ADDITIONAL MATERIAL FOR MICRO-LECTURE TOPICS

1.Representation

List 1:
https://developers.google.com/machine-learning/crash-course/representation/video-lecture
https://developers.google.com/machine-learning/crash-course/representation/qualities-of-good-features
https://datawarrior.wordpress.com/2019/09/15/data-representation-in-machine-learning/

List 2:
https://medium.com/@paritosh_30025/natural-language-processing-text-data-vectorization-af2520529cf7
https://www.samtalksml.net/from-linear-regression-to-vector-representations

2.Nearest Neighbour Method

List 1:
https://towardsdatascience.com/a-simple-introduction-to-k-nearest-neighbors-algorithm-b3519ed98e
https://www.youtube.com/watch?v=6kZ-OPLNcgE

List 2:
http://people.csail.mit.edu/dsontag/courses/ml13/slides/lecture11.pdf
https://en.wikipedia.org/wiki/K-nearest_neighbors_algorithm

3.Linear Classifier

List 1:
https://en.wikipedia.org/wiki/Linear_classifier
https://www.coursera.org/lecture/ml-classification/linear-classifier-model-XBc9n

List 2:
http://compneurosci.com/wiki/images/c/c0/Linear_Classification.pdf

4.Perfomance Metrics-I

List 1:
https://towardsdatascience.com/beyond-accuracy-precision-and-recall-3da06bea9f6c

List 2:
https://www.youtube.com/watch?v=j-EB6RqqjGI&ab_channel=CodeEmporium

5. Performance Metrics-II

List 1:

https://blog.exsilio.com/all/accuracy-precision-recall-f1-score-interpretation-of-performance-measures/
https://medium.com/@jonathan_hui/map-mean-average-precision-for-object-detection-45c121a31173#:~:text=The%20general%20definition%20for%20the,within%200%20and%201%20also.

List 2:
https://en.wikipedia.org/wiki/Evaluation_measures_(information_retrieval)#Average_precision
https://en.wikipedia.org/wiki/Precision_and_recall
https://en.wikipedia.org/wiki/F1_score

6.Representation-II

List1:
https://medium.com/inside-machine-learning/feature-engineering-for-deep-learning-2b1fc7605ace
https://towardsdatascience.com/unsupervised-feature-learning-46a2fe399929

List 2:
https://towardsdatascience.com/art-of-vector-representation-of-words-5e85c59fee5

7.Data from Multivariate Gaussians

List 1:
https://scipython.com/blog/visualizing-the-bivariate-gaussian-distribution/
https://medium.com/@SeoJaeDuk/archived-post-multivariate-gaussian-distributions-and-entropy-3-991578ca534c

List 2:
https://en.wikipedia.org/wiki/Normal_distribution
https://www.mathsisfun.com/data/standard-normal-distribution.html

8.Curse of Dimensionality

List 1:
https://en.wikipedia.org/wiki/Curse_of_dimensionality
https://www.youtube.com/watch?v=_4DaqzLyT08

List 2:
https://towardsdatascience.com/the-curse-of-dimensionality-50dc6e49aa1e
https://www.inf.fu-berlin.de/inst/ag-ki/rojas_home/documents/tutorials/dimensionality.pdf

9.Feature Selection and Extraction

List 1:

https://medium.com/@mehulved1503/feature-selection-and-feature-extraction-in-machine-learning-an-overview-57891c595e96

List 2:
https://towardsdatascience.com/getting-data-ready-for-modelling-feature-engineering-feature-selection-dimension-reduction-39dfa267b95a
https://medium.com/@mayankshah1607/machine-learning-feature-selection-with-backward-elimination-955894654026

10.Data as Matrix

List 1:
https://www.quora.com/What-is-an-intuitive-explanation-of-the-rank-of-a-matrix

List 2:
https://medium.com/@jonathan_hui/machine-learning-linear-algebra-a5b1658f0151

11.Supervised Learning: Formulation

List 1:
https://medium.com/@jonathan_hui/machine-learning-linear-algebra-a5b1658f0151

List 2:
https://medium.com/swlh/ml-fundamentals-optimization-problems-and-how-to-solve-them-572c6ddf0a0b

