1 Principle Component Analysis

Let us have a set of d dimensional vectors $\vec{x_1}, ..., \vec{x_n}$. We want to represent the set by a single vector $\vec{x_0}$ in such a way that the squared error criterion function:

$$J_0(\vec{x_0}) = \sum_{k=1}^{n} ||\vec{x_0} - \vec{x_k}||^2 \tag{1}$$

$$\vec{m} = \frac{1}{n} \sum_{k=1}^{n} \vec{x_k} \tag{2}$$

$\vec{x_k}$ is a zero dimensional representation of the data set.