

What is Machine Learning?

Chapter 5: Demo of Python Codes



```
22 def save_param(self):
23     param_layer = []
24     for count in range(self.nlayer):
25         param_layer.append(deepcopy(self.info[count]["param"]))
26     self.param.append(param_layer)
27
28 def get_param_list(self):
29     return self.param
30
31 def add_layer(self, nunit, activation):
32     if self.nlayer == 0:
33         nIn = self.nfeature
34     else:
35         nIn = self.info[self.nlayer - 1]["nOut"]
36     linfo = {"nIn": nIn, "nOut": nunit, "activation": activation}
37     linfo["param"] = {"w": np.random.randn(nunit, nIn), "b": np.random.randn(nunit)}
38     linfo["param_der"] = {"w": np.zeros((nunit, nIn)), "b": np.zeros(nunit)}
39     linfo["optimizer"] = {"w": None, "b": None}
40     self.info.append(linfo)
41     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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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

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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

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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

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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

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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

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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

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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

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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

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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](https://colab.research.google.com/github/satishchandrareddy/WhatisML/blob/master/Code/Reinforcement/notebook%20reinforcement%20maze.ipynb)

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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