Applied Machine Learning Course Schedule

DATE	MODULE	CHAPTER	TOPIC
2021-10-01	Module 1:Fundamentals of Programming	Python for DataScience	Keywords and identifiers, comments, indentation and statements, Variables and data types in Python
2021-10-02	Module 1:Fundamentals of Programming	Python for DataScience	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
2021-10-03	Module 1:Fundamentals of Programming	Python for DataScience:Data Structures	Lists, Tuples part 1, Tuples part-2, Sets, Dictionary, Strings,Revision Python for DataScience:Data Structures
2021-10-04	Module 1:Fundamentals of Programming	Python for DataScience:Functions	Introduction, Types of functions
2021-10-05	Module 1:Fundamentals of Programming	Python for DataScience:Functions	Function arguments, Recursive functions, Lambda functions
2021-10-06	Module 1:Fundamentals of Programming	Python for DataScience:Functions	Modules, Packages, File Handling
2021-10-07	Module 1:Fundamentals of Programming	Python for DataScience:Functions	Exception Handling, Debugging Python,Revision Python for DataScience:Functions
2021-10-08	Module 1:Fundamentals of Programming	Python for DataScience:Numpy	Numpy Introduction
2021-10-09	Module 1:Fundamentals of Programming	Python for DataScience:Numpy	Numerical operations on Numpy,Revision Python for DataScience:Numpy
2021-10-10	Module 1:Fundamentals of Programming	Python for DataScience:Matplotlib	Getting started with Matplotlib,Revision Python for DataScience:Matplotlib
2021-10-11	Module 1:Fundamentals of Programming	Python for DataScience:Pandas	Getting started with pandas, Data Frame Basics, Key Operations on Data Frames

2021-10-12	Module 1:Fundamentals of Programming	Python for DataScience:Pandas	Revision Python for DataScience:Pandas
2021-10-13	Module 1:Fundamentals of Programming	Python for DataScience:Compputational Complexity	Space and Time Complexity: Find largest number in a list , Binary search
2021-10-14	Module 1:Fundamentals of Programming	Python for DataScience:Compputational Complexity	Find elements common in two lists, Find elements common in two lists using a Hashtable/Dict,Revision Python for DataScience:Compputational Complexity
2021-10-15	Module 1:Fundamentals of Programming	SQL	Introduction to Databases, Why SQL?
2021-10-16	Module 1:Fundamentals of Programming	SQL	Execution of an SQL statement., IMDB dataset, Installing MySQL, Load IMDB data., USE, DESCRIBE, SHOW TABLES, SELECT , LIMIT, OFFSET, ORDER BY, DISTINCT , WHERE, Comparison operators, NULL, Logical Operators, Aggregate Functions: COUNT, MIN, MAX, AVG, SUM, GROUP BY
2021-10-17	Module 1:Fundamentals of Programming	SQL	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, DDL:CREATE TABLE, DDL:ALTER: ADD, MODIFY, DROP, DDL:DROP TABLE, TRUNCATE, DELETE, Data Control Language: GRANT, REVOKE, Learning resources,Revision SQL
2021-10-18	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Introduction to IRIS dataset and 2D scatter plot, 3D scatter plot

2021-10-19	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Pair plots, Limitations of Pair Plots, Histogram and Introduction to PDF(Probability Density Function)
2021-10-20	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Univariate Analysis using PDF, CDF(Cumulative Distribution Function), Mean, Variance and Standard Deviation
2021-10-21	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Median, Percentiles and Quantiles, IQR(Inter Quartile Range) and MAD(Median Absolute Deviation), Box-plot with Whiskers
2021-10-22	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Violin Plots, Summarizing Plots, Univariate, Bivariate and Multivariate analysis, Multivariate Probability Density, Contour Plot, Exercise: Perform EDA on Haberman dataset
2021-10-23	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Revision Plotting for exploratory data analysis (EDA)

2021-10-24	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Linear Algebra	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 origin, Normal to a Plane, Distance of a point from a 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,Revision Linear Algebra
2021-10-25	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	Introduction to Probability and Statistics, Population and Sample, Gaussian/ Normal Distribution and its PDF(Probability Density Function)
2021-10-26	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	CDF(Cumulative Distribution function) of Gaussian/ Normal distribution, Symmetric distribution, Skewness and Kurtosis, Standard normal variate (Z) and standardization, Kernel density estimation, Sampling distribution & Central Limit theorem
2021-10-27	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	Q-Q plot:How to test if a random variable is normally distributed or not?, How distributions are used?
2021-10-28	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	Chebyshev’s inequality, Discrete and Continuous Uniform distributions

