

# **Machine Learning Roadmap (From Kylie Ying)**

## **1) Foundations (Mah)**

- a) Foundational Math**
  - i) Statistics and Probability**
    - (1) Conditional Probability**
    - (2) Bayes Rule**
    - (3) Statistical Distributions**
- b) Calculus**
  - i) Optimization**
  - ii) Gradient Descent (Derivatives)**
- c) Linear Algebra**
  - i) Vectors and Matrices**
  - ii) Eigenvectors and Values**

## **2) Programming**

- a) Python**
  - i) Basic Concepts**
    - (1) Variables**
    - (2) Functions**
    - (3) Classes**
    - (4) Libraries**
      - (a) pandas**
      - (b) numpy**
      - (c) scikit-learn**
      - (d) tensorflow**
      - (e) pytorch**
      - (f) matplotlib (pyplot)**

## **3) Core Concepts**

- a) What is machine learning?**
  - i) Types of ML**
    - (1) Supervised -> Tasks**
    - (2) Unsupervised -> Classification**
    - (3) Reinforcement -> Regression**
- b) Data**
  - i) Types of Data**

- (1)** Qualitative Data
    - (2)** Quantitative Data
  - ii)** Training/Validating/Testing Data
  - iii)** Manipulation
    - (1)** Data Cleaning
    - (2)** Feature Scaling
    - (3)** Feature Engineering

**c) Models**

- i)** K-nearest neighbors
- ii)** Logistic Regression
- iii)** SVM (Support Vector Machine)
- iv)** Linear Regression
- v)** Neural Networks
  - (1)** Perceptron
  - (2)** Types of NN
    - (a)** CNN (Convolutional)
      - (i) Image
    - (b)** RNN (Recurrent)
      - (i) Sequential
- vi)** K-means
- vii)** PCA (Principal Component Analysis)
- viii)** Training + Evaluation
  - (1)** Metrics
  - (2)** Overfitting