Syllabus

0. Python and Envrionment setting

1. Installation (Anaconda, Virtual Environment, Tensorflow)
2. Jupyter notebook
3. Basic Python

---

1. Linear Algebra(ref. 3Blue1Brwon)

1. Vector
2. Linear combinations, Span, Basis vectors
3. Linear transformations and Matrices (including 3D)
4. Matrix multiplication as composition
5. Determinant
6. Inverse matrices, Column space, Null space
7. Nonsquare matrices as transformations
8. Dot products
9. Cross products
10. Change of basis
11. Eigenvectors and Eigenvalues

---

2. Probability and Statistics

1. Populations and Samples
2. Inference
3. Law of Large Numbers
4. Central limit theorem (Generating random numbers)
5. Multivariate Statistics
6. What is Probability (including conditional probability)
7. Random Variable
8. Random Vectors
9. Bayes Rule
10. Linear Transformation of Random Variables

---

3. Machine Learning

0. What is Machine Learning
1. Optimization
1. Linear Regeression
    - single variable, multi variables
    - overfitting, regularization(LASSO), L1 norm, L2 norm
    - non-linear regression
2. Classificaton(including KNN), Perceptron
3. SVM
4. Logistic Regeression
6. Maximum Likelihood Estimation(i.e. MLE)
5. Clustering: K-meas
6. PCA

4. Deep Learning

0. Difference between ML and DL
1. Neural Network
2. Autoencoder
3. Convolutional Neural Network
4. Recurrent Neural Network
5. Style Transfer
6. Generative Adversarial Network

5. Further Study

1. Reinforcement Learning
2. Natural Language Problems
3. Oters