**Unsupervised Learning**

A screenshot of a cell phone

Description automatically generated

**Optimization objective**

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**Random initialization**

For i=1 to m

denotes the index of cluster centroids closet to x(i)

denotes the average(mean) of points assigned to cluster j

A picture containing bird

Description automatically generated

A close up of a map

Description automatically generated

**Dimensionality Reduction**

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**A screenshot of a cell phone

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U, S, V = numpy.linalg.svd(sigma)

Ureduce = U[:, 0:K].T

Z = Ureduce\*X = X\_norm \* U[:, 0:K]

X\_approximate = X\_recovered = Z \* U[:, 0:K].T

Choosing K:

**A map with text

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**99% similarity.**

**A screenshot of a cell phone

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