12.Eigen Decomposition

List 1:
http://fourier.eng.hmc.edu/e176/lectures/algebra/node9.html
https://online.stat.psu.edu/statprogram/reviews/matrix-algebra/eigendecomposition

List 2:
https://personal.utdallas.edu/~herve/Abdi-EVD2007-pretty.pdf
https://drive.google.com/file/d/1t1cobzqcmG43QQTOzKYmmXhvTQbDcJDx/view?usp=sharing (Section 4.4)
https://en.wikipedia.org/wiki/Eigendecomposition_of_a_matrix#:~:text=In%20linear%20algebra%2C%20eigendecomposition%20or,be%20factorized%20in%20this%20way.

13.Distances and Similarities

List 1:
https://towardsdatascience.com/how-to-measure-distances-in-machine-learning-13a396aa34ce

https://towardsdatascience.com/light-on-math-machine-learning-intuitive-guide-to-understanding-kl-divergence-2b382ca2b2a8
https://deepai.org/machine-learning-glossary-and-terms/jaccard-index#:~:text=The%20Jaccard%20Index%2C%20also%20known,union%20of%20the%20sample%20sets
https://dzone.com/articles/machine-learning-measuring
https://medium.com/x8-the-ai-community/understanding-similarity-measures-in-ml-33deb0bf094

List 2:
https://www.ias.ac.in/article/fulltext/reso/004/06/0020-0026

14.Generalization and Overfitting

List 1:
https://towardsdatascience.com/generalization-regularization-overfitting-bias-and-variance-in-machine-learning-aa942886b870
https://www.quora.com/What-is-generalization-in-machine-learning
https://towardsdatascience.com/what-are-overfitting-and-underfitting-in-machine-learning-a96b30864690
https://www.quora.com/How-do-we-know-whether-a-model-is-overfitting

15.Linear Regression

List 1:
https://drive.google.com/file/d/19ltey-v-tsbR-66RcQQXf41n8pyAWqcM/view?usp=sharing
https://towardsdatascience.com/introduction-to-machine-learning-algorithms-linear-regression-14c4e325882a

List 2:
https://drive.google.com/file/d/1t1cobzqcmG43QQTOzKYmmXhvTQbDcJDx/view?usp=sharing **(Chapter 9)**

16.Optimization and Eigen Vectors

List 1:
https://joellaity.com/2018/10/18/pca.html
http://www.stat.cmu.edu/~cshalizi/uADA/12/lectures/ch18.pdf

List 2:
https://arxiv.org/pdf/1903.11240.pdf

17.MLE

List 1:
https://www.coursera.org/lecture/probabilistic-graphical-models-3-learning/maximum-likelihood-estimation-KzlS4

List 2:
http://jrmeyer.github.io/machinelearning/2017/08/18/mle.html

18.SVD

List 1:
https://web.mit.edu/be.400/www/SVD/Singular_Value_Decomposition.htm
https://blog.statsbot.co/singular-value-decomposition-tutorial-52c695315254

List 2:
https://medium.com/@jonathan_hui/machine-learning-singular-value-decomposition-svd-principal-component-analysis-pca-1d45e885e491
https://towardsdatascience.com/understanding-singular-value-decomposition-and-its-application-in-data-science-388a54be95d

19.MSE as MLE

List 1:
https://www.jessicayung.com/mse-as-maximum-likelihood/

20.Geometry of Gaussians

List 1:
https://towardsdatascience.com/an-intuitive-guide-to-gaussian-processes-ec2f0b45c71d

List 2:
http://www.gaussianprocess.org/gpml/chapters/RW.pdf

21.Bayesian Minimum Error Classification

List 1:
https://neumachine.net/minimum-error-rate-classification/

List 2:
https://www.byclb.com/TR/Tutorials/neural_networks/ch4_1.htm

22.Occam's Razor

List 1:
https://www.youtube.com/watch?v=Q_AclBHCaUo

List 2:
https://www.techopedia.com/how-does-occams-razor-apply-to-machine-learning/7/33087