2021-10-29	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	How to randomly sample data points (Uniform Distribution), Bernoulli and Binomial Distribution, Log Normal Distribution
2021-10-30	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	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? , Confidence interval (C.I) Introduction, Computing confidence interval given the underlying distribution, C.I for mean of a normal random variable, Confidence interval using bootstrapping, Hypothesis testing methodology, Null-hypothesis, 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 testing: another example, Resampling and Permutation test: another example, How to use hypothesis testing?, Propotional sampling
2021-10-31	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	Revision Questions, Assignment :Python (without Numpy)
2021-11-01	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	Revision Probability And Statistics

2021-11-02	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Dimensionality Reduction And Visualization	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
2021-11-03	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Dimensionality Reduction And Visualization	Mean of a data matrix, Data Preprocessing: Column Standardization, Co-variance of a Data Matrix
2021-11-04	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Dimensionality Reduction And Visualization	MNIST dataset (784 dimensional), Code to Load MNIST Data Set
2021-11-05	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Dimensionality Reduction And Visualization	Revision Dimensionality Reduction And Visualization
2021-11-06	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Principal Component Analysis	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 reduction, PCA for Dimensionality Reduction and Visualization, Visualize MNIST dataset, Limitations of PCA, PCA Code example, PCA for dimensionality reduction (not-visualization),Revision Principal Component Analysis

2021-11-07	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	T-Sne	What is t-SNE?, Neighborhood of a point, Embedding, Geometric intuition of t-SNE, Crowding Problem, How to apply t-SNE and interpret its output, t-SNE on MNIST, Code example of t-SNE, Revision Questions,Revision T-Sne
2021-11-08	Module 3: Foundations of Natural Language Processing and Machine Learning	Predict rating given product reviews on amazon	Dataset overview: Amazon Fine Food reviews(EDA), Data Cleaning: Deduplication
2021-11-09	Module 3: Foundations of Natural Language Processing and Machine Learning	Predict rating given product reviews on amazon	Why convert text to a vector?, Bag of Words (BoW)
2021-11-10	Module 3: Foundations of Natural Language Processing and Machine Learning	Predict rating given product reviews on amazon	Text Preprocessing: Stemming, Stop-word removal, Tokenization, Lemmatization., uni-gram, bi-gram, n-grams., tf-idf (term frequency- inverse document frequency)
2021-11-11	Module 3: Foundations of Natural Language Processing and Machine Learning	Predict rating given product reviews on amazon	Why use log in IDF?, Word2Vec., Avg-Word2Vec, tf-idf weighted Word2Vec, Bag of Words(Code Sample), Text Preprocessing(Code Sample)
2021-11-12	Module 3: Foundations of Natural Language Processing and Machine Learning	Predict rating given product reviews on amazon	Bi-Grams and n-grams (Code Sample), TF-IDF (Code Sample), Assignment :Implementing TFIDF vectorizer

2021-11-13	Module 3: Foundations of Natural Language Processing and Machine Learning	Predict rating given product reviews on amazon	Word2Vec (Code Sample), Avg-Word2Vec and TFIDF-Word2Vec (Code Sample),Revision Predict rating given product reviews on amazon
2021-11-14	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
2021-11-15	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Need for Cross validation, K-fold cross validation
2021-11-16	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Visualizing train, validation and test datasets, How to determine overfitting and underfitting?
2021-11-17	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Time based splitting, k-NN for regression, Weighted k-NN

2021-11-18	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Voronoi diagram, Binary search tree, How to build a kd-tree
2021-11-19	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Find nearest neighbours using kd-tree, Limitations of Kd tree, Extensions, Hashing vs LSH
2021-11-20	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	LSH for cosine similarity, LSH for euclidean distance, Probabilistic class label, Code Sample:Decision boundary ., Code Sample:Cross Validation, Assignment : Implement RandomSearchCV with k fold cross validation on KNN
2021-11-21	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K-Nearest Neighbors	Question and Answers,Revision Classification And Regression Models: K-Nearest Neighbors
2021-11-22	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	Introduction, Imbalanced vs balanced dataset, Multi-class classification
2021-11-23	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	k-NN, given a distance or similarity matrix, Train and test set differences

