link to maze notebook using Resources link for this section
- Link also available in Chapter 5 of WhatisML_Resources_v1.0.pdf file
- Link for notebook:

https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Reinforcement/notebook_reinforcement_maze.ipynb

What is Machine Learning?

Chapter 5.9: Demo of Running on a Local Machine using the Anaconda Platform

Anaconda Platform

If you don’t have Python on your machine, probably best to install the Anaconda Platform

- Anaconda Platform is distribution of Python for scientific computing
- Contains several programs for running and testing Python programs
- https://www.anaconda.com/

Documentation:

- https://docs.anaconda.com/anaconda/user-guide/
- Plenty of online tutorials for installing and using Anaconda

Course Github site

- Download Course resources zip file from Github site

https://github.com/satishchandrareddy/WhatisML

- Unzip to your local machine (I have Windows 10)
  - I have unzipped to folder WhatisML-master
  - I have put WhatisML-master in same folder as Documents

Running Python Codes in Anaconda Prompt Window

- Open an Anaconda Prompt window
  - Anaconda Prompt is similar to a command window
- Run drivers in:
  - WhatisML-master/Code/Supervised
  - WhatisML-master/Code/Unsupervised
  - WhatisML-master/Code/Reinforcement
  - These drivers are analogous to Google Colab notebooks we saw previously
  - Example command:

    python driver_supervised_classification_binary.py
- Use any editor to change settings (sublime, atom, notepad++)
- You can view all codes and modify if you like

Running notebooks in Jupyter Notebook

- Open Anaconda Navigator and Jupyter Notebook
- Run notebooks in:
  - WhatisML-master/Code/Supervised
  - WhatisML-master/Code/Unsupervised
  - WhatisML-master/Code/Reinforcement
  - These notebooks are exactly the same as those used in Google Colab demos
  - Example:
    notebook_supervised_classification_binary.ipynb