23.Validation

List 1:
https://en.wikipedia.org/wiki/Training,_validation,_and_test_sets
https://towardsdatascience.com/5-reasons-why-you-should-use-cross-validation-in-your-data-science-project-8163311a1e79

List 2:
https://www.analyticsvidhya.com/blog/2018/05/improve-model-performance-cross-validation-in-python-r/
https://www.coursera.org/lecture/big-data-machine-learning/using-a-validation-set-Pb8CI

24.Bias and Variance

List 1:
https://towardsdatascience.com/understanding-the-bias-variance-tradeoff-165e6942b229
https://www.youtube.com/watch?v=EuBBz3bI-aA&ab_channel=StatQuestwithJoshStarmer

List 2:
https://www.kaggle.com/residentmario/bias-variance-tradeoff

25.Loss Functions I

List 1:
https://algorithmia.com/blog/introduction-to-loss-functions
https://www.analyticsvidhya.com/blog/2019/08/detailed-guide-7-loss-functions-machine-learning-python-code/

List 2:
https://machinelearningmastery.com/loss-and-loss-functions-for-training-deep-learning-neural-networks/

26.LSI

List 1:
https://www.youtube.com/watch?v=OvzJiur55vo
https://en.wikipedia.org/wiki/Latent_semantic_analysis

List 2:
http://lsa.colorado.edu/papers/dp1.LSAintro.pdf

27.Regularization in Regression

List 1:
https://towardsdatascience.com/regularization-in-machine-learning-76441ddcf99a

List 2:
http://www.sthda.com/english/articles/37-model-selection-essentials-in-r/153-penalized-regression-essentials-ridge-lasso-elastic-net/#discussion

28.Rank and Recommendation System

List 1:
https://towardsdatascience.com/introduction-to-recommender-systems-6c66cf15ada
https://tryolabs.com/blog/introduction-to-recommender-systems/

List 2:
https://towardsdatascience.com/recommender-system-using-bayesian-personalized-ranking-d30e98bba0b9
https://medium.com/@jonathan_hui/machine-learning-recommender-system-e3237b9df14a

29.Orthogonal Line Fitting

List 1:
https://drive.google.com/drive/folders/1UypmObLq5rjiSGyLMEHgQiguENN3PjHI?usp=sharing
https://davegiles.blogspot.com/2014/11/orthogonal-regression-first-steps.html

30.PCA

List 1:
https://builtin.com/data-science/step-step-explanation-principal-component-analysis
https://towardsdatascience.com/a-one-stop-shop-for-principal-component-analysis-5582fb7e0a9c
http://people.ciirc.cvut.cz/~hlavac/TeachPresEn/11ImageProc/15PCA.pdf

List 2:
http://www.princeton.edu/~yc5/ele538b_sparsity/lectures/robust_PCA.pdf

31.Decision Boundaries for Multivariate Gaussians

List 1:
https://www.cs.rit.edu/~rlaz/PatternRecognition/slides/Bayesian.pdf

List 2:
https://www.youtube.com/watch?v=Vn3gcovBI1A

32.Deep Embeddings

List 1:
https://en.wikipedia.org/wiki/Feature_learning
https://developers.google.com/machine-learning/crash-course/embeddings/video-lecture

List 2:
https://cloud.google.com/solutions/machine-learning/overview-extracting-and-serving-feature-embeddings-for-machine-learning
https://youtu.be/ImUoubi_t7s

33.PCA as Compression

List 1:
https://aaronschlegel.me/image-compression-principal-component-analysis.html

List 2:
https://www.intechopen.com/books/statistics-growing-data-sets-and-growing-demand-for-statistics/application-of-principal-component-analysis-to-image-compression

34. Gradient Descent I

List 1:
https://www.coursera.org/lecture/machine-learning/gradient-descent-8SpIM
https://machinelearningmastery.com/gradient-descent-for-machine-learning/

List 2:
https://towardsdatascience.com/understanding-the-mathematics-behind-gradient-descent-dde5dc9be06e

35.Normalization of Features

List 1:
https://towardsdatascience.com/understand-data-normalization-in-machine-learning-8ff3062101f0
https://medium.com/@urvashilluniya/why-data-normalization-is-necessary-for-machine-learning-models-681b65a05029
https://en.wikipedia.org/wiki/Feature_scaling

