Applied Machine Learning Course Schedule

DATE	MODULE	CHAPTER	TOPIC
2020-12-10	Module 1:Fundamentals of Programming	Python for DataScience	Keywords and identifiers, comments, indentation and statements, Variables and data types in Python, Standard Input and Output, Operators, Control flow: if else, Control flow: while loop, Control flow: for loop, Control flow: break and continue,Revision Python for DataScience
2020-12-11	Module 1:of ProgrammingFundamentals	Python for DataScience:DataStructures	Lists, Tuples part 1, Tuples part-2, Sets, Dictionary,Strings,Revision Python forDataScience:Data Structures
2020-12-12	Module 1:of ProgrammingFundamentals	DataScience:FunctionsPython for	Introduction, Types of functions, Function arguments, Recursivefunctions, Lambda functions,Modules, Packages, File Handling, Exception Handling
2020-12-13	Module 1:of ProgrammingFundamentals	DataScience:FunctionsPython for	Debugging Python,RevisionPython forDataScience:Functions
2020-12-14	Module 1:of ProgrammingFundamentals	DataScience:NumpyPython for	Numpy Introduction, Numerical operations onNumpy,Revision Python forDataScience:Numpy

		Module		
2020-12-15	1:of ProgrammingFundamentals	DataScience:MatplotlibPython for		Getting started withMatplotlib,Revision Pythonfor DataScience:Matplotlib
		Module		Getting started with pandas,
2020-12-16	1:of ProgrammingFundamentals	DataScience:PandasPython for		Data Frame Basics, KeyOperations on DataFrames,Revision Python for DataScience:Pandas
		Module	Python for	Space and Time Complexity: Find largest number in a list , Binary search, Find elements common in two
2020-12-17	1:Fundamentals	DataScience:Compputational		lists, Find elements commonin two lists using a
		of Programming	Complexity	Hashtable/Dict,Revision Python for DataScience:Compputational Complexity
		Module		Introduction to Databases, Why SQL?, Execution of an SQL statement., IMDB dataset, Installing MySQL, Load IMDB data., USE, DESCRIBE, SHOW TABLES, SELECT , LIMIT, OFFSET, ORDER BY, DISTINCT ,
2020-12-18	1:Fundamentals	SQL	WHERE, Comparison	of Programming operators, NULL, Logical Operators, Aggregate Functions: COUNT, MIN, MAX, AVG, SUM, GROUP BY, HAVING, Order of keywords., Join and Natural Join, Inner, Left, Right and Outer joins. Sub Queries/Nested Queries/ Inner Queries, DML:INSERT, DML:UPDATE , DELETE,
		Module		DDL:CREATE TABLE,

2020-12-19 1:Fundamentals of Programming

SQL DDL:ALTER: ADD, MODIFY,DROP, DDL:DROP TABLE, TRUNCATE, DELETE, Data Control Language: GRANT, REVOKE, Learning resources,Revision SQL Introduction to IRIS dataset and 2D scatter plot, 3D scatter plot, Pair plots,

Module 2: Limitations of Pair Plots,Histogram and Introduction Datascience:

2020-12-20 Exploratory DataAnalysis andPlotting for exploratory dataanalysis (EDA) to PDF(Probability DensityFunction), UnivariateAnalysis using PDF,

Data Visualization

CDF(Cumulative Distribution Function), Mean, Variance and Standard Deviation, Median, Percentiles and Quantiles IQR(Inter Quartile Range) and MAD(Median Absolute Deviation), Box-plot with Whiskers, Violin Plots,Summarizing Plots,

Module 2: Datascience:

2020-12-21 Exploratory DataAnalysis andPlotting for exploratory dataanalysis (EDA)Univariate, Bivariate andMultivariate analysis,Multivariate Probability

Data Visualization

Density, Contour Plot, Exercise: Perform EDA on Haberman dataset,Revision Plotting for exploratory data analysis (EDA) Why learn it ?, Introduction to Vectors(2-D, 3-D, n-D) , Row Vector and Column Vector, Dot Product and Angle between 2 Vectors, Projection and Unit Vector, Equation of a line (2-D), Plane(3-D) and Hyperplane (n-D), Plane Passing through

Module 2: Datascience:

2020-12-22 Exploratory DataAnalysis and Linear Algebra origin, Normal to a Plane,Distance of a point from a

Data Visualization Plane/Hyperplane, Half-Spaces, Equation of a Circle (2-D), Sphere (3-D) and Hypersphere (n-D), Equation of an Ellipse (2-D), Ellipsoid (3-D) and Hyperellipsoid (n-D), Square ,Rectangle, Hyper Cube,Hyper Cuboid, Revision Questions

Module 2: Datascience:

2020-12-23 Exploratory DataAnalysis and Linear Algebra Revision Linear Algebra

Data Visualization

Introduction to Probability and Statistics, Population and Sample, Gaussian/ Normal Distribution and its PDF(Probability Density Function), CDF(Cumulative Distribution function) of Gaussian/Normal

Module 2: Datascience:

2020-12-24 Exploratory Data Analysis and Probability And Statistics distribution, Symmetricdistribution, Skewness and

Data Kurtosis, Standard normal Visualization variate (Z) and standardization, Kernel density estimation, Sampling distribution & Central Limit theorem, Q-Q plot:How to test if a random variable is normally distributed or not?

