

BROCHURE

Data Analytics for Operations Research

Workshop/Class Schedule

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Date/Day	Timing hours	Session No. #/Day	Title	Detailed Description
14-Nov-18 (Wednesday) (1 st Day)	1000-1130	1/1	Regression	Linear regression, bias-variance decomposition, subset selection
	1200-1330	2/1	Regression (contd)	Shrinkage methods, e.g. ridge regression and LASSO. Convex quadratic programs with constraints. Convex optimization problems and global optimality
	1500-1630	3/1	Regression (contd)	Sparsity via L_1 norms and linear optimization, Mixed 0-1 quadratic optimization problems, Regularization as robust optimization
	1700-1830	4/1	<i>Tutorials/Problem solving</i>	Based on: Lecture # 01, # 02, # 03
End of day 1				
15-Nov-18 (Thursday) (2 nd day)	0900-1030	1/2	Regression (contd)	Regression with a Gaussian process prior. Logistic regression and Generalized Linear Models (GLMs)
	1100-1230	2/2	Classification	k-nearest neighbors, Optimal Bayes classifier, Naive Bayes, Empirical risk minimization (ERM), Gradient descent and stochastic gradient descent algorithms for large scale ERM
	1400-1530	3/2	Support Vector Machines (SVMs)	Classification and regression using SVMs, Kernel methods and the kernel "trick", Hilbert spaces and Representing Kernel Hilbert Spaces (RKHS), Constrained convex programs and Alternating Direction Method of Multipliers (ADMM)
	1600-1730	4/2	<i>Tutorials/Problem solving</i>	Based on: Lecture # 05, # 06, # 07
End of day 2				
16-Nov-18 (Friday) (3 rd Day)	0900-1030	1/3	Resampling Methods for model assessment and selection	Resampling Methods for model assessment and selection, cross-validation methods
	1100-1230	2/3	Bootstrapping Aggregation (Bagging)	Classification and regression trees (CART), Random forests
	1400-1530	3/3	Clustering Algorithms	Clustering Algorithms, k-means, k-medoids and kernel k-means clustering, Mixed 0-1 linear programs
	1600-1730	4/3	<i>Problem solving</i>	Based on :Lecture # 09, # 10, # 11
End of day 3				
17-Nov-18 (Saturday) (4 th Day)	0900-1030	1/4	Dimension Reduction Methods	Principal components analysis (PCA), kernel PCA, SVD and numerically stable methods for SVD
	1100-1230	2/4	Matrix decomposition techniques	Non-negative matrix decomposition, Page Rank, Matrix decomposition using nuclear norm, ADMM for matrix decomposition
	1400-1530	3/4	Expectation-Maximization (EM) Algorithm	EM Algorithm, Applications include clustering via normal mixture models, the general EM algorithm via Kullback-Leibler divergence
	1600-1730	4/4	<i>Tutorials/Problem solving</i>	Based on: Lecture # 13, # 14, # 15
End of day 4				
18-Nov-18 (Sunday) (5 th Day)	0900-1030	1/5	Expectation-Maximization (EM) Algorithm (contd)	Applications to revenue management and pricing
	1100-1230	2/5	Empirical likelihood methods	Comparison with Bayesian methods, Information divergence, distributionally robust optimization
	1400-1530	3/5	Optimal transport methods	Wasserstein metric and robust optimization
	1600-1730	4/5/	Group Presentation/Examination	N/A