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Lecture: Machine Translation

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Video: Overview
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Video: Transforming word vectors
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Lab: Rotation matrices in R2
1h

Video: K-nearest neighbors
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Video: Hash tables and hash functions
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Video: Locality sensitive hashing
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Lab: Hash tables
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Video: Approximate nearest neighbors
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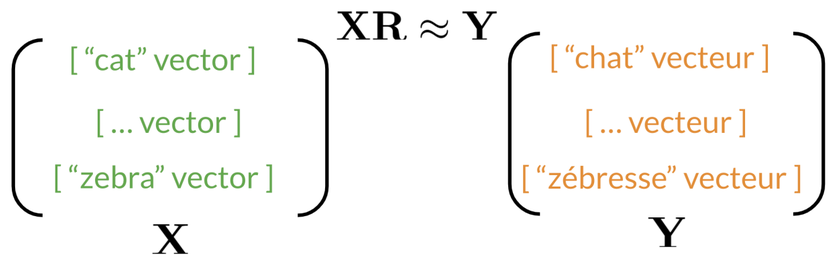

Note that X corresponds to the matrix of english word vectors and Y corresponds to the matrix of french word vectors. R is the mapping matrix.

Steps required to learn R:

- Initialize R
- For loop

$$Loss = \|XR - Y\|_F$$

$$g = \frac{d}{dR} Loss$$

$$R = R - \alpha * g$$

Here is an example to show you how the frobenius norm works.

$$\|\mathbf{XR} - \mathbf{Y}\|_F$$
$$\mathbf{A} = \begin{pmatrix} 2 & 2 \\ 2 & 2 \end{pmatrix}$$
$$\|\mathbf{A}_F\| = \sqrt{2^2 + 2^2 + 2^2 + 2^2}$$
$$\|\mathbf{A}_F\| = 4$$
$$\|\mathbf{A}\|_F \equiv \sqrt{\sum_{i=1}^{m} \sum_{j=1}^{n} |a^{ij}|^2}$$

In summary you are making use of the following:

- $\mathrm{XR} \approx \mathrm{Y}$
- minimize $\|\mathrm{XR} - \mathrm{Y}\|_F^2$