How distributions are used?, Chebyshev's inequality, Discrete and Continuous

Module 2: Uniform distributions, How Datascience: to randomly sample data

2020-12-25 Exploratory Data Analysis and Probability And Statistics points (UniformDistribution), Bernoulli and

	Data Visualization Module 2: Datascience:		Binomial Distribution, Log Normal Distribution, Power law distribution, Box cox transform, Applications of non-gaussian distributions? Co-variance, Pearson Correlation Coefficient, Spearman Rank Correlation Coefficient, Correlation vs Causation, How to use correlations?interval (C.I) Introduction, , Confidence
2020-12-26	Exploratory Data Analysis and Data Visualization Module 2: Datascience:	Probability And Statistics	Computing coninterval given the underlyingdistribution, C.I for mean offidence a normal random variable, Confidence interval using bootstrapping, Hypothesis testing methodology, Nullhypothesis, p-value, Hypothesis Testing Intution with coin toss example Resampling and permutation test, K-S Test for similarity of two distributions, Code Snippet K-S Test, Hypothesis
2020-12-27	Exploratory Data Analysis and Data Visualization Module 2: Datascience:	Probability And Statistics	testing: another example,Resampling and Permutation test: another example, How to use hypothesis testing?, Propotional sampling, Revision Questions
2020-12-28	Exploratory Data Analysis and Data Visualization Module 2: Datascience:	Probability And Statistics	Assignment :Python (withoutNumpy)

2020-12-29 Exploratory DataAnalysis and Data Visualization Module 2: Datascience: Probability And Statistics What is Dimensionality reduction?, Row Vector and Column Vector, How to represent a data set?, How to represent a dataset as a Matrix., Data Preprocessing: Feature Normalisation, Revision Probability AndStatistics

2020-12-30 Exploratory DataAnalysis and Data Visualization Module 2: Datascience: Dimensionality ReductionAnd Visualization Mean of a data matrix, DataPreprocessing: Column Standardization, Co-variance of a Data Matrix, MNIST dataset (784 dimensional), Code to Load MNIST Data Set,Revision Dimensionality Reduction And Visualization Why learn PCA?, Geometric intuition of PCA, Mathematical objective function of PCA, Alternative formulation of PCA: Distance minimization, Eigen values and Eigen vectors (PCA): Dimensionality

2020-12-31 Exploratory DataAnalysis and Reduction Data Visualization Module 2: Datascience: Principal ComponentAnalysis reduction, PCA forDimensionality and Visualization, Visualize MNIST dataset, Limitations of PCA, PCA Code example, PCA for dimensionality reduction (notvisualization),Revision Principal Component Analysis What is t-SNE?, Neighborhood of a point,Embedding, Geometric

2021-01-01	Exploratory DataAnalysis and t-SNE and interpret its output,	T-Sne	intuition of t-SNE, CrowdingProblem, How to apply
	Data Visualization		t-SNE on MNIST, Code example of t-SNE, Revision Questions,Revision T-Sne
	Module 3: Foundations of Natural		Dataset overview: Amazon Fine Food reviews(EDA), Data Cleaning: Deduplication, Why converttext to a vector?, Bag of Words (BoW), Text
2021-01-02	Language Processing and Machine	Predict rating given productreviews on amazon	Preprocessing: Stemming,Stop-word removal, Tokenization, Lemmatization., uni-gram, bi-gram, n-grams., tf-idf (term frequency- inverse document frequency), Why use log in IDF?
	Module 3: Foundations of Natural		Word2Vec., Avg-Word2Vec, tf-idf weighted Word2Vec, Bag of Words(Code
2021-01-03	Language Processing and Machine Learning	Predict rating given productreviews on amazon	Sample), Text Preprocessing(Code Sample), Bi-Grams andn-grams (Code Sample), TF-IDF (Code Sample), Assignment :Implementing TFIDF vectorizer

	Module 3: Foundations of Natural Language Processing and Machine Learning		Word2Vec (Code Sample), Avg-Word2Vec and TFIDF-
2021-01-04		Predict rating given productreviews on amazon	Word2Vec (CodeSample),Revision Predict rating given product reviews on amazon
	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	How "Classification" works?, Data matrix notation, Classification vs Regression (examples), K-Nearest Neighbours Geometric intuition with a toy example, Failure cases of KNN, Distance measures: Euclidean(L2) , Manhattan(L1), Minkowski, Hamming, Cosine Distance & Cosine Similarity, How to measure the effectiveness of k-NN?, Test/Evaluation time and space complexity, KNN Limitations, Decision surface for K-NN as K changes Overfitting and Underfitting, Need for Cross validation, K-fold cross validation, Visualizing train, validation and test datasets, How to determine overfitting and underfitting?, Time based splitting, k-NN for regression, Weighted k-NN, Voronoi diagram, Binary search tree
2021-01-05			
2021-01-06			
	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	How to build a kd-tree, Find nearest neighbours using kd-tree, Limitations of Kd tree,

