Low-rank decompositions emphasize patterns in a matrix, help complete missing data using low-rank approximations, and help mitigate isotropic noise in data. Patterned data is placed into ‘K’ clusters by using the K-Means algorithm. Singular Value Decomposition provides the best rank-r approximation to matrices, relates the principal components as left-singular vectors, and solves the classification problem using orthonormal bases which fails if problem is ill-conditioned. We must then use truncated SVD or ridge-regression to find solutions.