Mapping of Recorded Lectures to this Year's Lecture

This table of contents of the Pattern Analysis class from 2018 contains a mapping to the 2018 videos to 2010 videos/PDFs. The full collection of videos for Pattern Analysis 2018 is available at https://www.video.uni-erlangen.de/course/id/655

PA 2018 Clip Number	Content	Maps to (+ Remarks)	Direct Link
1	Organization Miscellaneous topics (both by Daniel Stromer, I was at a conference that week)		https://www.video.uni-erlangen.de/clip/id/8959
2	Introduction - Literature links - Recap on ML and MAP estimation - Overview on PA topics	01a: Probabilities, PDFs, and Sampling 01b: Recap Parametric Density Estimation 00b: Preview on PA topics	https://www.video.uni-erlangen.de/clip/id/8977
3	Parzen window estimation Motivation for unsupervised methods	01c: Non-parametric density estimation PA 2020: we also mentioned k-NN as a "memory method", we looked through kernel aspects both in the books by Bishop and HTF, and moreover discussed kernel regressors in 01g: Derivation of HTF Eqns. 6.8 and 6.9	https://www.video.uni-erlangen.de/clip/id/9036
4	Literature reference to HTF Mean Shift	02b: Mean Shift Algorithm (+ raccoon session for discussion) PA 2020 also discusses GMMs in 02d: Gaussian Mixture Models, which was not nicely in PA 2018	https://www.video.uni-erlangen.de/clip/id/9051
5	Looking through HTF Sec. 14 - K-means - Gap-Statistics - Clustering strategies	02c: kMeans Algorithm 02f: Model Selection for k-Means PA 2020: we did not discuss variants of hierarchical clustering	https://www.video.uni-erlangen.de/clip/id/9081
6	Spectral Clustering A look at the eigenvalue distribution, first mention of the "eigenvalue gap"	PA 2020: we omitted spectral clustering, but talked in the context of manifold learnign about the eigenvalue gap	https://www.video.uni-erlangen.de/clip/id/9118
7	Manifold Learning Introduction - Illustrates Curse of Dimensionality - Rushes through PCA - Multi-Dimensional Scaling - mentions the projections to d'-dimensional subspace	02g: Curse of Dimensionality 02h: PCA (PA 2020: more thorough) 02i: MDS	https://www.video.uni-erlangen.de/clip/id/9149
8	Manifold Learning continued - When do linear methods fail? -> nonlinear methods - ISOMAP - Locally Linear Embedding - Laplacian Eigenmaps	02j: ISOMAP and Laplacian Eigenmaps (PA 2020: note that we did not discuss Locally Linear Embedding)	https://www.video.uni-erlangen.de/clip/id/9171

9	Model Selection Problem - Gap Statistics - Kernel support size as a model selection parameter for mean shift - Cross-validation for kernel density estimation - Eigenvalue distribution for Laplacian Eigenmaps Start with Random Forests: Tutorial on decision trees	02f: Model Selection for k-Means 01d: First Glance at Model Selection PA 2020: note that we explored in the raccoon session that the within-cluster distance is somewhat suboptimal for mean shift; this kind of disqualifies the GAP statistics for mean shift Eigenvalue distribution is in the end of 02i: Multi-dimensional Scaling 01h: Classification and Regression Trees (PA 2020: note that we started here with the book by HTF)	https://www.video.uni-erlangen.de/clip/id/9200
10	Random Forests according to Shotton/Criminisi/Konokoglu - Information gain / entropy - Discussion of randomization, weak learner model, impact on decision boundaries	01h: Classification and Regression Trees 01i: Random Forests 02k: LE and Random Forests Part 1	https://www.video.uni-erlangen.de/clip/id/9238
11	Random Forests - Discussion of greedy space subdivision - Regression Forests - Density Forests - Manifold Forest	01h: Classification and Regression Trees 01i: Random Forests 02k: LE and Random Forests Part 2	https://www.video.uni-erlangen.de/clip/id/9245
12	- Impact of Random Forest Parameters, overfitting versus underfitting - Implementation of Random Forests - Manifold Forest	Random Forest parameters are iscussed in the raccoon session PA 2020: Implementation remarks are omitted 02k: LE and Random Forests Part 2 PA 2020: the shape of the Manifold Forest weight matrix was a topic in the raccoon session	https://www.video.uni-erlangen.de/clip/id/9271
13	Probabilistic Graphical Models - Generative versus Discriminative Models - Naive Bayes Model - Independence in Probabilistic Models	03a, 03b (HMM), 03d, 03e(MRF): Independence and factorization (in much more detail)	https://www.video.uni-erlangen.de/clip/id/9286
14	Hidden Markov Models - Introduction - Markov assumption - Low-level look at probabilities in the model	03b: HMMs	https://www.video.uni-erlangen.de/clip/id/9315
15	Hidden Markov Models - Forward algorithm / backward algorithm	03c: Forward algorithm	https://www.video.uni-erlangen.de/clip/id/9323
16	Organizational things on the exam Hidden Markov Models - Viterbi algorithm for recovering the most likely state sequence - Baum-Welch formulae for training	03c: Viterbi algorithm, Baum-Welch formulae	https://www.video.uni-erlangen.de/clip/id/9354

17	Markov Random Fields - Introduction: Denoising example - Distinction of likelihood (“data term”) and prior (“regularizer”) in the model - Transition to Gibbs Random Fields	03f: denoising example 03e: Gibbs Random Field	https://www.video.uni-erlangen.de/clip/id/9368
18	Markov Random Fields - Illustration, application examples - Graph cuts for MRF inference (binary variable assignments) - Submodularity condition and performance guarantees on the graph cut inference	03g: highly similar content	https://www.video.uni-erlangen.de/clip/id/9402
19	Recap on PA 2018 - Look at Stanford class on probabilistic graphical models - Cliques as the smallest unit in a MRF - Independence in MRFs	03e: Cliques in MRFs, independence in MRFs	https://www.video.uni-erlangen.de/clip/id/9411

The links for the lectures on probabilistic graphical models will be filled out when the 2020 videos are available.