2021-01-07	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Natural Language Processing and Machine Learning Extensions, Hashing vs LSH, LSH for cosine similarity, LSH for euclidean distance, Probabilistic class label, Code Sample:Decision boundary .
2021-01-08	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Code Sample:Cross Validation, Assignment : Implement RandomSearchCV with k fold cross validation on KNN
2021-01-09		Classification And Regression Models: K-Nearest Neighbors	Question and Answers,Revision Classification And Regression Models: K-Nearest Neighbors
2021-01-10	Module 3: Foundations of Natural Language Processing and Machine Learning	ClassiVarious Situationsfication Algorithms in	Introduction, Imbalanced vs balanced dataset, Multi-class classification, k-NN, given a distance or similarity matrix,Train and test set differences, Impact of outliers, Local outlier Factor(distance to Knn), K-Simple solution :Mean Distance(A),N(A), Reachability-Distance(A,B), Local reachabilitydensity(A), Local outlier Factor(A)
	Module 3:		Impact of Scale & Column standardization,Interpretability, Feature

	Module 3: Foundations of Natural Language Processing and Machine Learning		
2021-01-11	Foundations of Natural Language Processing and Machine Learning	Importance and Forward ClassiVarious Situationsfication Algorithms in Various Situations	Feature selection, Handlingcategorical and numericalfeatures, Handling missing values by imputation, Curse of dimensionality, Bias-Variance tradeoff
2021-01-12	Module 3: Foundations of Natural Language Processing and Machine Learning	Intuitive understanding of bias-variance., Best and ClassiVarious Situationsfication Algorithms in Various Situations	worst cases for analgorithm, Question andAnswers,Revision
2021-01-13	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations Performance Measurementof Models	Accuracy, Confusion matrix, TPR, FPR, FNR, TNR, Precision and recall, F1-score, Receiver Operating Characteristic Curve (ROC) curve and AUC, Log-loss, R-Squared/Coedetermination, Medianfficient of absolute deviation (MAD), Distribution of errors, Assignment:Compute Performance metrics without Sklearn
2021-01-14		Performance Measurementof Models	Revision PerformanceMeasurement of Models

2021-01-15	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Independent vs Mutually exclusive events, Bayes Theorem with examples, Exercise problems on Bayes Theorem, Naive Bayes algorithm, Toy example: Train and test stages, Naive Bayes on Text data	Conditional probability,
2021-01-16	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Laplace/Additive Smoothing, Log-probabilities for numerical stability, Bias and Variance tradeoff, Feature importance and interpretability, Imbalanced data, Outliers, Missing values, Handling Numerical features (Gaussian NB), Multiclass classification, Similarity or Distance matrix, Large dimensionality, Best and worst cases, Code example, Assignment: Apply Multinomial NB on Donors Choose Dataset	Learning
2021-01-17	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Revision Naive Bayes	
2021-01-18	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Geometric intuition of Logistic Regression, Sigmoid function: Squashing, Mathematical formulation of Objective function, Weight vector, L2 Regularization: Overfitting and Underfitting	

			L1 regularization and sparsity, Probabilistic Interpretation: Gaussian
	Module 3: Foundations of Natural		Naive Bayes, Lossminimization interpretation, Hyperparameter search:
2021-01-19	Language Processing and Machine Learning	Logistic Regression	Grid Search and RandomSearch, Column Standardization, Feature importance and Model interpretability, Collinearity of features, Test/Run time space and time complexity, Real world cases
2021-01-20	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Non-linearly separable data & feature engineering, Code sample: Logistic regression, GridSearchCV, RandomSearchCV, Extensions to Logistic Regression: Generalized linear models,Revision Logistic Regression
2021-01-21	Module 3: Foundations of Natural Language Processing and Machine Learning	Linear Regression	Geometric intuition of Linear Regression, Mathematical formulation, Real world Cases, Code sample for Linear Regression, Question and Answers,Revision Linear Regression
	Module 3: Foundations of Natural	and Minima, Vector calculus:	Differentiation, Online differentiation tools, Maxima Grad, Gradient descent:
2021-01-22	Language Processing and Machine Learning	Solving OptimizationProblems	geometric intuition,Learning rate, Gradientdescent for linear regression, SGD algorithm, Constrained Optimization &

