

Applied Machine Learning Course Schedule

DATE	MODULE	CHAPTER	TOPIC
2021-07-03	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
2021-07-04	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
2021-07-05	Module 1: Fundamentals of Programming	Python for DataScience: Functions	Introduction, Types of functions, Function arguments, Recursive functions, Lambda functions, Modules, Packages, File Handling
2021-07-06	Module 1: Fundamentals of Programming	Python for DataScience: Functions	Exception Handling, Debugging Python, Revision Python for DataScience: Functions
2021-07-07	Module 1: Fundamentals of Programming	Python for DataScience: Numpy	Numpy Introduction, Numerical operations on Numpy, Revision Python for DataScience: Numpy
2021-07-08	Module 1: Fundamentals of Programming	Python for DataScience: Matplotlib	Getting started with Matplotlib, Revision Python for DataScience: Matplotlib
2021-07-09	Module 1: Fundamentals of Programming	Python for DataScience: Pandas	Getting started with pandas, Data Frame Basics, Key Operations on Data Frames, Revision Python for DataScience: Pandas

2021-07-10	Module 1: Fundamentals of Programming	Python for Data Science: Computational Complexity	Space and Time Complexity: Find largest number in a list, Binary search, Find elements common in two lists, Find elements common in two lists using a Hashtable/Dict, Revision Python for Data Science: Computational Complexity
2021-07-11	Module 1: Fundamentals of Programming	SQL	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, WHERE, Comparison operators, NULL
2021-07-12	Module 1: Fundamentals of Programming	SQL	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.
2021-07-13	Module 1: Fundamentals of Programming	SQL	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
2021-07-14	Module 2: Data Science: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Introduction to IRIS dataset and 2D scatter plot, 3D scatter plot, Pair plots, Limitations of Pair Plots, Histogram and Introduction to PDF (Probability Density Function), Univariate Analysis using PDF, CDF (Cumulative Distribution Function), Mean, Variance and Standard Deviation

2021-07-15	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, Violin Plots, Summarizing Plots, Univariate, Bivariate and Multivariate analysis, Multivariate Probability Density, Contour Plot, Exercise: Perform EDA on Haberman dataset
2021-07-16	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Plotting for exploratory data analysis (EDA)	Revision Plotting for exploratory data analysis (EDA)
2021-07-17	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

2021-07-18	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	<p>Introduction to Probability and Statistics, Population and Sample, Gaussian/Normal Distribution and its PDF(Probability Density Function), 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, Q-Q plot:How to test if a random variable is normally distributed or not?, How distributions are used?, Chebyshev's inequality</p> <p>Discrete and Continuous Uniform distributions, How to randomly sample data points (Uniform Distribution), Bernoulli and Binomial Distribution, Log Normal Distribution, Power law distribution, Box cox transform, Applications of non-gaussian distributions?</p> <p>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</p>
2021-07-19	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	
2021-07-20	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	

2021-07-21	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	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, Revision Questions, Assignment :Python (without Numpy)
2021-07-22	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	Probability And Statistics	Revision Probability And Statistics
2021-07-23	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, Mean of a data matrix, Data Preprocessing: Column Standardization, Co- variance of a Data Matrix, MNIST dataset (784 dimensional), Code to Load MNIST Data Set,Revision Dimensionality Reduction And Visualization
2021-07-24	Module 2: Datascience: Exploratory Data Analysis and Data Visualization		

2021-07-25	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
2021-07-26	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
2021-07-27	Module 2: Datascience: Exploratory Data Analysis and Data Visualization	T-Sne	Revision T-Sne
2021-07-28	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, Why convert text to a vector?, Bag of Words (BoW), Text Preprocessing: Stemming, Stop-word removal, Tokenization, Lemmatization., uni-gram, bi-gram, n-grams.

2021-07-29	Module 3: Foundations of Natural Language Processing and Machine Learning	Predict rating given product reviews on amazon	tf-idf (term frequency- inverse document frequency), Why use log in IDF?, Word2Vec., Avg- Word2Vec, tf-idf weighted Word2Vec, Bag of Words(Code Sample), Text Preprocessing(Code Sample)
2021-07-30	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
2021-07-31	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
2021-08-01	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

2021-08-02	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, 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, How to build a kd-tree, Find nearest neighbours using kd-tree, Limitations of Kd tree, Extensions, Hashing vs LSH, LSH for cosine similarity
2021-08-03	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification And Regression Models: K- Nearest Neighbors	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
2021-08-04	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
2021-08-05	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	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 (Simple solution :Mean distance to Knn)
2021-08-06	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	K-Distance(A),N(A), Reachability-Distance(A,B), Local reachability-density(A), Local outlier Factor(A), Impact of Scale & Column standardization, Interpretability, Feature Importance and Forward Feature selection, Handling categorical and numerical features

