CS 236756 - Technion - Intro to Machine Learning

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Exam Preparation – Suggested Guidelines

1. Go over the lecture presentations, make sure you understand everything, including all of the nuances. You will probably be asked on something that was in the lectures but was not covered in the tutorials.
2. Go over the tutorials, make sure you don't miss anything. Skip the code parts, you won't be asked to write Python in the test. The tutorial slides are on the course website, and my tutorials are @ https://github.com/taldatech/cs236756-intro-to-ml. My tutorials include everything that is on the slides and much more. I have included some hard to miss points and also examples which may help you understand better.
3. Solve exams from past semesters. Pay attention that there are different teachers in charge in the Spring and in the Winter.
4. If you are done with the exams from past years or if your are studying for Moed B (unfortunately) and have time to spare, I have prepared a repository of questions from tests in other universities. Solving them will strengthen your understanding. There are a lot of them, so I suggest you start with the subjects you struggle with the most.
5. In case you need to refresh your memory on the theoretical stuff or just strengthen it, I recommend Stanford's CS229-Machine Learning video lectures by Andrew Ng @ https://see.stanford.edu/course/cs229.

Relevant Exam Questions Repository

Source	Name	Address	Notes
1	MIT – Machine Learning – Fall 2006	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/exams/	
2	Stanford – CS229 – Machine Learning	https://see.stanford.edu/course/cs229	Under "Assignments"
3	University of Washington – CSE 546 – Machine Learning – Fall 2014	https://courses.cs.washington.edu/courses/cse546/14au/exams.html	
4	CMU – Machine Learning – Fall 2007	http://www.cs.cmu.edu/~guestrin/Class/10701-F07/exams.html#prev_exams	
5	Berkeley – CS 189 – Introduction to Machine Learning	http://people.eecs.berkeley.edu/~jrs/189/	
6	Tel Aviv University – Introduction to Machine Learning – Fall 2013	http://ml-tau-2013.wikidot.com/exam	Hebrew

Source 1 - MIT – Machine Learning – Fall 2006

Exam / File	Question	Topics
Midterm Fall 2006	Problem 1	Regression and Regularization
	Problem 2	Polynomial Regression, Bias and Variance
	Problem 3	SVM
	Problem 4	Kernels
	Problem 5	Perceptron
Midterm Fall 2004	Problem 1	Linear and Quadratic Regression
	Problem 2	MLE and Regression
	Problem 3	Logistic Regression and MLE
	Problem 4	Feature Selection for Logistic Regression
	Problem 5	Margins
Midterm Fall 2003	Problem 1	Logistic Regression
	Problem 2	Polynomial Regression, Underfitting and Overfitting
	Problem 3	SVM
	Problem 4	Mixture of Gaussians
Midterm Fall 2002	Problem 1	Linear Regression Closed-Form Solution
	Problem 2	Regularization
	Problem 3	SVM and Kernels
	Problem 5	Boosting and AdaBoost
Midterm Fall 2001	Problem 2	Logistic Regression, Gradient Descent
	Problem 3	Feature Selection (Filter, Wrapper)
	Problem 4	Boosting
	Problem 5	Cross-Validation, VC-Dimension
	Problem 6	Mixture of Gaussians vs. Regression
Final Fall 2004	Problem 1	Boosting
	Problem 2	SVM
Final Fall 2003	Problem 2	VC-Dimension
	Problem 3	Boosting

Source 2 Stanford – CS229 – Machine Learning

Exam / File	Question	Topics
Problem Set 1	Question 3	Multivariate Least-Squares
	Question 4	Naïve Bayes
Problem Set 2	Question 1	Kernel Ridge Regression
	Question 3	SVM with RBF Kernel
	Question 5	Uniform Convergence
Problem Set 3	Question 1	Uniform Convergence and Model Selection
	Question 2	VC-Dimension
	Question 5	EM Algorithm
Problem Set 4	Question 1	EM for Supervised Learning

Source 3 - University of Washington – CSE 546 – Machine Learning – Fall 2014

Exam / File	Question	Topics
Midterm Autumn/Fall 2014	Question 1	Short Answers – Logistic Regression, K-NN, MLE, Decision Trees
	Question 2	Building a Decision Tree
	Question 3	Logistic Regression for Sparse Data
	Question 4	Boosting
	Question 5	L1 + L2 Regularization (ElasticNet)
Midterm Autumn/Fall 2007	Question 1	Short Answers – Naïve Bayes, Boosting, Cross-Validation
	Question 2	Loss Functions
	Question 4	Model Selection
	Question 5	SVM
	Question 6	Decision Trees and Ensemble Methods

Source 4 - CMU – Machine Learning – Fall 2007

Exam / File	Question	Topics
Midterm Spring 2007	Question 1	Short Answers – Overfitting, MLE, AdaBoost
	Question 2	SVM and Slacks
	Question 3	Feature Selection with Boosting
	Question 4	Gaussian Naïve Bayes
	Question 5	Neural Networks
	Question 7	Learning Theory
Final Exam Spring 2006 (+ Handwritten Solutions)	Question 1	Short Answers – SVM ,Choosing the Best Classifier
	Question 2	Gaussian Naïve Bayes, Logistic Regression
	Question 3	Boosting
	Question 8	EM Algorithm
	Question 9	PCA
	Question 10	Neural Networks with PCA
Final Exam Fall 2006	Question 1	Short Answers – Trees, Probability, EM, MLE, MAP
	Question 3	Learning Theory
	Question 4	Gaussian Mixture Model
	Question 7	PCA, LDA
Midterm Fall 2006	Question 1	MLE, MAP
	Question 2	Decision Trees
	Question 3	Neural Networks, Regression
	Question 4	Bias-Variance Tradeoff
	Question 5	SVM
	Question 6	Discriminative vs Generative Models
	Question 7	Learning Theory