				PCA, Logistic regression formulation revisited
	Module 3: Foundations of Natural			Why L1 regularization creates sparsity?,
2021-01-23	Language Processing and Machine Learning	Solving OptimizationProblems		Assignment : Implement SGDClassifier with Log Loss and L2 regularization Using SGD: without using sklearn
	Module 3: Foundations of Natural			
2021-01-24	Language and Machine Learning	Solving OptimizationProblems		Revision SolvingOptimization Problems Processing
	Module 4: Machine			Geometric Intuition, Why we take values +1 and and -1 for Support vector planes, Mathematical derivation,
2021-01-25	Learning-II (Supervised	Support Vector Machines	based interpretation, Dual Learning Models)	Loss function (Hinge Loss) form of SVM formulation, Kernel trick, Polynomial kernel, RBF-Kernel Domain specific Kernels,
	Module 4: Machine			Train and run timecomplexities, nu-SVM:
2021-01-26	Learning-II (Supervised Learning Models)	Support Vector Machines		control errors and supportvectors, SVM Regression, Cases, Code Sample, Assignment : Behaviour of Linear Models
	Module 4: Machine			
2021-01-27	Learning-II (Supervised Learning Models)	Support Vector Machines		Revision Support VectorMachines

			Geometric Intuition of decision tree: Axis parallel hyperplanes, Sample Decision tree, Building a decision Tree:Entropy, Building a decision Tree:Information Gain,
	Module 4: Machine Learning-II (Supervised Learning Models)	Building a decision Tree:Gini Impurity, Building a	
2021-01-28	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	decision Tree: Constructinga DT, Building a decision Tree: Splitting numerical features, Feature standardization, Building a decision Tree:Categorical features with many possible values, Overfitting and Underfitting, Train and Run time complexity, Regression using Decision Trees Module 4: Cases, Code Samples,
2021-01-29	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	Assignment : Apply DecisionTrees on Donors Choose Dataset
2021-01-30	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	Revision Decision Trees
			What are ensembles?, Bootstrapped Aggregation (Bagging) Intuition, Random
	Module 4: Machine Learning-II (Supervised Learning Models)	Forest and theirconstruction, Bias-Variance	
2021-01-31	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	tradeoRun-time Complexity.,ff, Bagging :Train and Bagging:Code Sample, Extremely randomized trees,
			Assignment : Application of Bootstrap samples in Random Forest

2021-02-01	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Random Tree :Cases, Boosting Intuition, Residuals, Loss functions and gradients, Gradient Boosting + Randomization, Boosting, Regularization by Shrinkage, Train and Run time complexity, XGBoost: AdaBoost: geometric intuition, Stacking models, Cascading classifiers, Kaggle competitions vs Real world
2021-02-02	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Assignment : Apply GBDT/ XGBOOST/LIGHT-GBM on Donors Choose Dataset
2021-02-03	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Revision Ensemble Models
2021-02-04	Module 5: Feature Engineering,Productionization and Deployment of ML Models	Featurization And FeatureImportance	Introduction, Moving window for Time SeriesData, Fourier decomposition, Deeplearning features: LSTM,Image histogram, Keypoints: SIFT., Deep learning features: CNN, Relational data, Graph data Indicator variables, Feature binning, Interaction variables, Mathematicaltransforms, Model specific Feature
2021-02-05	Module 5: Feature Engineering,Productionization and Deployment of ML Models	Featurization And FeatureImportance	featurizations, Featureorthogonality, Domainspecific featurizations, Feature slicing, Kaggle Winners solutions,Revision

Featurization And Feature Importance

Calibration of Models:Need for calibration, Calibration

Module 5: Plots., Platt's Calibration/Scaling., Isotonic Feature

2021-02-06 Engineering,Productionization and Deployment of ML Models Miscellaneous Topics Regression, Code Samples,Modeling in the presence ofoutliers: RANSAC, Productionizing models, Retraining models periodically., A/B testing., Data Science Life cycle Productionization and deployment of Machine Learning Models, Module 5: Feature

2021-02-07 Engineering,Productionization and Deployment of ML Models Miscellaneous Topics Productionization anddeployment + Spark, Hands on Live Session: Deploy an ML model using APIs on AWS Module 5: Feature Building web apps for ML/AI

2021-02-08 Engineering,Productionization and Deployment Miscellaneous Topics using StreamLit, Buildingweb apps for ML/AI using StreamLit-ii of ML Models Module 5: Feature

2021-02-09 Engineering,Productionization and Deployment of ML Models Miscellaneous Topics VC dimension,RevisionMiscellaneous Topics

Business/Real world problem : Problem definition , Business objectives and constraints., Mapping to an ML problem : Data overview , Mapping to an ML problem : ML problem and performance metric., Mapping to an ML problem Module 6: : Train-test split, EDA: Basic Machine

2021-02-10 Learning RealWorld Case Extraction, EDA:Text Preprocessing, EDA: studies Quora Question PairSimilarity Statistics., EDA: BasicFeature Advanced Feature Extraction, EDA: Feature analysis., EDA: Data Visualization: T-SNE., EDA: TF-IDF weighted Word2Vec featurization., ML Models :Loading Data, ML Models: Random Model, ML Models : Logistic Regression and Linear SVM Module 6: Machine

2021-02-11 Learning RealWorld Case QuoraQuestion Pair Similarity studies Quora Question PairSimilarity ML Models :XGBoost,Revision Business/Real world problem : Overview, Business objectives and constraints., ML problem formulation :Data, ML problem formulation: Mapping real world to ML problem., ML Module 6: problem formulation :Train,CV and Test data Machine