List 2:

https://www.analyticsvidhya.com/blog/2020/04/feature-scaling-machine-learning-normalization-standardization/
https://towardsai.net/p/data-science/how-when-and-why-should-you-normalize-standardize-rescale-your-data-3f083def38ff

36. Eigen Faces

List 1:
https://en.wikipedia.org/wiki/Eigenface#:~:text=An%20eigenface%20(%2F%CB%88a%C9%AA%C9%A1,Alex%20Pentland%20in%20face%20classification.
https://towardsdatascience.com/eigenfaces-recovering-humans-from-ghosts-17606c328184
https://www.youtube.com/watch?v=_IY74pXWIS8

List 2:
http://www.scholarpedia.org/article/Eigenfaces

37. Gradient Descent II

List 1:
http://s3.amazonaws.com/mitsloan-php/wp-faculty/sites/30/2016/12/15031226/Newton%E2%80%99s-Method-for-Unconstrained-Optimization.pdf
https://www.youtube.com/watch?v=sAT3mNr0TBg

List 2:
https://www.youtube.com/watch?v=o6FfdP2uYh4
https://www.cs.ccu.edu.tw/~wtchu/courses/2014s_OPT/Lectures/Chapter%209%20Newton%27s%20Method.pdf

38. Perceptron Algorithm

List 1:
https://medium.com/@nikhilc3013/simple-perceptron-training-algorithm-explained-7bbfdff2c57d
https://towardsdatascience.com/perceptron-learning-algorithm-d5db0deab975

List 2:
https://www.youtube.com/watch?v=BbYV8UfMJS
https://www.youtube.com/watch?v=wl7gVvI-Hu

39. MSE as GD

List 1:
https://towardsdatascience.com/gradient-descent-from-scratch-e8b75fa986cc

List 2:
https://mccormickml.com/2014/03/04/gradient-descent-derivation/

40. Neuron Model

List 1:
https://ml-cheatsheet.readthedocs.io/en/latest/nn_concepts.html
https://www.youtube.com/watch?v=aircAruvnKk&list=PLZHQObOWTQDNU6R1_67000Dx_ZCJB-3pi

List 2:
https://towardsdatascience.com/machine-learning-for-beginners-an-introduction-to-neural-networks-d49f22d238f9
https://medium.com/towards-artificial-intelligence/main-types-of-neural-networks-and-its-applications-tutorial-734480d7ec8e
https://playground.tensorflow.org/

41.Variations in GD

List 1:
https://towardsdatascience.com/gradient-descent-algorithm-and-its-variants-10f652806a3

List 2:
https://ruder.io/optimizing-gradient-descent/

42.Perceptron II

List 1:
https://towardsdatascience.com/perceptron-algorithms-for-linear-classification-e1bb3dcc7602
https://cmci.colorado.edu/classes/INFO-4604/files/slides-3_perceptron.pdf
https://www.youtube.com/watch?v=oGn1m7EReco

List 2:
https://www.youtube.com/watch?v=wl7gVvl-HuY
http://ml.informatik.uni-freiburg.de/former/_media/documents/teaching/ss09/ml/perceptrons.pdf

43.Naive Bayes

List 1:
https://www.analyticsvidhya.com/blog/2017/09/naive-bayes-explained/
https://monkeylearn.com/blog/practical-explanation-naive-bayes-classifier/

List 2:
https://machinelearningmastery.com/naive-bayes-for-machine-learning/
https://www.geeksforgeeks.org/naive-bayes-classifiers/

44. Perceptron Algorithm III

List 1:
https://www.cse.iitb.ac.in/~shivaram/teaching/old/cs344+386-s2017/resources/classnote-1.pdf
http://www.cs.columbia.edu/~mcollins/courses/6998-2012/notes/perc.converge.pdf

List 2:
https://www.youtube.com/watch?v=kObhWlqIeD8

45.Loss Functions II

List 1:
https://en.wikipedia.org/wiki/Hinge_loss
https://en.wikipedia.org/wiki/Cross_entropy#Cross-entropy_loss_function_and_logistic_regression