2021-11-24	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	Impact of outliers, Local outlier Factor (Simple solution :Mean distance to Knn), K-Distance(A),N(A), Reachability-Distance(A,B)
2021-11-25	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	Local reachability-density(A), Local outlier Factor(A), Impact of Scale & Column standardization, Interpretability, Feature Importance and Forward Feature selection
2021-11-26	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	Handling categorical and numerical features, Handling missing values by imputation
2021-11-27	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	Curse of dimensionality, Bias-Variance tradeoff, Intuitive understanding of bias-variance., Best and worst cases for an algorithm, Question and Answers,Revision Classification Algorithms in Various Situations
2021-11-28	Module 3: Foundations of Natural Language Processing and Machine Learning	Performance Measurement of 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/Coefficient of determination, Median absolute deviation (MAD), Distribution of errors, Assignment:Compute Performance metrics without Sklearn
2021-11-29	Module 3: Foundations of Natural Language Processing and Machine Learning	Performance Measurement of Models	Revision Performance Measurement of Models

2021-11-30	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Conditional probability, Independent vs Mutually exclusive events, Bayes Theorem with examples
2021-12-01	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Exercise problems on Bayes Theorem, Naive Bayes algorithm, Toy example: Train and test stages
2021-12-02	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Naive Bayes on Text data, Laplace/Additive Smoothing
2021-12-03	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Log-probabilities for numerical stability, Bias and Variance tradeoff, Feature importance and interpretability
2021-12-04	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	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
2021-12-05	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Revision Naive Bayes

2021-12-06	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Geometric intuition of Logistic Regression
2021-12-07	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Sigmoid function: Squashing
2021-12-08	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Mathematical formulation of Objective function, Weight vector
2021-12-09	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	L2 Regularization: Overfitting and Underfitting, L1 regularization and sparsity
2021-12-10	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Probabilistic Interpretation: Gaussian Naive Bayes, Loss minimization interpretation

2021-12-11	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Hyperparameter search: Grid Search and Random Search, Column Standardization, Feature importance and Model interpretability, Collinearity of features, Test/Run time space and time complexity, Real world cases, Non-linearly separable data & feature engineering, Code sample: Logistic regression, GridSearchCV, RandomSearchCV, Extensions to Logistic Regression: Generalized linear models,Revision Logistic Regression
2021-12-12	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
2021-12-13	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	Differentiation, Online differentiation tools
2021-12-14	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	Maxima and Minima, Vector calculus: Grad, Gradient descent: geometric intuition
2021-12-15	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	Learning rate, Gradient descent for linear regression, SGD algorithm, Constrained Optimization & PCA

2021-12-16	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	Logistic regression formulation revisited, Why L1 regularization creates sparsity?, Assignment : Implement SGD Classifier with Log Loss and L2 regularization Using SGD: without using sklearn
2021-12-17	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	Revision Solving Optimization Problems
2021-12-18	Module 4: Machine Learning-II (Supervised Learning Models)	Support Vector Machines	Geometric Intuition, Why we take values +1 and and -1 for Support vector planes, Mathematical derivation, Loss function (Hinge Loss) based interpretation, Dual form of SVM formulation, Kernel trick, Polynomial kernel, RBF-Kernel, Domain specific Kernels, Train and run time complexities
2021-12-19	Module 4: Machine Learning-II (Supervised Learning Models)	Support Vector Machines	nu-SVM: control errors and support vectors, SVM Regression, Cases, Code Sample, Assignment : Behaviour of Linear Models
2021-12-20	Module 4: Machine Learning-II (Supervised Learning Models)	Support Vector Machines	Revision Support Vector Machines
2021-12-21	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	Geometric Intuition of decision tree: Axis parallel hyperplanes, Sample Decision tree, Building a decision Tree:Entropy
2021-12-22	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	Building a decision Tree:Information Gain, Building a decision Tree: Gini Impurity, Building a decision Tree: Constructing a DT

