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# Machine Learning

## Homework 3

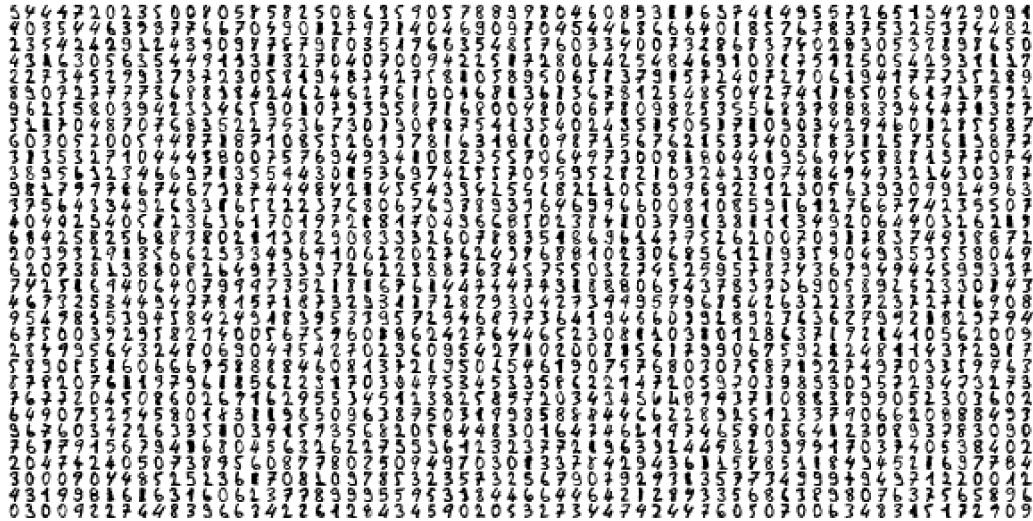
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		Q1	Q2	Q3	Q4	Total
Grade	Max	1	1.5	1	1.5	5
	Expected					

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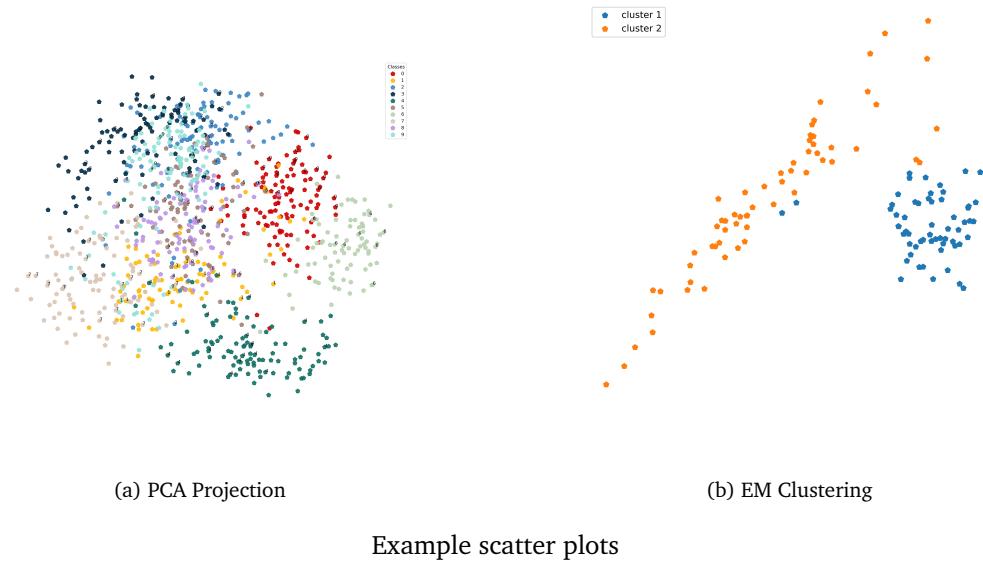
Make sure that you read chapters 6 & 7 from the **textbook**.

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Digits from Optdigits dataset

You will be using the **Optdigits dataset** for the first two questions. Only use **optdigits.tra** from the dataset. The last column indicates the class label.



## Question 1

Implement Principal Component Analysis(PCA) to project the digits into two dimensional space. Plot the transformed data points on a scatter plot. Use a unique color for each class.

## Question 2

Implement Linear Discriminant Analysis(LDA) and project the data points into 2D space. This time, use the class labels given within the dataset. Plot the transformed data points on a scatter plot using a unique color for each class.

## Question 3

Implement k-Means Clustering. Run the algorithm for the data given within the homework files. Plot the data points on a scatter plot using a unique color for each cluster. Repeat the procedure for  $K \in \{2, 3\}$ .

## Question 4

Implement Expectation-Maximization(EM) Algorithm on Gaussian Mixture Models to cluster the given data within the homework files. Follow the same plotting steps from the third question. Write down the EM steps you followed into your report.