2021-02-12 Learning Real World Case & preprocessing, studies Personalized CancerDiagnosis Exploratory Data Analysis:Reading data construction, ExploratoryData Analysis:Distribution of Class-labels, Exploratory Data Analysis: “Random” Model, Univariate Analysis:Gene feature, Univariate Analysis:Variation Feature Univariate Analysis:Text feature, Machine Learning Models:Data preparation, Baseline Model: Naive Bayes, K-Nearest Neighbors

Classification, Logistic

Module 6: Regression with classbalancing, Logistic

Machine

2021-02-13 Learning Real Personalized CancerDiagnosis Regression without classbalancing, Linear-SVM.,

World Case Random-Forest with one-hot studies encoded features, Random-

Forest with response-coded features, Stacking Classifier, Majority Voting classifier,Revision Personalized Cancer Diagnosis

Problem definition. ,
Overview of Graphs: node/ vertex, edge/link, directed-

Module 6: edge, path.Limitations. , Data format & , Mapping to a

Machine Facebook Friend

2021-02-14 Learning Real Recommendation Using supervised classiproblem. , Businessfication

World Case Graph Mining constraints & Metrics. ,

studies EDA:Basic Stats,

EDA:Follower and following stats., EDA:Binary Classification Task EDA:Train and test split.,

Module 6: Feature engineering onGraphs:Jaccard & Cosine

Machine Facebook Friend

2021-02-15 Learning Real Recommendation Using Similarities, PageRank,Shortest Path, Connected-

World Case Graph Mining components, Adar Index,

studies Kartz Centrality, HITS

Score, SVD

Module 6:

Machine Facebook Friend Weight features, Modeling,

2021-02-16 Learning Real Recommendation Using Assignment : Facebook World Case Graph Mining Friend Recommendation studies Module 6:

Machine Facebook Friend

2021-02-17 Learning Real Recommendation Using Assignment: SQL

World Case Graph Mining studies Module 6:

Machine Learning Real World Case

Facebook Friend Recommendation Using Graph Mining

Revision Facebook Friend Recommendation Using Graph Mining studies

2021-02-18

Business/Real world problem Overview, Objectives and Constraints, Mapping to ML problem :Data, Mapping to ML problem :dask dataframes, Mapping to ML problem :Fields/Features., Mapping to ML problem :Time series forecasting/ Regression, Mapping to ML problem :Performance metrics, Data Cleaning :Latitude and Longitude

Module 6: Machine

2021-02-19 Learning RealWorld Case studies Taxi Demand Prediction in New York City data, Data Cleaning :TripDuration., Data Cleaning:Speed., Data Cleaning :Distance., Data Cleaning :Fare, Data Cleaning :Remove all outliers/ erroneous points, Data Preparation:Clustering/ Segmentation, Data Preparation:Time binning, Data Preparation:Smoothing time-series data., Data Preparation:Smoothing timeseries data cont.., Data Preparation: Time series and Fourier transforms.

Module 6: Machine

Ratios and previous-time-bin values, Simple moving average, Weighted Moving average., Exponential weighted moving average,

2021-02-20 Learning RealWorld Case studies Taxi Demand Prediction inNew York City Results., Regression models:Linear regression., RandomTrain-Test split & Features,

Forest regression, Xgboost Regression, Model comparison,Revision Taxi Demand Prediction in New York City

Business/Real world problem, Business objectives and constraints, Mapping to an ML problem: Data overview, Mapping to an ML

Module 6: problem:ML problemformulation., Mapping to an Machine

2021-02-21 Learning RealWorld Case Stack OverPredictorflow Tag ML problem:Performancemetrics., Hamming loss,EDA:Data Loading,

studies EDA:Analysis of tags,

EDA:Data Preprocessing, Data Modeling : Multi label Classification, Data preparation., Train-Test Split, Featurization

Logistic regression: One VS Module

6: Rest, Sampling data and

Machine

2021-02-22 Learning RealWorld Case Stack OverPredictorflow Tag tags+Weighted models.,Logistic regression revisited,Why not use advanced

studies techniques,Revision Stack Overflow Tag Predictor Problem Definition, Objectives and Constraints, Data Overview, ML Problem, Train and Test Splitting, Exploratory Data Analysis:Class Distribution, Exploratory Data Analysis:Feature Extraction from Byte Files, Exploratory Data Analysis:Multivariate analysis of features from

Module 6: byte files, Train-Test class

Machine

2021-02-23 Learning RealWorld Case Microsoft MalwareDetection Distribution, ML models –using byte :Random Model, K-NN,files only

studies Logistic regression, Random Forest and XGBoost, Feature Extraction and Multi Threading, File Size Feature,