2021-12-23	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	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
2021-12-24	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	Regression using Decision Trees, Cases, Code Samples, Assignment : Apply Decision Trees on Donors Choose Dataset
2021-12-25	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	Revision Decision Trees
2021-12-26	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	What are ensembles?, Bootstrapped Aggregation (Bagging) Intuition, Random Forest and their construction, Bias-Variance tradeoff, Bagging :Train and Run-time Complexity., Bagging:Code Sample, Extremely randomized trees, Assignment : Application of Bootstrap samples in Random Forest
2021-12-27	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Random Tree :Cases, Boosting Intuition, Residuals, Loss functions and gradients
2021-12-28	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Gradient Boosting, Regularization by Shrinkage, Train and Run time complexity, XGBoost: Boosting + Randomization
2021-12-29	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	AdaBoost: geometric intuition, Stacking models, Cascading classifiers

2021-12-30	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Kaggle competitions vs Real world, Assignment : Apply GBDT/XGBOOST/LIGHT-GBM on Donors Choose Dataset
2021-12-31	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Revision Ensemble Models
2022-01-01	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Featurization And Feature Importance	Introduction, Moving window for Time Series Data, Fourier decomposition, Deep learning features: LSTM, Image histogram, Keypoints: SIFT., Deep learning features: CNN, Relational data, Graph data, Indicator variables, Feature binning
2022-01-02	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Featurization And Feature Importance	Interaction variables, Mathematical transforms, Model specific featurizations, Feature orthogonality, Domain specific featurizations, Feature slicing, Kaggle Winners solutions,Revision Featurization And Feature Importance
2022-01-03	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Calibration of Models:Need for calibration, Calibration Plots., Platt’s Calibration/ Scaling.
2022-01-04	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Isotonic Regression, Code Samples, Modeling in the presence of outliers: RANSAC, Productionizing models
2022-01-05	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Retraining models periodically., A/B testing., Data Science Life cycle, Productionization and deployment of Machine Learning Models

2022-01-06	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Productionization and deployment + Spark
2022-01-07	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Hands on Live Session: Deploy an ML model using APIs on AWS
2022-01-08	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Building web apps for ML/AI using StreamLit, Building web apps for ML/AI using StreamLit-ii
2022-01-09	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	VC dimension,Revision Miscellaneous Topics
2022-01-10	Module 6: Machine Learning Real World Case studies	Quora Question Pair Similarity	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 : Train-test split, EDA: Basic Statistics.
2022-01-11	Module 6: Machine Learning Real World Case studies	Quora Question Pair Similarity	EDA: Basic Feature Extraction, EDA: Text Preprocessing, EDA: Advanced Feature Extraction
2022-01-12	Module 6: Machine Learning Real World Case studies	Quora Question Pair Similarity	EDA: Feature analysis., EDA: Data Visualization: T-SNE., EDA: TF-IDF weighted Word2Vec featurization., ML Models :Loading Data, ML Models: Random Model

2022-01-13	Module 6: Machine Learning Real World Case studies	Quora Question Pair Similarity	ML Models : Logistic Regression and Linear SVM, ML Models : XGBoost,Revision Quora Question Pair Similarity
2022-01-14	Module 6: Machine Learning Real World Case studies	Personalized Cancer Diagnosis	Business/Real world problem : Overview, Business objectives and constraints., ML problem formulation :Data, ML problem formulation: Mapping real world to ML problem.
2022-01-15	Module 6: Machine Learning Real World Case studies	Personalized Cancer Diagnosis	ML problem formulation :Train, CV and Test data construction, Exploratory Data Analysis:Reading data & preprocessing, Exploratory Data 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 Regression with class balancing
2022-01-16	Module 6: Machine Learning Real World Case studies	Personalized Cancer Diagnosis	Logistic Regression without class balancing, Linear-SVM., Random-Forest with one-hot encoded features, Random-Forest with response-coded features, Stacking Classifier, Majority Voting classifier,Revision Personalized Cancer Diagnosis
2022-01-17	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Problem definition. , Overview of Graphs: node/ vertex, edge/link, directed-edge, path. , Data format & Limitations. , Mapping to a supervised classification problem.

