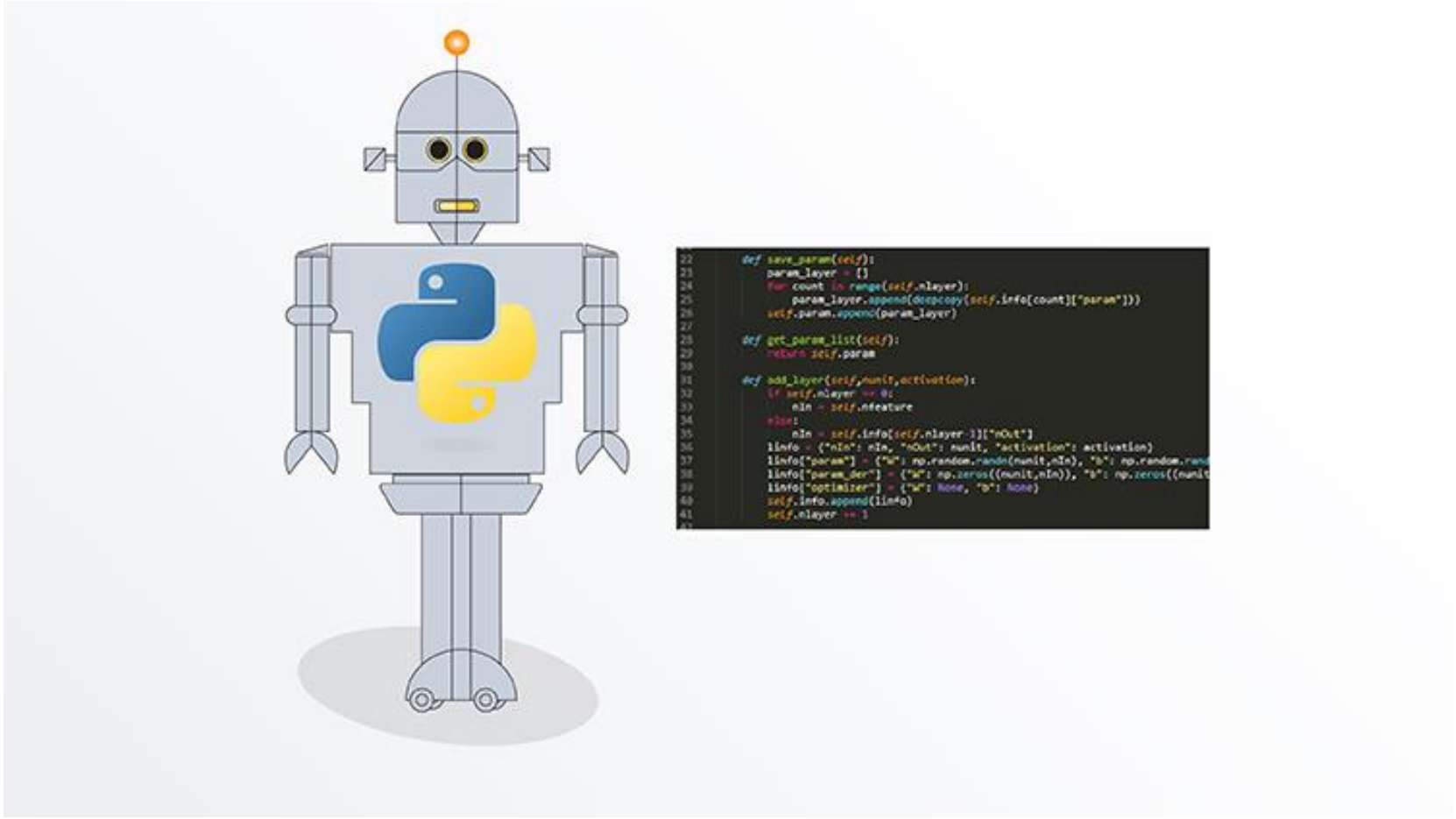
What is Machine Learning?

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 and experiment with Python codes
  - Knowledge of Python is not required
  - Demos will suggest input settings to investigate

Options for Demo of Python Codes

Option	Approach	Details and Requirements
1	Run online using Google Colab	• Google Colab link: https://colab.research.google.com/notebooks/intro.ipynb • Will provide links to individual notebooks and show how to run them • No downloads of codes or software is required • Best option if you are new to Python • REQUIREMENT: need a Google account
2	Run on Local Machine using Python using Anaconda Platform	• Will show how to download codes to your machine • Will show how to run notebooks using Jupyter Notebook • Will show how to run programs in Anaconda Prompt window • 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 • Packages (versions) : numpy (>=1.18.5), pandas (>=1.0.5), matplotlib (>=3.2.2)

Demos

Section	Type	Details
5.1	Supervised	Linear Regression in Colab
5.2	Supervised	Binary Classification in Colab
5.3	Supervised	Multi-class Classification in Colab
5.4	Supervised	MNIST Digits Classification in Colab
5.5	Unsupervised	K Means Clustering in Colab
5.6	Unsupervised	PCA in Colab
5.7	Reinforcement	K Bandit in Colab
5.8	Reinforcement	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

How to Link to Notebook in Colab

Can go to Linear Regression Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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

Can go to Binary Classification Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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

Can go to Multi-Class Classification Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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

Can go to MNIST Digits Classification Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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

Can go to K Means Clustering Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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

Can go to PCA Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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

Can go to K Bandit Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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

Can go to Maze Notebook by:

(1) Clicking on link in the Resources tab for this section

(2) Clicking on link in Chapter 5 of WhatisML_Resources_v1.0.pdf file

(3) Clicking on link below:

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 Codes on a Local Machine using the Anaconda Platform

Course Resources

- 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

Anaconda Platform

- Anaconda Platform is distribution of Python for scientific computing
- Get free Individual Edition at https://www.anaconda.com/
- Plenty of online tutorials for installing and using Anaconda
- Anaconda Platform has all necessary packages needed to run course codes right “out of the box”

Running Notebooks in Jupyter Notebook

- Similar to Google Colab but on your local machine
- Open Jupyter Notebooks
  - This should open up a browser on your machine
- 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

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