2021-08-07	Module 3: Foundations of Natural Language Processing and Machine Learning	Classification Algorithms in Various Situations	Handling missing values by imputation, 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 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
2021-08-08	Module 3: Foundations of Natural Language Processing and Machine Learning	Performance Measurement of Models	
2021-08-09	Module 3: Foundations of Natural Language Processing and Machine Learning	Performance Measurement of Models	Revision Performance Measurement of Models
2021-08-10	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Conditional probability, Independent vs Mutually exclusive events, Bayes Theorem with examples, Exercise problems on Bayes Theorem, Naive Bayes algorithm
2021-08-11	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Toy example: Train and test stages, Naive Bayes on Text data, Laplace/Additive Smoothing, Log-probabilities for numerical stability, Bias and Variance tradeoff

2021-08-12	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	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
2021-08-13	Module 3: Foundations of Natural Language Processing and Machine Learning	Naive Bayes	Revision Naive Bayes
2021-08-14	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 Naive Bayes Loss minimization interpretation, 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
2021-08-15	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	

2021-08-16	Module 3: Foundations of Natural Language Processing and Machine Learning	Logistic Regression	Revision Logistic Regression
2021-08-17	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
2021-08-18	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	Differentiation, Online differentiation tools, Maxima and Minima, Vector calculus: Grad, Gradient descent: geometric intuition, Learning rate, Gradient descent for linear regression SGD algorithm, Constrained Optimization & PCA, Logistic regression formulation revisited, Why L1 regularization creates sparsity?, Assignment : Implement SGD Classifier with Log Loss and L2 regularization Using SGD: without using sklearn
2021-08-19	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	
2021-08-20	Module 3: Foundations of Natural Language Processing and Machine Learning	Solving Optimization Problems	Revision Solving Optimization Problems
2021-08-21	Module 4: Machine Learning-II (Supervised Learning Models)	Support Vector Machines	Geometric Intuition, Why we take values +1 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

2021-08-22	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
2021-08-23	Module 4: Machine Learning-II (Supervised Learning Models)	Support Vector Machines	Revision Support Vector Machines
2021-08-24	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, Building a decision Tree:Information Gain, Building a decision Tree: Gini Impurity, Building a decision Tree: Constructing a 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, Cases, Code Samples, Assignment : Apply Decision Trees on Donors Choose Dataset
2021-08-25	Module 4: Machine Learning-II (Supervised Learning Models)	Decision Trees	Revision Decision Trees
2021-08-26	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

2021-08-27	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Random Tree :Cases, Boosting Intuition, Residuals, Loss functions and gradients, Gradient Boosting, Regularization by Shrinkage, Train and Run time complexity, XGBoost: Boosting + Randomization, AdaBoost: geometric intuition, Stacking models
2021-08-28	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Cascading classifiers, Kaggle competitions vs Real world, Assignment : Apply GBDT/XGBOOST/LIGHT-GBM on Donors Choose Dataset
2021-08-29	Module 4: Machine Learning-II (Supervised Learning Models)	Ensemble Models	Revision Ensemble Models
2021-08-30	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
2021-08-31	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Featurization And Feature Importance	Keypoints: SIFT., Deep learning features: CNN, Relational data, Graph data, Indicator variables, Feature binning, Interaction variables, Mathematical transforms, Model specific featurizations, Feature orthogonality, Domain specific featurizations
2021-09-01	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Featurization And Feature Importance	Feature slicing, Kaggle Winners solutions, Revision Featurization And Feature Importance

2021-09-02	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Calibration of Models:Need for calibration, Calibration Plots., Platt's Calibration/Scaling., Isotonic Regression, Code Samples, Modeling in the presence of outliers: RANSAC, Productionizing models, Retraining models periodically., A/B testing.
2021-09-03	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Data Science Life cycle, Productionization and deployment of Machine Learning Models, Productionization and deployment + Spark
2021-09-04	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Hands on Live Session: Deploy an ML model using APIs on AWS, Building web apps for ML/AI using StreamLit
2021-09-05	Module 5: Feature Engineering, Productionization and Deployment of ML Models	Miscellaneous Topics	Building web apps for ML/AI using StreamLit-ii, VC dimension,Revision Miscellaneous Topics
2021-09-06	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., EDA: Basic Feature Extraction, EDA: Text Preprocessing, EDA: Advanced Feature Extraction, EDA: Feature analysis., EDA: Data Visualization: T-SNE.

