SMAI Mid 2

PCA

- *Dimensionality Reduction*
  - Feature extraction
  - Feature selection
- Two points on PCA
  - Dimensionality reduction that retains maximum information
  - Reconstruction of original data with minimum error
- Proof of mean projection
- **EIGEN VECTOR AND VALUE**
- Minimising Reconstruction Loss - Proof
- Retention of maximum information - Proof
- **PCA - Algorithm - All Steps and Why**
- Deciding k
- Eigen Faces
- N and d value comparison and inter-change calculations

SVM

- Why SVM
- Constraints for SVM
- Primal problem equation
- Dual problem equation
- Support Vector
- Number of Support Vectors and Error
- Soft SVM and new constraint equation
- Implementation Algorithm
- Priman to Dual

Kernels

- Why Kernel
- Feature Map
- Kernel
- Kernel Matrix and properties
- Non-linear, Kernel SVM
- Example Breakdown
- Popular Kernels
- Kernel to Feature Map [*Always dot product of feature map*]

LDA and KPCA

- LDA, FDA
- Within Scatter, Between Scatter
- New Objective Function and Minimisation
- Generalised Eigen Value problem and Sw inversion
- Sw defined wrt each component pair
- KPCA equation
- KPCA Calculations
- Projection and Centring of Kernel
- Steps

MLE Bias

- Proof of mean estimator unbiased
- Proof of variance estimator biased
- Derivation of variance estimator modification for unbiased