2022-01-18	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Business constraints & Metrics. , EDA:Basic Stats
2022-01-19	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	EDA:Follower and following stats., EDA:Binary Classification Task, EDA:Train and test split.
2022-01-20	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Feature engineering on Graphs:Jaccard & Cosine Similarities, PageRank, Shortest Path
2022-01-21	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Connected-components, Adar Index, Kartz Centrality, HITS Score, SVD, Weight features, Modeling
2022-01-22	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Assignment : Facebook Friend Recommendation
2022-01-23	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Assignment: SQL
2022-01-24	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Revision Facebook Friend Recommendation Using Graph Mining
2022-01-25	Module 6: Machine Learning Real World Case studies	Taxi Demand Prediction in New York City	Business/Real world problem Overview, Objectives and Constraints, Mapping to ML problem :Data, Mapping to ML problem :dask dataframes
2022-01-26	Module 6: Machine Learning Real World Case studies	Taxi Demand Prediction in New York City	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 data, Data Cleaning :Trip Duration.

2022-01-27	Module 6: Machine Learning Real World Case studies	Taxi Demand Prediction in New York City	Data Cleaning :Speed., Data Cleaning :Distance., Data Cleaning :Fare, Data Cleaning :Remove all outliers/erroneous points, Data Preparation:Clustering/ Segmentation
2022-01-28	Module 6: Machine Learning Real World Case studies	Taxi Demand Prediction in New York City	Data Preparation:Time binning, Data Preparation:Smoothing time-series data., Data Preparation:Smoothing time-series data cont.., Data Preparation: Time series and Fourier transforms., Ratios and previous-time-bin values
2022-01-29	Module 6: Machine Learning Real World Case studies	Taxi Demand Prediction in New York City	Simple moving average, Weighted Moving average., Exponential weighted moving average, Results., Regression models :Train-Test split & Features, Linear regression., Random Forest regression, Xgboost Regression, Model comparison,Revision Taxi Demand Prediction in New York City
2022-01-30	Module 6: Machine Learning Real World Case studies	Stack Overflow Tag Predictor	Business/Real world problem, Business objectives and constraints, Mapping to an ML problem: Data overview, Mapping to an ML problem:ML problem formulation., Mapping to an ML problem:Performance metrics., Hamming loss, EDA:Data Loading, EDA:Analysis of tags, EDA:Data Preprocessing, Data Modeling : Multi label Classification, Data preparation., Train-Test Split, Featurization, Logistic regression: One VS Rest, Sampling data and tags+Weighted models., Logistic regression revisited, Why not use advanced techniques,Revision Stack Overflow Tag Predictor

2022-01-31	Module 6: Machine Learning Real World Case studies	Microsoft Malware Detection	Problem Definition, Objectives and Constraints, Data Overview, ML Problem
2022-02-01	Module 6: Machine Learning Real World Case studies	Microsoft Malware Detection	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 byte files, Train-Test class Distribution, ML models – using byte files only :Random Model
2022-02-02	Module 6: Machine Learning Real World Case studies	Microsoft Malware Detection	K-NN, 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
2022-02-03	Module 6: Machine Learning Real World Case studies	Microsoft Malware Detection	Revision Microsoft Malware Detection
2022-02-04	Module 7: Data Mining (Unsupervised Learning) and Recommender 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

2022-02-05	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Clustering	K-Means Algorithm., How to initialize: K-Means++, Failure cases/Limitations, K-Medoids, Determining the right K, Code Samples, Time and space complexity, Assignment :Clustering on Graph Dataset
2022-02-06	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Clustering	Revision Clustering
2022-02-07	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Hierarchical Clustering	Agglomerative & Divisive, Dendrograms, Agglomerative Clustering, Proximity methods: Advantages and Limitations.
2022-02-08	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Hierarchical Clustering	Time and Space Complexity, Limitations of Hierarchical Clustering, Code sample,Revision Hierarchical Clustering
2022-02-09	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	DBSCAN Technique	Density based clustering, MinPts and Eps: Density, Core, Border and Noise points, Density edge and Density connected points., DBSCAN Algorithm
2022-02-10	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	DBSCAN Technique	Hyper Parameters: MinPts and Eps, Advantages and Limitations of DBSCAN, Time and Space Complexity, Code samples., Question and Answers