			Univariate Analysis, T-SNE Analysis, ML Models on ASM File features, Models on all features: t-SNE, Models on all features: RandomForest and XGBoost, Assignment : Microsoft Malware Detection
2021-02-24	Module 6: Machine Learning Real World Case studies	Microsoft MalwareDetection	Revision Microsoft MalwareDetection
2021-02-25	Module 7: Data Mining (Unsupervised Learning) andRecommender systems+Real World Case studies	Clustering	What is Clustering?, Unsupervised learning,Applications, Metrics for Clustering, K-Means: Geometric intuition,Centroids, K-Means:Mathematical formulation: Objective function, K-Means Algorithm., How to initialize: K-Means++, Failure cases/ Limitations, K-Medoids
2021-02-26	Module 7: Data Mining (Unsupervised Learning) andRecommender systems+Real World Case studies	Clustering	Determining the right K, Code Samples, Time andspace complexity,Assignment :Clustering on Graph Dataset
2021-02-27	Module 7: Data Mining (Unsupervised Learning) andRecommender systems+Real World Case studies	Clustering	Revision Clustering Agglomerative & Divisive,

Module 7: Data Dendrograms, Mining Agglomerative Clustering, (Unsupervised Proximity methods:

2021-02-28 Learning) andRecommender Hierarchical Clustering Advantages and Limitations.,Time and Space Complexity,

systems+Real Limitations of Hierarchical World Case Clustering, Code studies sample,Revision

Hierarchical Clustering Density based clustering,

MinPts and Eps: Density,

Module 7: Data Core, Border and Noisepoints, Density edge and

Mining Density connected points.,

(Unsupervised

2021-03-01 Learning) andRecommender DBSCAN Technique DBSCAN Algorithm, HyperParameters: MinPts

and Eps,Advantages and Limitations systems+Real of DBSCAN, Time and Space World

Case Complexity, Code samples.,

studies Question and

Answers,Revision DBSCAN Technique

Problem formulation: IMDB Movie reviews, Content

Module 7: Data based vs Collaborative

Mining Filtering, Similarity based

(Unsupervised Algorithms, Matrix

2021-03-02 Learning) andRecommenderRecommender Systems andMatrix Factorization Factorization: PCA, SVD,Matrix Factorization: NMF,

systems+Real Matrix Factorization for World Case Collaborative filtering, studies

Matrix Factorization for

feature engineering,

Clustering as MF Hyperparameter tuning, Module 7: Data Matrix Factorization forrecommender systems:

Mining Netflix Prize Solution, Cold

(Unsupervised

2021-03-03 Learning) andRecommenderRecommender Systems andMatrix Factorization Start problem, Word vectorsas MF, Eigen-Faces, Codeexample., Assignment :

systems+Real Recommendation Systems World Case and Truncated SVD:
studies Implement SGD algorithm to predict the ratings

Module 7: Data Mining (Unsupervised

2021-03-04 Learning) andRecommenderRecommender Systems andMatrix FactorizationRevision RecommenderSystems and MatrixFactorization

systems+Real World Case studies Problem Statement: Recommend similar apparel products in e-commerce using product descriptions and Images, Plan of action, Amazon product advertising

Module 7: Data Mining (Unsupervised API, Data folders and paths, Overview of the data and Terminology, Data cleaning

2021-03-05 Learning) andRecommender Amazon Fashion DiscoveryEngine and understanding:Missingdata in various features,

systems+Real studies Understand duplicate rows, World Case Remove duplicates : Part 1 , Remove duplicates: Part 2, Text Pre-Processing: Tokenization and Stop-word removal, Stemming, Text based product similarity :Converting text to an n-D vector: bag of words

Code for bag of words based product similarity, TF-IDF: featurizing text based on word-importance, Code for TF-IDF based product similarity, Code for IDF based product similarity, Text Semantics based product similarity: Word2Vec(featurizing text based on semantic similarity), Code for Average Word2Vec product similarity,

Module 7: Data Mining(Learning) andUnsupervised Amazon Fashion Discovery TF-IDF weighted Word2Vec,Code for IDF weightedWord2Vec product similarity,Weighted similarity usingbrand and color, Code for

2021-03-06 Recommender systems+Real Engine weighted similarity, Buildinga real world solution, Deep

World Case learning based visual studies product similarity:ConvNets:

How to featurize an image: edges, shapes, parts, Using Keras + Tensorflow to extract features, Visual similarity based product similarity, Measuring goodness of our solution :A/ B testing, Exercise :Build a weighted Nearest neighbor model using Visual, Text, Brand and Color,Revision

Amazon Fashion Discovery Engine

Business/Real World Problem:Problem Definition, Objectives and Constraints, Mapping to ML problem : Data Overview, Mapping to ML problem : ML problem formulation, Exploratory Data Analysis: Data

			preprocessing, Exploratory Data Analysis: Temporal Train-Test split, Exploratory
	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Data Analysis: PreliminaryData Analysis, Exploratory Data Analysis: Sparse matrix representation, ExploratoryData Analysis:Averageratings for various slices , Exploratory Data Analysis:Cold start problem, Computing Similarity matrices:User-User similarity matrix , Computing Similarity matrices:Movie-Movie similarity , Computing Similarity matrices:Does movie-movie similarity work?, ML Models:Surprise library , Overview of the modelling strategy. , Data Sampling. Google drive with intermediate files , Featurizations for regression. , Data transformation for Surprise. , Xgboost with 13 features , Surprise Baseline model. , Xgboost + 13 features +Surprise baselinemodel , Surprise KNN predictors , Matrix Factorization models using Surprise , SVD ++ with implicit feedback , Final models with all features and predictors., High Level + End-End Design of a Music Recommendation system - I	
2021-03-07			
2021-03-08			
	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	High Level + End-End Design of a Music Recommendation system - II	

