

Home
Machine Learning
Computer Vision
Source Code
Teaching
Selected Publications
Richard's Bio
My drawings

Statistics, Probability and Machine Learning Short Course

Here is a Statistics, Probability and Machine Learning course I developed mainly for PhD students at UTS. It's constantly being updated. I enjoy sharing my knowledge with other researchers and industry practitioners. Depends on the level of the participants, I am happy to give one to ten days face-to-face tutorials / workshops on these topics. Please email me. This short course is focused mainly on probabilistic generative models. Machine Learning of course, contains much more topics than what these notes cover.



大家好，从2015年10月开始，我为国内的同行，同学们做了一系列概率机器学习的视频公开课。我每星期都会更新。为了方便大家，我是用中文讲的。The English version of my machine learning MOOCs is also on its way...

- ☐ [优酷 连接](#)
- ☐ [Youtube 连接](#)

Notes can be downloaded from: (in English)

- ☐ [Intro to Bayesian Statistics](#)
 - General probability knowledge, Bayesian Statistics
- ☐ [Probabilities and Estimations](#)
 - Various common probability distribution (functions), natural parameters and Maximum Likelihood & Maximum A Posterior Estimation
- ☐ [Statistical Properties](#)
 - Various useful statistical properties include inequalities, convergence and uniqueness
- ☐ [Expectation-Maximization](#)
 - Proof of convergence for E-M, examples of E-M through Gaussian Mixture Model
- ☐ [Continuous and Discrete State Dynamic Systems](#)
 - Derivations for Kalman Filter and Hidden Markov Model
- ☐ [Monte Carlo and Sequential Monte Carlo Inference](#)
 - Overview of several Sampling techniques, including Rejection, Adaptive Rejection, Importance, Markov Chain Monte Carlo (MCMC), Gibbs, Bootstrap Particle Filter, and Auxiliary Particle Filter
- ☐ [Non-parametric Bayes & applications](#)
 - Dirichlet Process, Hierarchical Dirichlet Process, HDP-HMM, Indian Buffet Process, and applications of DP to relational models.
- ☐ [Variational Bayes](#)
 - Explain Variational Bayes in two parts: non-exponential and exponential family distribution plus stochastic variational inference.
- ☐ [Linear Regression and Support Vector Machine](#)
 - Explain Linear Model, Norms and the internal workings of support vector machine.

Some older notes (before 2009) for Computer vision

- ☐ [Camera calibration](#) 
 - A partial explanation to [Z. Zhang](#), "A flexible new technique for camera calibration", *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol.22, No.11, pages 1330-1334, 2000
- ☐ [Mean-shift Tracking](#)  (2 hours face to face)
 - To explain [D. Comaniciu, V. Ramesh, P. Meer](#): *Kernel-Based Object Tracking*, *IEEE Trans. Pattern Analysis Machine Intell.*, Vol. 25, No. 5, 564-575, 2003
- ☐ [Non-Linear Least Square Fitting \(Part A\)](#) 