2022-02-11	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	DBSCAN Technique	Revision DBSCAN Technique
2022-02-12	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Recommender Systems and Matrix Factorization	Problem formulation: IMDB Movie reviews, Content based vs Collaborative Filtering, Similarity based Algorithms, Matrix Factorization: PCA, SVD, Matrix Factorization: NMF, Matrix Factorization for Collaborative filtering, Matrix Factorization for feature engineering, Clustering as MF, Hyperparameter tuning, Matrix Factorization for recommender systems: Netflix Prize Solution
2022-02-13	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Recommender Systems and Matrix Factorization	Cold Start problem, Word vectors as MF, Eigen-Faces, Code example., Assignment : Recommendation Systems and Truncated SVD: Implement SGD algorithm to predict the ratings
2022-02-14	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Recommender Systems and Matrix Factorization	Revision Recommender Systems and Matrix Factorization
2022-02-15	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Amazon Fashion Discovery Engine	Problem Statement: Recommend similar apparel products in e-commerce using product descriptions and Images, Plan of action, Amazon product advertising API, Data folders and paths

2022-02-16	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Amazon Fashion Discovery Engine	Overview of the data and Terminology, Data cleaning and understanding:Missing data in various features
2022-02-17	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Amazon Fashion Discovery Engine	Understand duplicate rows, Remove duplicates : Part 1 , Remove duplicates: Part 2
2022-02-18	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Amazon Fashion Discovery Engine	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

2022-02-19	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Amazon Fashion Discovery Engine	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, TF-IDF weighted Word2Vec, Code for IDF weighted Word2Vec product similarity, Weighted similarity using brand and color, Code for weighted similarity, Building a real world solution, Deep learning based visual 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

2022-02-20	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	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 Data Analysis: Preliminary Data Analysis, Exploratory Data Analysis: Sparse matrix representation, Exploratory Data Analysis:Average ratings 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.
2022-02-21	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	Xgboost + 13 features +Surprise baseline model , Surprise KNN predictors , Matrix Factorization models using Surprise , SVD ++ with implicit feedback

2022-02-22	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	Final models with all features and predictors., High Level + End-End Design of a Music Recommendation system - I
2022-02-23	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	High Level + End-End Design of a Music Recommendation system - II
2022-02-24	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	Building a simple Youtube recommendation using basic Math
2022-02-25	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	Revision Netflix Movie Recommendation system
2022-02-26	Module 8: Neural Networks, Computer Vision and Deep Learning	Neural Networks	History of Neural networks and Deep Learning., How Biological Neurons work?, Growth of biological neural networks, Diagrammatic representation: Logistic Regression and Perceptron, Multi-Layered Perceptron (MLP)., Notation, Training a single-neuron model., Training an MLP: Chain Rule

2022-02-27	Module 8: Neural Networks, Computer Vision and Deep Learning	Neural Networks	Training an MLP:Memoization, Backpropagation., Activation functions, Vanishing Gradient problem., Bias-Variance tradeoff., Decision surfaces: Playground,Revision Neural Networks
2022-02-28	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Deep Multi-layer perceptrons:1980s to 2010s, Dropout layers & Regularization.
2022-03-01	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Rectified Linear Units (ReLU)., Weight initialization.
2022-03-02	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Batch Normalization., Optimizers:Hill-descent analogy in 2D
2022-03-03	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Optimizers:Hill descent in 3D and contours., SGD Recap
2022-03-04	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Batch SGD with momentum., Nesterov Accelerated Gradient (NAG)
2022-03-05	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Optimizers:AdaGrad, Optimizers : Adadelta andRMSProp, Adam, Which algorithm to choose when?, Gradient Checking and clipping, Softmax and Cross-entropy for multi-class classification., How to train a Deep MLP?, Auto Encoders., Word2Vec :CBOW, Word2Vec: Skip-gram, Word2Vec :Algorithmic Optimizations.

2022-03-06	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Assignment : Backpropagation and Gradient Checking
2022-03-07	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Revision Deep Multi Layer Perceptrons
2022-03-08	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	Tensorflow and Keras overview, GPU vs CPU for Deep Learning.
2022-03-09	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	Google Colaboratory., Install TensorFlow, Online documentation and tutorials, Softmax Classifier on MNIST dataset.
2022-03-10	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	MLP: Initialization, Model 1: Sigmoid activation.
2022-03-11	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	Model 2: ReLU activation., Model 3: Batch Normalization., Model 4 : Dropout., MNIST classification in Keras.
2022-03-12	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	Hyperparameter tuning in Keras., Assignment : Working with Callbacks
2022-03-13	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	Exercise: Try different MLP architectures on MNIST dataset.,Revision Tensorflow And Keras
2022-03-14	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Biological inspiration: Visual Cortex, Convolution:Edge Detection on images.

