

Course Information Of Selected Topics On Machine Learning And Computer Vision

2prime

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Research Interest: Image Science, Computer Vision, High Dimensional Data
- Yue Wu(PKU EECS)
Research Interest: Learning Theory.
- Shicong Cen(PKU SMS)
Research Interest: Optimization.
- QianYing Liu(PKU SMS)
Research Interest:Nature Language Processing.

Machine Learning Theory.

Machine learning is a data-driven method to construct models from the real world data instead of physical or mathematical theorems.

Our course isn't a technical course, we want to discuss the theory in order to discover why the algorithm works.

Computer Vision

As a famous application of machine learning, computer vision, which enables the computers to understand images, becomes a active research field.

We will also discuss the mathematical problems behind images, like PDE and wavelets. And at the same time, we want to build connection between them and machine learning.

Optimization.

Optimization is the field to discover fast algorithms for solving $\min f(x)$, which is a part of developing machine learning methods. Recent research shows that the optimization may influence ML model's effect.

Semi-supervised Learning

Sometimes, you don't have so many labeled data. You must utilize the structure of the given data, this topic is called semi-supervised learning. This is an advanced topic in machine learning we want to cover it during the course.

2nd,3rd year student from

- 1 SMS
- 2 EECS
- 3 etc.

We don't need your prior knowledge about machine learning. We need you passion to read the huge amount of papers and books we provide. **We will give some papers at the first time(2017.5.6), we need your review of the papers.**

We hope that you can conquer hard coding jobs. We suggest that you can use tensorflow.

Example (Tensorflow for machine learning)

```
input1 = tf.placeholder(tf.float32)
input2 = tf.placeholder(tf.float32)
output = tf.mul(input1, input2)

with tf.Session() as sess:
print sess.run([output], feed_dict={input1:[7.], input2:[2.]})

# Output:
# [array([ 14.], dtype=float32)]
```

If you don't have coding skills, **learn it during the seminar in the summer vacation.**

Our seminar will start at 2017.8 ends at 2018.

We will give an introduction at 5.6(1560), the topics will about:

- Course Information.
- Elements of optimization.
- Elements of machine learning.

What we follow?

- Short Course of Deep Learning 2016 Autumn at PKU(advised by Prof.BinDong and Prof. ZaiwenWen)
- Stanford CS229 Machine Learning, CS231 CNN for visual recognition.
- Berkeley CS291 Deep Reinforcement Learning.
- CMU 10601 Machine Learning, 10701 An introduction of machine learning, 10708 Probabilistic Graphical Models
- **Text Book:**Deep learning book, The element of statistical learning,Machine learning a probabilistic perspective
- ICLR,NIPS,ICML,CVPR,ICCV,IJCAI,AAAI and etc.
- <http://deeplearning.net/reading-list/>

The End