

Course: Unsupervised Learning

Useful resources

Course Github Site:

<https://github.com/satishchandrareddy/UnsupervisedML>

Section 1: Introduction

Wikipedia page for Machine Learning

https://en.wikipedia.org/wiki/Machine_learning

Wikipedia page for Unsupervised Learning:

https://en.wikipedia.org/wiki/Unsupervised_learning

Wikipedia page for cluster analysis:

https://en.wikipedia.org/wiki/Cluster_analysis

Website for Anaconda package which is a downloadable data science platform for Python:

<https://www.anaconda.com/>

Website for Anaconda documentation:

<https://docs.anaconda.com/anaconda/user-guide/>

Python website:

<https://www.python.org/>

Numpy, Matplotlib, Pandas, scikit-learn, IPython, and wordcloud package websites:

<https://numpy.org/>

<https://matplotlib.org/>

<https://pandas.pydata.org/>

<https://scikit-learn.org/stable/>

<https://pypi.org/project/ipython/>

<https://pypi.org/project/wordcloud/>

Section 2: Python Demos

The following links to details about animation using matplotlib

https://matplotlib.org/api/animation_api.html

Additionally, many examples and tutorials can be found by searching the internet

Website for ffmpeg for creating mp4 files from matplotlib animations (this is optional):

<https://ffmpeg.org/>

This is the Youtube video I followed to install ffmpeg on my Windows 10 machine:

https://www.youtube.com/watch?v=a_KqycyErd8

scikit-learn page on datasets for clustering:

<https://scikit-learn.org/stable/modules/clustering.html>

Section 3: Review of Mathematical Concepts

Kaggle is a free website for Data Science Competitions. I believe that you have to register to be able to download datasets. (Registration is not required for this course. I have made necessary data available.)

<https://www.kaggle.com/>

University of California, Irvine, Machine Learning Repository is a free site (no registration required):

Citation: Dua, D. and Graff, C. (2019). UCI Machine Learning Repository [<http://archive.ics.uci.edu/ml>]. Irvine, CA: University of California, School of Information and Computer Science.

<https://archive.ics.uci.edu/ml/index.php>

Wikipedia page for Computational Complexity:

https://en.wikipedia.org/wiki/Computational_complexity

Wikipedia page for Singular Value Decomposition:

https://en.wikipedia.org/wiki/Singular_value_decomposition

Section 4: Hierarchical Clustering

Wikipedia page for Hierarchical Clustering:

https://en.wikipedia.org/wiki/Hierarchical_clustering

Section 5: DBScan

Wikipedia page for DBSCAN:

<https://en.wikipedia.org/wiki/DBSCAN>

Section 6: K Means Clustering

Wikipedia page for K means clustering:

https://en.wikipedia.org/wiki/K-means_clustering

Wikipedia page for K means ++

<https://en.wikipedia.org/wiki/K-means%2B%2B>

Wikipedia page for elbow method

[https://en.wikipedia.org/wiki/Elbow_method_\(clustering\)](https://en.wikipedia.org/wiki/Elbow_method_(clustering))

Section 7: Gaussian Mixture Model

Wikipedia page for mixture models:

https://en.wikipedia.org/wiki/Mixture_model

Matrix Cookbook reference:

Kaare Brandt Petersen and Michael Syskind Pedersen, *The Matrix Cookbook*, Version November 15, 2012. <https://www.math.uwaterloo.ca/~hwolkowi/matrixcookbook.pdf>

Section 8: Comparison of Methods

Silhouette coefficient:

[https://en.wikipedia.org/wiki/Silhouette_\(clustering\)](https://en.wikipedia.org/wiki/Silhouette_(clustering))

Dunn Index:

https://en.wikipedia.org/wiki/Dunn_index

Davies-Bouldin Index:

https://en.wikipedia.org/wiki/Davies-Bouldin_index

You can see the sklearn version of comparison of methods at:

<https://scikit-learn.org/stable/modules/clustering.html>

Section 9: Principal Component Analysis

Wikipedia page for PCA:

https://en.wikipedia.org/wiki/Principal_component_analysis

Wikipedia page for autoencoders:

<https://en.wikipedia.org/wiki/Autoencoder>

Section 10: Case Studies

Setosa, Versicolor, and Virginica figure citations and licenses:

Setosa:

https://en.wikipedia.org/wiki/Iris_flower_data_set#/media/File:Kosaciec_szczecinkowaty_Iris_setosa.jpg

CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=170298>

https://commons.wikimedia.org/wiki/File:Iris_setosa01.jpg

Miya.m, CC BY-SA 3.0 <<http://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

Versicolor:

https://commons.wikimedia.org/wiki/File:Iris_versicolor_3.jpg

No machine-readable author provided. Dlanglois assumed (based on copyright claims)., CC BY-SA 3.0 <<http://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

Virginica:

https://commons.wikimedia.org/wiki/File:Iris_virginica.jpg

Frank Mayfield, CC BY-SA 2.0 <<https://creativecommons.org/licenses/by-sa/2.0/>>, via Wikimedia Commons

Source for Iris Flower Dataset:

<https://archive.ics.uci.edu/ml/datasets/iris>

Source for MNIST Dataset:

<http://yann.lecun.com/exdb/mnist/>

Source for BBC Text Data:

See following link at Kaggle:

<https://www.kaggle.com/yufengdev/bbc-fulltext-and-category>

License: <https://creativecommons.org/publicdomain/zero/1.0/>

Section 11: Concluding Remarks and Thank You

scikit-learn package:

<https://scikit-learn.org/stable/>

Python package for Hierarchical Clustering:

<https://pypi.org/project/fastcluster/>

Python package for identifying elbow (called knee) of a curve:

<https://pypi.org/project/kneed/>

Python package for Gaussian Mixture Model:

<https://pypi.org/project/gmr/>

Python package for various clustering algorithms:

<https://pypi.org/project/klusterpy/>