

Artificial Intelligence

Roadmap

Fundamentals



Data Scientist



Machine Learning



Deep Learning

Fundamentals

Basics

Matrices & Linear Algebra Fundamentals

Database Basics

Tabular Data

Data Frames & Series

Extract, Transform, Load

Reporting vs BI vs Analytics

Data Formats

JSON

XML

CSV

Regular Expression (Regex)

Python Programming

Python Basics

Important Libraries

Numpy

Pandas

Virtual Environments

Jupyter Notebooks / Lab

Expressions

Variables

Data Structures

Functions

Install Packages

Codestyle, eg PEP8

Data Sources

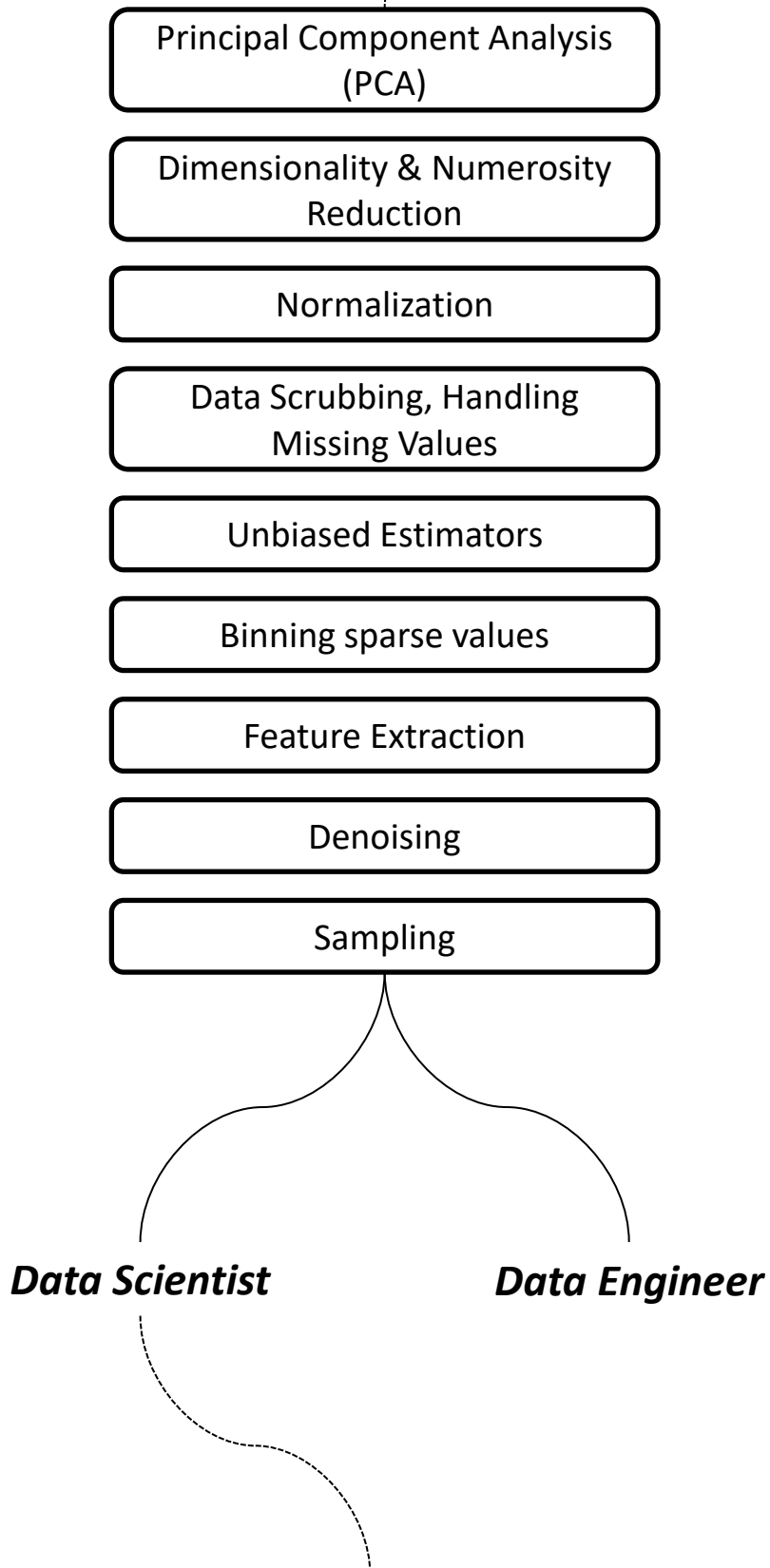
Data Mining

Web Scraping

Awesome Public Datasets

Kaggle

Exploratory Data Analysis / Data Munging / - Wrangling



Data Scientist

Statistics

Random variable & random sample

Probability distribution

Conditional probability & Byes' theorem

(Statistical) Independence

iid

Cdf, pdf, pmf

Probability Theory

Continuous Distributions

Discrete Distributions

Summary Statistics

Important Laws

Estimation

Hypothesis Testing

Confidence Interval (CI)

Monte Carlo Method

- Normal / Gaussian
- Uniform (continuous)
- Beta
- Dirichlet
- Exponential
- χ^2 (Chi-squared)

- Uniform (discrete)
- Binomial
- Multinomial
- Hypergeometric
- Poisson
- Geometric

- Expectation and mean
- Variance standard deviation (sd)
- Covariance and correlation
- Median, quartile
- Interquartile range
- Percentile / quantile
- Mode

- P-Value
- χ^2 test
- F-test
- t-test

- Cumulative distribution function (cdf)
- Probability density function (pdf)
- Probability massfunction (pmf)

Law of large number (LLN)

Central limit theorem (CLT)

Maximum Likelihood Estimation (MLE)

Kernel Density Estimation (KDE)

Visualization

Chart Suggestions thought starter

Python

Web

Dashboards

BI

streamlit

- Matplotlib
- Plotnine (like ggplot in R)
- Bokeh
- Seaborn
- Ipyvolume (3D data)

- Vega-Lite
- D3.js
- Dash
- Tableau
- PowerBI

Machine Learning

Machine Learning

Concepts, Inputs & Attributes

Cost functions and gradient descent

Overfitting / Underfitting

Training, validation & test data

Precision vs Recall