List 2:
https://medium.com/data-science-bootcamp/understand-cross-entropy-loss-in-minutes-9fb263caee9a
https://towardsdatascience.com/understanding-binary-cross-entropy-log-loss-a-visual-explanation-a3ac6025181a
https://medium.com/analytics-vidhya/understanding-loss-functions-hinge-loss-a0ff112b40a1

46.Logistic Regression I

List 1:
https://kambria.io/blog/logistic-regression-for-machine-learning/
https://towardsdatascience.com/introduction-to-logistic-regression-66248243c148

List 2:
https://machinelearningmastery.com/logistic-regression-for-machine-learning/
https://ml-cheatsheet.readthedocs.io/en/latest/logistic_regression.html

47. Logistic Regression II

List 1:
https://medium.com/swlh/what-is-logistic-regression-62807de62efa

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

List 2:
https://towardsdatascience.com/binary-cross-entropy-and-logistic-regression-bf7098e75559
https://medium.com/@jeheonpark93/ml-logistic-regression-cross-entropy-and-kl-divergence-29be209d7ae3

48. Logistic Regression III

List 1:
https://towardsdatascience.com/logistic-regression-detailed-overview-46c4da4303bc

List 2:
https://win-vector.com/2011/09/14/the-simpler-derivation-of-logistic-regression/
http://www.stat.cmu.edu/~cshalizi/uADA/12/lectures/ch12.pdf

49. Logistic Regression IV

List 1:
https://www.youtube.com/watch?v=g32mKhvh1VI

List 2:
https://cedar.buffalo.edu/~srihari/CSE574/Chap4/4.3.4-MultiLogistic.pdf
https://chrisyeh96.github.io/2018/06/11/logistic-regression.html

50. LDA I

List 1:
https://en.wikipedia.org/wiki/Linear_discriminant_analysis
https://www.youtube.com/watch?v=azXCzI57Yfc

List 2:
https://medium.com/@sharvill/linear-discriminant-analysis-37859b65abd1
https://en.wikipedia.org/wiki/Kernel_Fisher_discriminant_analysis

51. LDA II

List 1:
https://machinelearningmastery.com/linear-discriminant-analysis-for-machine-learning/

List 2:
https://sebastianraschka.com/Articles/2014_python_lda.html
https://www.csd.uwo.ca/~oveksler/Courses/CS434a_541a/Lecture8.pdf

52. Multi-Class classification

List 1:
https://www.youtube.com/watch?v=-Elfb6vFJzc
https://en.wikipedia.org/wiki/Multiclass_classification
https://towardsdatascience.com/decision-trees-in-machine-learning-641b9c4e8052
https://www.geeksforgeeks.org/decision-tree/

List 2:
https://medium.com/datadriveninvestor/the-basics-of-decision-trees-e5837cc2aba7
https://towardsdatascience.com/machine-learning-multiclass-classification-with-imbalanced-data-set-29f6a177c1a
https://machinelearningmastery.com/one-vs-rest-and-one-vs-one-for-multi-class-classification/

53. Kernels - I

List 1:
https://xavierbourretsicotte.github.io/Kernel_feature_map.html
https://disi.unitn.it/~passerini/teaching/2014-2015/MachineLearning/slides/17_kernel_machines/handouts.pdf

List 2:
http://www.cs.cmu.edu/~aarti/Class/10701_Spring14/slides/kernel_methods.pdf
http://cs.brown.edu/courses/cs195-5/fall2009/docs/lecture_10-27.pdf

54. Kernels - II

List 1:
https://danieltakeshi.github.io/2015-08-08-perceptrons-svms-and-kernel-methods.md/
http://aritter.github.io/courses/5523_slides/kernels.pdf

List 2:
https://alex.smola.org/teaching/pune2007/pune_3.pdf

55. Kernels - III

List 1:
https://en.wikipedia.org/wiki/Positive-definite_kernel
http://web.iitd.ac.in/~sumeet/CLT2008S-lecture18.pdf

List 2:
https://ocw.mit.edu/courses/sloan-school-of-management/15-097-prediction-machine-learning-and-statistics-spring-2012/lecture-notes/MIT15_097S12_lec13.pdf