Exam / File	Question	Topics
Midterm Spring 2013	Question 1	True/False – Probability, Gaussians, Hessian, Regularization, MLE, Perceptron
	Question 2	SVD, Sigmoid, Regularization, Convexity
	Question 3	Short Answers – SVM, MLE, Least-Squares
Midterm Spring 2014	Question 1	True/False – SVM, Regression, Convexity, 1-NN, Cross-Validation
	Question 2	Classification, Gaussians
	Question 3	Risk Minimization
	Question 4	Kernels
	Question 6	MLE
	Question 8	Generative Models, Lagrange Multipliers
Midterm Spring 2015	Question 1	True/False – Logistic Regression, Norms, MLE, Discriminative and Generative Models
	Question 2	SVM, Kernels, Cross-Validation, Regression Normal Equations, Perceptron
	Question 3	Parameter Estimation
	Question 5	Regularization, Priors, MAP for Linear Regression
Midterm Fall 2015	Question 1	True/False – SGD, Convexity, Bootstrap Method, Ridge Regression, LDA
	Question 2	Underfitting and Overfitting, Feature Selection, SVM
	Problem 1	SGD
Midterm Spring 2016	Question 1	SVM, Gaussians, Regression, Bias-Variance
	Question 2	Gaussians
	Question 3	Linear Regression
	Question 4	LDA
Midterm Spring 2017	Question 1	Training Accuracy, ROC Curve, Probability, LDA/QDA, MLE, Regression, Regularization, SVM
	Question 3	Loss Functions and Gradient Descent
	Question 4	QDA
	Question 5	Eigenvalues, Hessian

Midterm Spring 2019	Question 1	Eigenvectors, Cost Functions, Logistic Regression, Least-Squares, LDA, Bias-Variance, Polynomial Regression
	Question 2	Perceptron
	Question 3	QDA
	Question 4	Ridge Regression
	Question 5	Logistic Regression
Final Exam Spring 2013	Question 1	True/False – SVM, Kernels, Classification, Gaussians, Logistic Regression, Random Forests, AdaBoost, K-NN, Neural Networks, K-Means
	Question 2	SVM, Linear Regression, Bias-Variance, Convexity
	Question 3	Short Answers – Linear Regression Closed-Form for sin/cos, Classification
Final Exam Spring 2014	Question 1	True/False – SVD, Neural Networks, MLE, K-Means, Decision Trees, Boosting
	Question 2	PCA, SVM, Decision Boundaries, Clustering, Gaussian Mixture Models
	Question 3	Softmax Regression, Batch Gradient Descent
	Question 4	PCA, Least-Squares
	Question 5	Mixture of Linear Regressions
	Question 7	Kernel PCA
	Question 8	Neural Networks, Backpropagation
Final Exam Spring 2015	Question 1	True/False – Neural Networks, Logistic Regression, PCA, Cross-Validation, Boosting, Bagging, Precision/Recall, SVM
	Question 2	Gradient Descent, Logistic Regression, Overfitting, Sigmoid
	Question 3	Learning Theory
	Question 4	Parameter Estimation
	Question 6	Decision Trees
Final Exam Fall 2015	Question 1	True/False – Boosting, Bagging, K-Means, Dimensionality Reduction
	Question 2	Neural Networks, Regression, ROC Curve, K-Means, PCA, Random Forests
	Question 5	Decision Trees, Random Forests
	Question 6	L1 + L2 Regularization (ElasticNet)

Final Exam Spring 2016	Question 1	Overfitting, Neural Networks, Generative Models, LASSO Regression, PCA, Bias-Variance, Boosting, SVM
	Question 2	Feature Selection
	Question 3	Gradient Descent for K-Means
	Question 4	Kernels
	Question 5	PCA
	Question 7	Neural Networks, Backpropagation
Final Exam Spring 2017	Question 1	Normalization, SVD, PCA, Random Forest, K-NN, Entropy, Neural Networks, VC-Dimension, Clustering
	Question 3	MLE
	Question 4	Decision Trees
	Question 5	Bagging and Random Forests
	Question 8	VC-Dimension

Source 6 - Tel Aviv University – Introduction to Machine Learning – Fall 2013

Exam / File	Question	Topics
Sample Exam	Question 1	SVM, Perceptron
	Question 2	Perceptron
	Question 3	Linear Regression
	Question 4	Kernel SVM
	Question 5	AdaBoost
	Question 6	MAP, MLE
	Question 7	Regression, SGD
	Question 8	EM Algorithm
Moed A	Question 1	SVM, 1-NN, Decision Trees
	Question 2	Naïve Bayes
	Question 3	Empirical Risk Minimization (ERM), Overfitting
	Question 4	Regression
	Question 5	SVM
	Question 6	AdaBoost
	Question 7	K-NN, SVM
	Question 8	MLE, MAP