2021-09-07	Module 6: Machine Learning Real World Case studies	Quora Question Pair Similarity	EDA: TF-IDF weighted Word2Vec featurization., ML Models :Loading Data, ML Models: Random Model, ML Models : Logistic Regression and Linear SVM, ML Models : XGBoost,Revision Quora Question Pair Similarity Business/Real world problem : Overview, Business objectives and constraints., ML problem formulation :Data, ML problem formulation: Mapping real world to ML problem., 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, 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
2021-09-08	Module 6: Machine Learning Real World Case studies	Personalized Cancer Diagnosis	
2021-09-09	Module 6: Machine Learning Real World Case studies	Personalized Cancer Diagnosis	
2021-09-10	Module 6: Machine Learning Real World Case studies	Personalized Cancer Diagnosis	

2021-09-11	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. , Business constraints & Metrics. , EDA:Basic Stats, EDA:Follower and following stats., EDA:Binary Classification Task, EDA:Train and test split. Feature engineering on Graphs:Jaccard & Cosine Similarities, PageRank, Shortest Path, Connected-components, Adar Index, Kartz Centrality, HITS Score, SVD, Weight features, Modeling, Assignment : Facebook Friend Recommendation
2021-09-12	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	
2021-09-13	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Assignment: SQL
2021-09-14	Module 6: Machine Learning Real World Case studies	Facebook Friend Recommendation Using Graph Mining	Revision Facebook Friend Recommendation Using Graph Mining

2021-09-15

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, 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., 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 time-
series data cont., Data
Preparation: Time series and
Fourier transforms., Ratios
and previous-time-bin values,
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

2021-09-16

Module 6:
Machine
Learning Real
World Case
studies

Taxi Demand Prediction in
New York City

2021-09-17	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
2021-09-18	Module 6: Machine Learning Real World Case studies	Stack Overflow Tag Predictor	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 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 byte files, Train-Test class Distribution, ML models - using byte files only
2021-09-19	Module 6: Machine Learning Real World Case studies	Microsoft Malware Detection	:Random Model, 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

2021-09-20	Module 6: Machine Learning Real World Case studies	Microsoft Malware Detection	Revision Microsoft Malware Detection
2021-09-21	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, K-Means Algorithm., How to initialize: K-Means++
2021-09-22	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Clustering	Failure cases/Limitations, K-Medoids, Determining the right K, Code Samples, Time and space complexity, Assignment :Clustering on Graph Dataset
2021-09-23	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Clustering	Revision Clustering
2021-09-24	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., Time and Space Complexity, Limitations of Hierarchical Clustering, Code sample,Revision Hierarchical Clustering

2021-09-25	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, Hyper Parameters: MinPts and Eps, Advantages and Limitations of DBSCAN, Time and Space Complexity, Code samples., Question and Answers,Revision DBSCAN Technique 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
2021-09-26	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
2021-09-27	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Recommender Systems and Matrix Factorization	
2021-09-28	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Recommender Systems and Matrix Factorization	Revision Recommender Systems and Matrix Factorization

2021-09-29

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, Overview of the data and Terminology, Data cleaning and understanding:Missing data in various features, Understand duplicate rows, 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

2021-09-30 Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies

Amazon Fashion Discovery Engine

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

2021-10-01 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

2021-10-02	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	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 baseline model , 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
2021-10-03	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, Building a simple Youtube recommendation using basic Math
2021-10-04	Module 7: Data Mining (Unsupervised Learning) and Recommender systems+Real World Case studies	Netflix Movie Recommendation system	Revision Netflix Movie Recommendation system
2021-10-05	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).

2021-10-06	Module 8: Neural Networks, Computer Vision and Deep Learning	Neural Networks	Notation, Training a single-neuron model., Training an MLP: Chain Rule, Training an MLP: Memoization
2021-10-07	Module 8: Neural Networks, Computer Vision and Deep Learning	Neural Networks	Backpropagation., Activation functions, Vanishing Gradient problem., Bias-Variance tradeoff., Decision surfaces: Playground
2021-10-08	Module 8: Neural Networks, Computer Vision and Deep Learning	Neural Networks	Revision Neural Networks
2021-10-09	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Deep Multi-layer perceptrons: 1980s to 2010s, Dropout layers & Regularization., Rectified Linear Units (ReLU)., Weight initialization., Batch Normalization., Optimizers: Hill-descent analogy in 2D, Optimizers: Hill descent in 3D and contours., SGD Recap Batch SGD with momentum., Nesterov Accelerated Gradient (NAG), Optimizers: AdaGrad, Optimizers : Adadelta and RMSProp, 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
2021-10-10	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Word2Vec: Skip-gram, Word2Vec : Algorithmic Optimizations., Assignment : Backpropagation and Gradient Checking
2021-10-11	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	
2021-10-12	Module 8: Neural Networks, Computer Vision and Deep Learning	Deep Multi Layer Perceptrons	Revision Deep Multi Layer Perceptrons