56. SVM - I

List 1:
https://web.mit.edu/zoya/www/SVM.pdf
https://en.wikipedia.org/wiki/Support_vector_machine#Hard-margin
https://www.svm-tutorial.com/2014/11/svm-understanding-math-part-1/

List 2:
https://www.youtube.com/watch?v=_PwhiWxHK8o

57. SVM - II

List 1:
https://en.wikipedia.org/wiki/Support_vector_machine#Soft-margin
https://towardsdatascience.com/support-vector-machines-soft-margin-formulation-and-kernel-trick-4c9729dc8efe

List 2:
https://www.youtube.com/watch?v=8xbnLHn4jjQ

58. SVM - III

List 1:
http://www.robots.ox.ac.uk/~az/lectures/ml/lect3.pdf
http://people.csail.mit.edu/dsontag/courses/ml13/slides/lecture6.pdf
https://medium.com/@sathvikchiramana/svm-dual-formulation-7535caa84f17

List 2:
https://www.youtube.com/watch?v=1aQLEzeGJC8
https://www.youtube.com/watch?v=_PwhiWxHK8o

59. SVM - IV

List 1:
https://www.youtube.com/watch?v=GcCG0PPV6cg
https://nlp.stanford.edu/IR-book/html/htmledition/nonlinear-svms-1.html
https://drive.google.com/file/d/13zuh9CbhqHB8clqDbAT25iwE_Re6WLUx/view?usp=sharing
https://www.stat.berkeley.edu/~arturof/Teaching/EE127/Notes/support_vector_machines.pdf

List2:
https://people.eecs.berkeley.edu/~jordan/kernels/0521813972c02_p25-46.pdf

60. Kernels - IV

List 1:
https://www.shogun-toolbox.org/examples/latest/examples/regression/kernel_ridge_regression.html#barber2012bayesian
https://www.ics.uci.edu/~welling/classnotes/papers_class/Kernel-Ridge.pdf

List 2:
https://people.cs.umass.edu/~domke/courses/sml2010/06kernels.pdf
https://www.youtube.com/watch?v=JQJVA8ehlbM

61. Neural Network Architecture
List 1: https://medium.com/@jorgesleonel/multilayer-perceptron-6c5db6a8dfa3
List 2:
https://medium.com/@AI_with_Kain/understanding-of-multilayer-perceptron-mlp-8f179c4a135f

62. NN Architecture II

List 1:
https://missinglink.ai/guides/neural-network-concepts/7-types-neural-network-activation-functions-right/

List 2: https://ujjwalkarn.me/2016/08/09/quick-intro-neural-networks/

63. NN Learning I

List 1: https://www.guru99.com/backpropogation-neural-network.html

List 2:
https://medium.com/@14prakash/back-propagation-is-very-simple-who-made-it-complicated-97b794c97e5c

64.DDAG

List1:
https://www.researchgate.net/publication/228929239_Optimizing_directed_acyclic_graph_support_vector_machines

https://drive.google.com/file/d/1lAmT7T3OrX-K0xybG_HCNR5yQsGD3npu/view?usp=sharing

List2:
https://papers.nips.cc/paper/1773-large-margin-dags-for-multiclass-classification.pdf

65.Logistic Regression 5

List1:
https://machinelearningmastery.com/logistic-regression-with-maximum-likelihood-estimation/

https://www.youtube.com/watch?v=BfKanl1aSG0

List2:
http://web.stanford.edu/class/archive/cs/cs109/cs109.1178/lectureHandouts/220-logistic-regression.pdf
http://www.stat.cmu.edu/~cshalizi/uADA/12/lectures/ch12.pdf

66. LDA3:

Llst1:
http://www.stat.cmu.edu/~ryantibs/datamining/lectures/21-clas2-marked.pdf
https://www.andrew.cmu.edu/user/skolouri/Presentations/DiscAnalysis.pdf
http://www.stat.cmu.edu/~ryantibs/datamining/lectures/21-clas2.pdf

List2:
https://towardsdatascience.com/linear-discriminant-analysis-explained-f88be6c1e00b