Bias & Variance

Lift

Categorical Variables

Ordinal Variables

Numerical Variables

Regression

- Linear Regression
- Multiple Linear Reg.
- Ridge Regression
- Lasso Regression
- Decision Tree
- Random Forest
- SVM
- Gaussian Regression
- Polynomial Regression
- Poisson Regression
- Robust Regression
- Neural Network Regression

Classification

- Classification Rate
- Logistic Regression
- Decision Tree
- Random Forest
- Naïve Bayes Classifier
- K-Nearest Neighbour
- Support Vector Machine Classifier,
- Gaussian Mixture Models,

Supervised Learning

Unsupervised Learning

Ensemble Learning

Reinforcement Learning

Clustering

- Hierarchical Clustering
- DBSCAN
- HDBSCAN
- Fuzzy C-Means
- Mean Shift
- Agglomerative
- OPTICS

Association Rule Learning

- Apriori Algorithm
- ECLAT Algorithm
- FP Trees

Dimensionality Reduction

- Principal Component Analysis (PCA)
- Random Projection
- NMF
- T-SNE
- UMAP

Boosting

Bagging

Stacking

Q-Learning

Use Cases

Sentiment Analysis

Collaborative Filtering

Tagging

Prediction

Tools

Important Libraries

Scikit-learn

Spacy (NLP)

Deep Learning

@yadavnikhilrao

Deep Learning

Deep Belief Network(DBN)

ImageNet Evolution

Speech Recognition
Evolution

Neural Networks

Understanding Neural Network

Loss Functions

Activation Functions

Weight Initialization

Vanishing / Exploding
Gradient Problem

Architectures

Freedforward Neural Network

Autoencoder

Convolutional Neural Network (CNN)

Recurrent Neural Network (RNN)

Transformer

Siamese Network

Generative Adversarial Network (GAN)

Evolving Architectures / NEAT

Residual Connections

Autoencoder

Pooling

LSTM

GRU

Encoder

Decoder

Attention

Training

Optimizers

Learning Rate Schedule

Batch Normalization

Batch Size Effects

Regularization

Multitask Learning

Transfer Learning

Curriculum Learning

Tools

Important Libraries

Tensorflow

PyTorch

Tensorboard

MLFlow

Awesome Deep Learning

Huggingface Transformers

Model optimization (advanced)

Distillation

Quantization

Neural Architecture
Search (NSA)

***keep exploring and stay
up-to-date***