Chapter 8: Dimensionality Reduction

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1 The Curse of Dimensionality

- The more dimensions the training set has, the greater the risk of **overfitting** it.
- One solution to the curse of dimensionality could be to **increase** the size of the training set to reach a sufficient density of training instances.
- Unfortunately, the number of training instances required to reach a given density grows **exponentially** with the number of dimensions.

2 Approaches for Dimensionality Reduction

- There are two main approaches to reducing dimensionality **Projection** and **Manifold**.

2.1 Projection

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2.2 Manifold Learning

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3 Dimensionality reduction algorithms:

- There are many dimensionality reduction algorithms like: PCA, Kernel PCA, LLE

3.1 PCA

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3.2 Kernel PCA

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3.3 LLE

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Papers to read later

- Karl Pearson, "On Lines and Planes of Closet Fit to System of Points in Space"