2021-03-09 Learning) andRecommenderRecommendation systemNetflix Movie Recommendation system - II,Building a simple Youtube

systems+Real recommendation using basic
World Case Math studies
Module 7: Data
Mining
(Unsupervised

2021-03-10 Learning) andRecommenderRecommendation systemNetflix MovieRevision NetRecommendation systemflix Movie

systems+Real World
Case studies

History of Neural networks and
Deep Learning., How

Module 8: Neural Biological Neurons work?,Growth of biological neural Networks,

2021-03-11 Computer Vision Neural Networks networks, Diagrammaticrepresentation: Logistic

and Deep Regression and Perceptron,
Learning Multi-Layered Perceptron
(MLP)., Notation, Training a single-neuron model.
Training an MLP: Chain
Rule, Training an

Module 8: Neural MLP:Memoization,Backpropagation., Networks,

2021-03-12 Computer Vision Neural Networks Activation functions,Vanishing Gradient

and Deep problem., Bias-Variance Learning tradeoff., Decision surfaces:

Playground,Revision Neural
Networks
Deep Multi-layer
perceptrons:1980s to 2010s,
Module 8: Neural Dropout layers &
Networks,

2021-03-13 Computer Vision Deep Multi LayerPerceptrons Regularization., RectiLinear Units (ReLU)., Weightinitialization., Batch fied

and Deep
Learning Normalization.,

			Optimizers:Hill-descent analogy in 2D Optimizers:Hill descent in 3D and contours., SGD Recap, Batch SGD with momentum., Nesterov Accelerated	
	Module 8: Neural Networks,		Gradient (NAG),	
2021-03-14	Computer Vision and Deep Learning	Deep Multi LayerPerceptrons	Optimizers:AdaGrad,Optimizers : AdadeltaandRMSProp, Adam, Which algorithm to choose when?, Gradient Checking and clipping, Softmax and Crossentropy for multi-class classification. How to train a Deep MLP?,	
	Module 8: Neural Networks,		Auto Encoders., Word2Vec:CBOW, Word2Vec: SkipNetworks,	
2021-03-15	Computer Vision and Deep Learning	Deep Multi LayerPerceptrons	gram, Word2Vec:Algorithmic Optimizations., Assignment : LearningBackpropagation and Gradient Checking	
	Module 8: Neural Networks,			
2021-03-16	Computer Vision and Deep Learning	Deep Multi LayerPerceptrons	Revision Deep Multi LayerPerceptrons and Deep Learning	
	Module 8: Neural Networks,		Tensorflow and Keras overview, GPU vs CPU for Deep Learning., GoogleColaboratory., Install	
2021-03-17	Computer Vision and Deep Learning	Tensorflow And Keras	TensorFlow, Onlinedocumentation and tutorials, Softmax Classifier on MNIST dataset., MLP: Initialization, Model 1: Sigmoid activation. Model 2: ReLU activation.,	
	Module 8: Neural Networks,		Model 3: BatchNormalization., Model 4 :	
2021-03-18	Computer Vision	Tensorflow And Keras	Dropout., MNISTclassification in Keras.,	

and Deep Hyperparameter tuning in Learning Keras., Assignment :
Working with Callbacks

Module 8: Neural Exercise: Try different MLP
Networks,

2021-03-19 Computer Vision Tensorflow And Keras architectures on MNISTdataset.,Revision Tensorflow and
Deep And Keras
Learning

Biological inspiration: Visual
Cortex, Convolution:Edge
Module 8: Neural Detection on images.,
Networks, Convolution:Padding and
2021-03-20 Computer Vision Convolutional Neural Nets strides, Convolution over
and Deep RGB images., Convolutional
Learning layer., Max-pooling., CNN
Training: Optimization,
Example CNN: LeNet [1998]
ImageNet dataset., Data
Module 8: Neural Augmentation., Convolution
Networks, Layers in Keras, AlexNet,
2021-03-21 Computer Vision Convolutional Neural Nets VGGNet, Residual Network.,
and Deep Inception Network., What is Learning Transfer learning., Code
example: Cats vs Dogs.

