The referenced videos：

Andrew Ng （AN）, “Machine Learning”, Stanford University (Coursera)

<https://www.coursera.org/learn/machine-learning/home/welcome>

Tom Mitchell, “Machine Learning”, Carnegie Mellon University

<http://www.cs.cmu.edu/~tom/10701_sp11/lectures.shtml>

**Lec1-2： Sept. 12 & 19, 2017**

Introduction to pattern recognition with use cases;

**An introduction to three typical PR algorithms**, i.e., k-Nearest Neighbor (KNN) and K-Means  (KMeans)

**Case study**: [Scene Completion Using Millions of Photographs](http://graphics.cs.cmu.edu/projects/scene-completion/), by [James Hays](http://www.cs.cmu.edu/~jhhays/) and [Alexei Efros](http://www.cs.cmu.edu/~efros/); Face recognition; and robot navigation

**Readings**：  
Chapter 1, DHS

A. K. Jain, R. P. W. Duin, J. Mao, ["Statistical Pattern Recognition: A Review"](http://ieeexplore.ieee.org/iel5/34/17859/00824819.pdf) , *IEEE Trans. on Pattern Analysis and Machine Intelligence*, 22(1):4-37, January 2000.  
  
[Chapter 1: Introduction](https://worldscientific.com/etextbook/3641/3641_chap01.pdf) INTRODUCTION TO PATTERN RECOGNITION Statistical, Structural, Neural and Fuzzy Logic Approaches by Menahem Friedman (Nuclear Research Center-Negv, Israel) & Abraham Kandel (University of South Florida, USA & Tel-Aviv University, Israel).  
  
[Chapter 1: Introduction to statistical pattern recognition,](http://media.wiley.com/product_data/excerpt/39/04708451/0470845139.pdf) Statistical PATTERN RECOGNITION (2nd Ed.), by Andrew R. Webb  
  
Mini Project: (1) KNN; (2) KMeans, (3) The implementation of Hanoi with Q-learning

**Lec: Sept. 26, 2017**

**Video Lectures:**

(1) AN Lecture: **Week 1 Linear Algebra overview**;

(2) **Decision Tree**:

        (i) http://v.youku.com/v\_show/id\_XMTgxODM0MDI3Ng==.html (Visualizaton Decision tree);

        (ii)  http://v.youku.com/v\_show/id\_XMTM1NzMxMzU0MA==.html (Decision tree: an overview).

**Readings**:  DHS pp. 24-26; Vapnik Ch1.1-5&Ch9.1, Bishop 1.3-1.5

* [Linear Algebra](http://www.deeplearningbook.org/contents/linear_algebra.html)
* [Probability and Information Theory](http://www.deeplearningbook.org/contents/prob.html)

**Week 4: Oct. 3, 2017**

No lecture

**Lec4: Oct. 10, 2017**

**Introduction to three learning paradigms**, i.e., supervised learning, unsupervised learning and reinforcement learning with a typical algorithm, i.e.,  Q-Learning.

**Readings**：  
Chapter 1, DHS

**Lec5: Oct. 17 , 2017**

**Bayesian Decision Theory**

**Linear Regression**

**Readings**：  
Chapter 2, DHS

**Lec6: Oct. 24 , 2017**

**Linear Classification** ——

Least Squares, Fisher Linear Discriminant, Perceptron  Logistic Regression

**Lec7: Oct. 31 , 2017**

**Support Vector Machines**

**Lec8: Nov. 7 , 2017**

Midterm Exam

**Lec9: Nov. 14 , 2017**

**A54R FC 45RF545R**

Discussion on mid-term exam

**Lec10: Nov. 21 , 2017**

**Back-propagation algorithms**

**Deep learning: an introduction**

Readings: [Deep Feedforward Networks](http://www.deeplearningbook.org/contents/mlp.html)

**Lec11: Nov. 28 , 2017**

**Supervised deep learning: CNN &RNN**

Readings:

* [Convolutional Networks](http://www.deeplearningbook.org/contents/convnets.html)
* [Sequence Modeling: Recurrent and Recursive Nets](http://www.deeplearningbook.org/contents/rnn.html)

**Lec12: Dec. 5 , 2017**

**Introduction to reinforcement learning, i.e. Q-learning**:

an example algorithm  for RL.

Bayesian decision theory  
**Readings**:  DHS pp. 24-26; Vapnik Ch1.1-5&Ch9.1, Bishop 1.3-1.5

        Mastering the game of Go with deep neural networks and tree search

       (https://www.nature.com/articles/nature16961)

       Mastering the game of Go without human knowledge (https://www.nature.com/articles/nature24270)

**Lec13: Dec. 12 , 2017**

**Unsupervised learning, clustering**, GMM

**Lec14: Dec. 19 , 2017**

**Online Learning, active learning**

**Lec15: Dec. 26, 2017**

**Semisupervised learning**

Discussion

**Lec16: Jan. 2  , 2017**

Final Exam

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