

KURIKULUM ITB 2013 PROGRAM MAGISTER
Program Studi Magister Informatika
Fakultas Sekolah Teknik Elektro dan Informatika

Kode Matakuliah: <i>IF5180</i>	Bobot sks: <i>3</i>	Semester: <i>1</i>	KK / Unit Penanggung Jawab: Informatika	Sifat: Wajib Opsi Sistem Intelijen
Nama Matakuliah	Pembelajaran Mesin Lanjut			
	Advanced Machine Learning			
Silabus Ringkas	Pendalaman konsep dan pendekatan dalam pembelajaran.			
	In-depth analysis of machine learning concepts and approaches.			
Silabus Lengkap	Pengenalan pembelajaran mesin, decision learning, bayesian learning, logistic regression, graphical models, computational learning theory, hidden markov model, neural net, dimensional reduction, support vector machine, boosting, dan active learning.			
	Introduction to machine learning, decision learning, bayesian learning, logistic regressions, graphical models, computational learning theory, hidden markov model, neural net, dimensional reduction, support vector machine, boosting, dan active learning.			
Luaran (Outcomes)	Upon completion of this course, students are able to understand basic principles and to analyze the main characteristics of various machine learning algorithms.			
Matakuliah Terkait	IF5020 Algoritma & Pemrograman A		Pra-syarat:	
Kegiatan Penunjang	<i>Praktikum Mandiri</i>			
Pustaka	Tom Mitchell, Machine Learning, Mcgraw-Hill, 1997			
	Bishop, Pattern Recognition & Machine Learning (Information Science & Statistics), Springer, 2007			
Panduan Penilaian	Komponen Nilai terdiri dari: Pekerjaan Rumah (15%), Kuiz (15%), UTS (30%), Tugas Besar (35%), Presentasi (5%)			
Catatan Tambahan				

Mg#	Topik	Sub Topik	Capaian Belajar Mahasiswa	Sumber Materi
1	Pengenalan Kuliah & Pembelajaran	<ul style="list-style-type: none"> Definisi Learning problem Karakteristik persoalan Contoh-contoh aplikasi 	Memahami karakteristik masalah yang dapat diselesaikan dengan	Mitchell: Bab 1

Mg#	Topik	Sub Topik	Capaian Belajar Mahasiswa	Sumber Materi
	Mesin		pembelajaran mesin	
	Decision Tree Learning	<ul style="list-style-type: none"> • Representasi • Algoritma Dasar IDT • Isu-isu dalam IDT 		Mitchell: Bab 3
2	Overview Probability Theory	<ul style="list-style-type: none"> • Dasar Probabilitas: Events, random variables, Independent Events, Bayes Rules, Joint probability distributins • Point estimations: Max likelyhood estimate, Max a posteriori estimates, Distributions: binomial, beta, dirichlet 	Dapat menerapkan konsep dasar teori probabilitas	
3	Bayesian Learning	Naïve Bayes <ul style="list-style-type: none"> • Asumsi • Algoritma • Estimasi Parameter • Klasifikasi Teks Gaussian Naïve Bayes	Dapat menjelaskan dan menerapkan Naïve Bayes.	Mitchell: Bab 6 Bishop: Bab 1.2.4, 4.2
4	Logistics Regressions	<ul style="list-style-type: none"> • Training Logistics Regression • Training Linear Regression • MAP Estimates • Generative vs Discriminative Estimates • Bias & Variance decomposition 	Dapat menjelaskan prinsip kerja logistics regression.	Bishop: Bab 1.2.5, 3, 3.2
5	Model Grafik	<ul style="list-style-type: none"> • Bayes Net • Representasi joint distribution dengan asumsi conditional independence • D-separation • Inference 	Dapat menjelaskan dan menerapkan Bayes Net.	Bishop: Bab 8-8.2
6	Model Grafik	<ul style="list-style-type: none"> • Expectation-Maximization • Mixture of Gaussian Clustering • Pembelajaran Bayes Net 	Dapat menjelaskan dan menerapkan EM, clustering dan proses pembelajaran Bayes Net	Bishop: Bab 9.2, 9.3.3, 9.4
7	Computational Learning Theory	<ul style="list-style-type: none"> • PAC Learning • VC-Dimension • Model Mistake-Bound 	Dapat menjelaskan konsep dasar dari Computational Learning Theory.	Mitchell: Bab 7
8	UTS			

Mg#	Topik	Sub Topik	Capaian Belajar Mahasiswa	Sumber Materi
9	Hidden Markov Model	<ul style="list-style-type: none"> • Markov Models • HMM & Bayes Net • Model Probabilistics Time Series lainnya 	Dapat memahami dan menjelaskan konsep penting dari Hidden Markov Model.	Bishop: Bab 13.1, 13.2
10	Neural Net	<ul style="list-style-type: none"> • Non-linear regressions • Back-propagations & Gradient Descent • Pembelajaran representasi hidden Layers 	Memahami dan menjelaskan konsep penting dari Neural Net.	Mitchell: Bab 4 Bishop: Bab 5
11	Learning Representations	Unsupervised Dimensional Reduction <ul style="list-style-type: none"> • Principal Component Analysis (PCA) • Singular Value Decomposition • Independent Component Analysis • Cannonical Correlation Analysis 	Dapat menjelaskan beragam teknik unsupervised dimensional reduction.	Bishop: Bab 12, 12.1
12	Learning Representations	Supervised Dimensional Reduction <ul style="list-style-type: none"> • Fischer Linear Discriminant • Hidden Layers of Neural Networks 	Dapat menjelaskan beragam teknik supervised dimensional reduction.	Bishop: Bab 12, 12.1
13	Support Vector Machine	<ul style="list-style-type: none"> • Maximum Margin • Support Vector • Quadratic Programming • Kernel Trick 	Dapat memahami dan menjelaskan konsep SVM.	Bishop: Bab 4.1.1, 4.1.2, 6.1, 6.2, 7.1, Appendix E
14	Boosting	<ul style="list-style-type: none"> • Weak Classifiers • AdaBoost • Boosting & Logistic Regression 	Dapat memahami dan menjelaskan beragam teknik Boosting.	Bishop: Bab 14.3
15	Active Learning	<ul style="list-style-type: none"> • Binary Bisection • Uncertainty Sampling • Query by Committee 	Dapat memahami & menjelaskan beragam mekanisme dalam active learning.	