2021-10-13	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	Tensorflow and Keras overview, GPU vs CPU for Deep Learning., Google Colaboratory., Install TensorFlow, Online documentation and tutorials, Softmax Classifier on MNIST dataset.
2021-10-14	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	MLP: Initialization, Model 1: Sigmoid activation., Model 2: ReLU activation., Model 3: Batch Normalization., Model 4 : Dropout., MNIST classification in Keras., Hyperparameter tuning in Keras., Assignment : Working with Callbacks
2021-10-15	Module 8: Neural Networks, Computer Vision and Deep Learning	Tensorflow And Keras	Exercise: Try different MLP architectures on MNIST dataset.,Revision Tensorflow And Keras
2021-10-16	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Biological inspiration: Visual Cortex, Convolution:Edge Detection on images., Convolution:Padding and strides, Convolution over RGB images., Convolutional layer., Max-pooling., CNN Training: Optimization, Example CNN: LeNet [1998], ImageNet dataset., Data Augmentation., Convolution Layers in Keras
2021-10-17	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	AlexNet, VGGNet, Residual Network., Inception Network., What is Transfer learning., Code example: Cats vs Dogs., Code Example: MNIST dataset., Assignment : Transfer Learning - (Given an rvl-cdip dataset, classify the given document using transfer learning)
2021-10-18	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Assignment : Document Classification with CNN

2021-10-19	Module 8: Neural Networks, Computer Vision and Deep Learning	Convolutional Neural Nets	Revision Convolutional Neural Nets
2021-10-20	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Why RNNs? , Recurrent Neural Network., Training RNNs: Backprop., Types of RNNs., Need for LSTM/GRU.
2021-10-21	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	LSTM., GRUs., Deep RNN., Bidirectional RNN., Code example : IMDB Sentiment classification
2021-10-22	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)
2021-10-23	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) 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
2021-10-24	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Attention Models in Deep Learning:Attention Models in Deep Learning, Assignment : NLP Attention Mechanism
2021-10-25	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Deep Learning: Transformers and BERT:Transformers and BERT
2021-10-26	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)
2021-10-27	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	

2021-10-28	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Deep Learning: Image Segmentation:Live session on Image Segmentation
2021-10-29	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)
2021-10-30	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Deep Learning: Object Detection:Object Detection, Object Detection YOLO V3
2021-10-31	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Generative Adversarial Networks (GANs), Encoder Decoder Models
2021-11-01	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Attention Models in Deep Learning, Transformers and BERT
2021-11-02	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Image Segmentation
2021-11-03	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Object Detection
2021-11-04	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Object Detection YOLO V3
2021-11-05	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	GPT-1, 2 and GPT-3 Models

2021-11-06	Module 8: Neural Networks, Computer Vision and Deep Learning	Long Short-Term Memory(LSTMS)	Design and Build a smart store,Revision Long Short-Term Memory(LSTMS)
2021-11-07	Module 9: Deep Learning Real World Case Studies	Human Activity Recognition	Human Activity Recognition Problem definition, Dataset understanding, Data cleaning & preprocessing, EDA:Univariate analysis., EDA:Data visualization using t-SNE, Classical ML models., Deep-learning Model., Exercise: Build deeper LSTM models and hyper-param tune them,Revision Human Activity Recognition
2021-11-08	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.
2021-11-09	Module 9: Deep Learning Real World Case Studies	Self Driving Car	Test and visualize the output., Extensions.,Revision Self Driving Car
2021-11-10	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.

2021-11-11	Module 9: Deep Learning Real World Case Studies	Music Generation Using Deep Learning	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, MIDI music generation., Case Study 13: Semantic Search Engine for Q&A [Design + Code]:Semantic Search for Q&A [Design + Code] --- Part 1
2021-11-12	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 , Case Study 13: 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 + Code] --- Part 4 , Survey blog, Assignment : Spoken Digit Recognition - (Working with Audio Dataset: Detect the sounds using spectrograms and Deep Learning)
2021-11-13	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