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Introduction to ML, AI

- Why we require AI and ML?
- Problem with traditional Software systems
- Opportunities with AI,ML
- What you need to excel - only a logical mind!!
- Tools and Software to efficiently build ML models •Why R and Python(with Tensorflow) is very popular ?

ML model

- Understand what actually is a ML model
- How to handle data
- Preprocessing data
- Types of ML models - Supervised and Unsupervised
- A peek into Reinforcement Learning
- How to break your data into Training and Test
- Cross validation techniques

Linear Regression

- Understand Linear Regression
- Gradient Descent
- Do actual hands on and understand the calculations behind Gradient Descent
- Brush up on Differentiation to understand the maths behind the hands on
- Code both in R and Python
- Learn how to improve your model

Overfitting

- Overfitting is one of the most difficult aspect to learn while building a ML model
- Use the above Linear Regression model to understand Overfitting
- Learn with Hands on - how to avoid Overfitting
- Bias Variance Tradeoff
- Regularization - Ridge, LASSO
- ANOVA, F tests
- Logistic Regression
- Understand CLassification with Logistic Regression
- Maximum Likelihood Estimation
- Build an end-end model with Logistic Regression using scikit Learn
- Hands on - how actually you will build a model in the Industry
- How to code for Interviews, Data Science Competitions

Decision Trees

- What is a Probability based model and why Decision Tree is such a model? Understand the concepts of Entropy, Gini Impurity, Information Gain Do a detailed hands on project to predict the possible Loan Defaulters for a large multi-national bank
- Apply the concepts of Overfitting
- How to improve the Decision Tree model without Overfitting

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- Bagging, Boosting
- Random Forest
- AdaBoost, Gradient Boost

k-NN

- Understand a Distance based model with kNN
- how to choose the value of k
- Project work on Predicting Breast Cancer

Support Vector Machines(SVM)

- The power of SVM and what it can do which other models cannot
- Why SVM is so popular in the industry
- Learn all about Kernel Functions
- Different Kernel functions
- Build an OCR(Optical Character Reader) with the help of SVM and Kernel functions
- Neural Networks
- Why Neural Networks can actually solve any Complex pattern?
- How to build the Neural Network Architecture
- How Neural Network mimics the cognitive capabilities of humans
- Build your own AND,OR,NOT,XOR,XNOR Logic Gates with Neural Network
- Understand Forward & Backward Propagation
- Plot a Neural Network with code and map your understanding between theory and practical
- Change the architecture with code and see how the Neural Network behaves
- Different Activation Functions
- Vanishing Gradient problem
- Loss functions

Deep Neural Networks

- Optimization methods
- Gradient Descent with Momentum, RMSProp, ADAM
- Learning Rate Decay
- Xavier Initialization
- Introduction to Keras and Tensorflow(TF)
- Deep Learning in Keras with TensorFlow as the backend
- Project Work

Unsupervised Learning

- Basic concepts of Clustering
- k-means Clustering
- Hierarchical clustering
- Build a hands on project to do Social Media analysis with Clustering

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Computer Vision

- Image Detection, Image Classification, Localization
- Introduction to Convolutional Neural Networks(CNN)
- Build a Handwritten Digit recognizer with CNN
- Strides, Padding concepts
- Convolutional, Padding and Fully Connected layers
- Sliding Window
- Edge Detection

Advanced Computer Vision

- YOLO ALgorithm - You Only Look Once
- Introduction to classical networks like LeNet5
- IoU
- Build an Image Classifier with CNN
- Data Augmentation Techniques
- Natural Language Processing(NLP)
- Introduction to Natural Language Processing(NLP)
- Text Preprocessing
- Lemmatization, Stemming
- Syntactical Parsing, Entity Parsing
- CTopic Modelling with Latent Dirichlet Allocation(LDA)
- Collapsed Gibbs Sampling
- Word Embedding with Word2Vec - CBOW and SkipGram models
- Restricted Boltzman Machines
- Recurrent Neural Network(RNN) and Long Short Term memory(LSTM)
- Build a cahatbot with the above concepts of NLP and Neural Networks

Introduction to AI

- History of AI
- State of the Art AI
- Types of Agents
- Types of Environments
- Asymptotic Notations

Search

- Uninformed Search-Breadth first search
- Uniform Cost Search
- Depth First Search
- Depth-Limited Search
- Iterative Deepening Depth-First Search
- Bidirectional Search
- Informed Search-Greedy Best-First Search
- A* Search
- Beyond Local Search-Hill Climbing

- Simulated Annealing
- Beam Search
- Genetic Algorithms
- Online Search

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