2022-03-15	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Convolution:Padding and strides, Convolution over RGB images., Convolutional layer., Max-pooling.
2022-03-16	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	CNN Training: Optimization, Example CNN: LeNet [1998], ImageNet dataset., Data Augmentation.
2022-03-17	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Convolution Layers in Keras, AlexNet, VGGNet, Residual Network.
2022-03-18	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Inception Network., What is Transfer learning.
2022-03-19	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Code example: Cats vs Dogs., Code Example: MNIST dataset., Assignment : Transfer Learning - (Given an rvl-cdip dataset, classify the given document using transfer learning)
2022-03-20	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Assignment : Document Classification with CNN
2022-03-21	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Revision Convolutional Neural Nets
2022-03-22	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Why RNNs? , Recurrent Neural Network.
2022-03-23	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Training RNNs: Backprop., Types of RNNs., Need for LSTM/GRU., LSTM.

2022-03-24	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	GRUs., Deep RNN., Bidirectional RNN., Code example : IMDB Sentiment classification
2022-03-25	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Assignment : LSTM on Donors Choose - (LSTM with Text and categorical data)
2022-03-26	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Assignment : CNN on CIFR - (Classifying CIFAR-10 dataset images with DenseNet and work with optimization)
2022-03-27	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Exercise: Amazon Fine Food reviews LSTM model., Deep Learning: Generative Adversarial Networks (GANs):Live session on Generative Adversarial Networks (GAN), Encoder-Decoder Models:LIVE: Encoder-Decoder Models
2022-03-28	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Attention Models in Deep Learning:Attention Models in Deep Learning
2022-03-29	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Assignment : NLP Attention Mechanism
2022-03-30	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Deep Learning: Transformers and BERT:Transformers and BERT
2022-03-31	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Assignment : NLP with Transfer Learning - (Classification of reviews using BERT embeddings)
2022-04-01	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Deep Learning: Image Segmentation:Live session on Image Segmentation

2022-04-02	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Assignment : Computer Vision: Segmentation - (Self Driving Cars: Detect the Objects on the road using Semantic Segmentation)
2022-04-03	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Deep Learning: Object Detection:Object Detection, Object Detection YOLO V3
2022-04-04	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Generative Adversarial Networks (GANs)
2022-04-05	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Encoder Decoder Models
2022-04-06	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Attention Models in Deep Learning
2022-04-07	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Transformers and BERT
2022-04-08	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Image Segmentation
2022-04-09	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Object Detection, Object Detection YOLO V3
2022-04-10	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	GPT-1, 2 and GPT-3 Models, Design and Build a smart store

2022-04-11	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Revision Long Short-Term Memory(LSTMS)
2022-04-12	Module 9: Deep Learning Real World Case Studies	Human Activity Recognition	Human Activity Recognition Problem definition, Dataset understanding
2022-04-13	Module 9: Deep Learning Real World Case Studies	Human Activity Recognition	Data cleaning & preprocessing, EDA:Univariate analysis., EDA:Data visualization using t-SNE, Classical ML models., Deep-learning Model.
2022-04-14	Module 9: Deep Learning Real World Case Studies	Human Activity Recognition	Exercise: Build deeper LSTM models and hyper-param tune them
2022-04-15	Module 9: Deep Learning Real World Case Studies	Human Activity Recognition	Revision Human Activity Recognition
2022-04-16	Module 9: Deep Learning Real World Case Studies	Self Driving Car	Problem Definition, Datasets., Data understanding & Analysis :Files and folders., Dash-cam images and steering angles., Split the dataset: Train vs Test, EDA: Steering angles, Mean Baseline model: simple, Deep-learning model: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

2022-04-17	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	Real-world problem, Music representation, Char-RNN with abc-notation :Char-RNN model, Char-RNN with abc-notation :Data preparation., Char-RNN with abc-notation:Many to Many RNN ,TimeDistributed-Dense 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 abc-notation :Generate tabla music
2022-04-18	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	MIDI music generation., Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design + Code] --- Part 1
2022-04-19	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design + Code] --- Part 2
2022-04-20	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design + Code] --- Part 3
2022-04-21	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design + Code] --- Part 4
2022-04-22	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	Survey blog, Assignment : Spoken Digit Recognition - (Working with Audio Dataset: Detect the sounds using spectrograms and Deep Learning)
2022-04-23	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	Revision Music Generation Using Deep Learning

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