



deeplearning.ai

# NLP and Word Embeddings

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## Debiasing word embeddings

# The problem of bias in word embeddings

Man:Woman as King:Queen

Man:Computer\_Programmer as Woman:Homemaker ✗

Father:Doctor as Mother:Nurse ✗

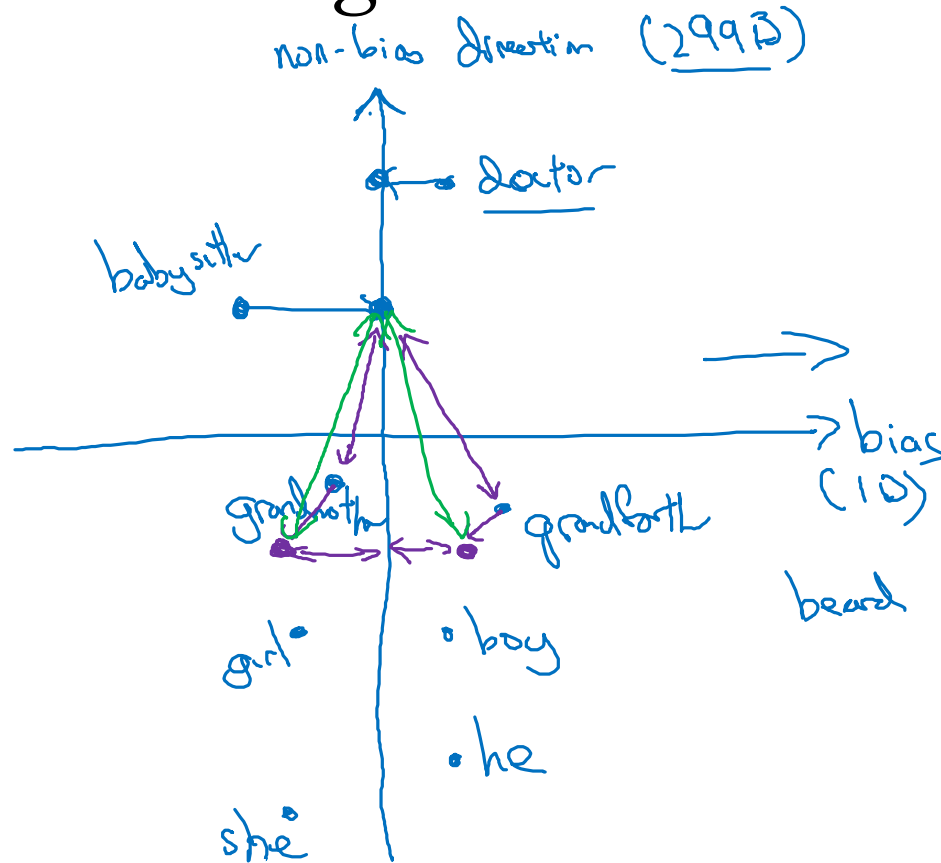
Word embeddings can reflect gender, ethnicity, age, sexual orientation, and other biases of the text used to train the model.

[Bolukbasi et. al., 2016. Man is to computer programmer as woman is to homemaker? Debiasing word embeddings]



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# Addressing bias in word embeddings



1. Identify bias direction.

$$\begin{cases} e_{he} - e_{she} \\ e_{male} - e_{female} \\ \vdots \end{cases} \rightarrow \text{average}$$

2. Neutralize: For every word that is not definitional, project to get rid of bias.

3. Equalize pairs.

$$\left\{ \begin{array}{l} \rightarrow \text{grandmother} - \text{grandfather} \\ \text{girl} \quad \text{boy} \end{array} \right\}$$