Module 8: Neural Code Example: MNISTdataset., Assignment : Networks,

2021-03-22 Computer Vision Convolutional Neural Nets Transfer Learning - (Givenan rvl-cdip dataset, classify
and Deep the given document using Learning transfer learning)
Module 8: Neural
Networks,

2021-03-23 Computer Vision Convolutional Neural Nets Assignment : DocumentClassification with CNN and
Deep Learning
Module 8: Neural
Networks,

2021-03-24 Computer Vision Convolutional Neural Nets Revision ConvolutionalNeural Nets and Deep
Learning Module 8: Neural Why RNNs? , Recurrent
Networks,

2021-03-25 Computer Visionand Deep Memory(LSTMS)Long Short-Term Neural Network., TrainingRNNs:
Backprop., Types ofRNNs., Need for LSTM/

Learning GRU., LSTM.
GRUs., Deep RNN., Module 8:
Neural Bidirectional RNN., Code
Networks,

2021-03-26 Computer Visionand Deep Memory(LSTMS)Long Short-Term example : IMDB SentimentclassiLSTM on Donors Choose -fication, Assignment :

Learning (LSTM with Text and
categorical data)
Module 8: Neural Assignment : CNN on CIFR -
Networks,

2021-03-27 Computer Visionand Deep Memory(LSTMS)Long Short-Term(dataset images withDenseNet and work withClassifying CIFAR-10

Learning optimization)
Exercise: Amazon Fine Food Module
8: Neural reviews LSTM model., Deep
Networks,

2021-03-28 Computer Visionand Deep Memory(LSTMS)Long Short-Term Learning: GenerativeAdversarial Networks(GANs):Live session on

Learning Generative Adversarial
Networks (GAN)

Module 8: Neural Encoder-DecoderModels:LIVE: Encoder Networks,

2021-03-29 Computer Visionand Deep Memory(LSTMS)Long Short-Term Decoder Models, AttentionModels in DeepLearning:Attention Models in

Learning Deep Learning

Module 8: Neural
Networks, **2021-03-30** Computer Visionand Deep Memory(LSTMS)Long Short-Term

Assignment : NLP AttentionMechanism

Learning

Deep Learning:
Module 8: Neural Transformers and

Networks,

2021-03-31 Computer Visionand Deep Memory(LSTMS)Long Short-Term BERT:Transformers andBERT, Assignment : NLPwith Transfer Learning -

Learning (Classification of reviews using BERT embeddings)
Deep Learning: Image

Module 8: Neural Segmentation:Live sessionon Image Segmentation, Networks,

2021-04-01 Computer Visionand Deep Memory(LSTMS)Long Short-Term Assignment : ComputerVision: Segmentation - (SelfDriving Cars: Detect the

Learning Objects on the road using Semantic Segmentation)

Module 8: Neural
Networks,

2021-04-02 Computer Visionand Deep Memory(LSTMS)Long Short-Term Deep Learning: ObjectDetection:Object Detection

Learning
Module 8: Neural
Networks,

2021-04-03 Computer Visionand Deep Memory(LSTMS)Long Short-TermObject Detection YOLOV3,Revision Long Short-Term Memory(LSTMS)

Learning

Human Activity Recognition Problem definition, Dataset understanding, Data

Module 9: Deep cleaning & preprocessing,

2021-04-04 Learning RealWorld Case Human Activity Recognition EDA:Univariate analysis.,EDA:Data visualization usingt-SNE, Classical ML models.,

Studies Deep-learning Model.,

Exercise: Build deeper LSTM models and hyper-param tune them Module 9: Deep

2021-04-05 Learning RealWorld Case Studies Human Activity Recognition Revision Human ActivityRecognition Problem Definition, Datasets., Data understanding & Analysis :Files and folders., Dash-cam images and steering angles., Split the dataset: Train vs Test, EDA: Steering angles, Module 9: Deep

2021-04-06 Learning RealWorld Case Studies Self Driving Car Mean Baseline model:simple, Deep-learningmodel:Deep Learning for regression: CNN, CNN+RNN, Batch load the dataset., NVIDIA's end to end CNN model., Train the model., Test and visualize the output., Extensions.,Revision Self Driving Car Real-world problem, Music representation, Char-RNN with abc-notation :Char-RNN model, Char-RNN with Module 9: Deep

2021-04-07 Learning RealWorld Case Studies Music Generation UsingDeep Learning abc-notation :Datapreparation., Char-RNN with abc-notation:Many to Many RNN ,TimeDistributedDense layer, Char-RNN with abc-notation : State full RNN Char-RNN with abc-notation :Model architecture,Model training., Char-RNN with abc-notation :Music generation., Char-RNN with Module 9: Deep

2021-04-08 Learning RealWorld Case Studies Module 9: Deep Learning Music Generation UsingDeep Learning abc-notation :Generate tablamusic, MIDI musicgeneration., Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design + Code] --- Part 1 Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design +

2021-04-09 Learning RealWorld Case Studies Module 9: Deep Learning Music Generation UsingDeep Learning Code] --- Part 2 , Case Study13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design + Code] --- Part 3 Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design +

2021-04-10 Learning RealWorld Case Studies Module 9: Deep Learning Music Generation UsingDeep Learning Code] --- Part 4 , Surveyblog, Assignment : SpokenDigit Recognition - (Working with Audio Dataset: Detect the sounds using spectrograms and Deep Learning)

2021-04-11 Learning RealWorld Case Studies Module 9: Deep Learning Music Generation UsingDeep Learning Revision Music GenerationUsing Deep Learning

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Please mail us to team@appliedaicourse.com if you have any queries