Gender bias in Wikipedia

"How does the gender bias in word embeddings from Wikipedia develop over time?"

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background

1

>> Word embeddings are an important tool for natural language processing.

>> Certain categories of words have a stronger association with male words than female words or the other way around.

>> Wikipedia has less than 15% female editors

>> Gender bias decreased from 1800 to 2000, but after that it is unknown

importance

2

>> Bias in word embeddings can cause bias in machine translation or bias in search results and potentially in many other downstream applications.
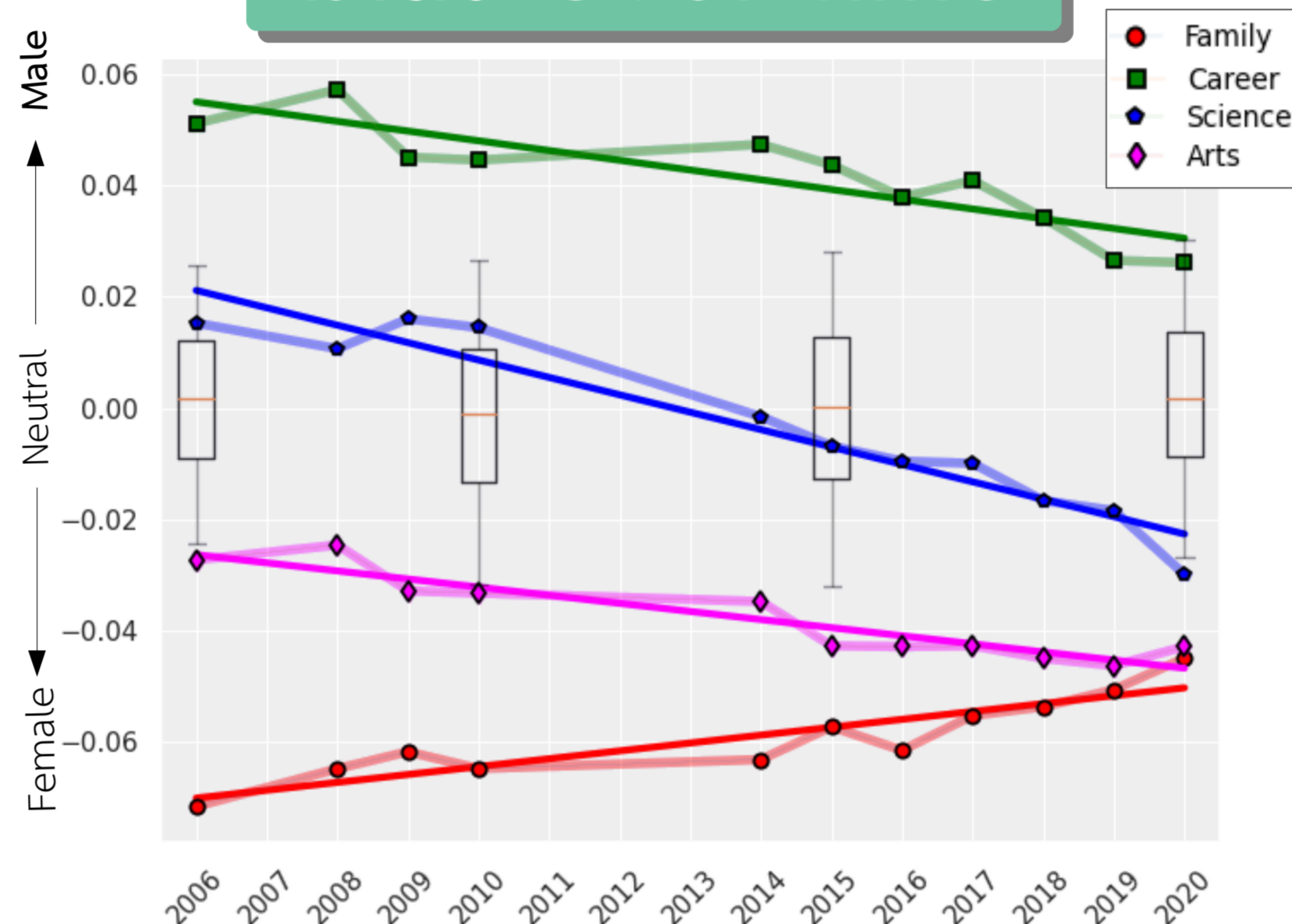
TURKISH - DETECTED ⇄ ENGLISH

o bir yönetici
o bir hemşire
o bir bilim adamı   ×

he is a manager   ☆
she is a nurse
he is a scientist

source: google.translate.com

bias over time

5

>> The box-plots show the quartiles and 5th/95th percentiles of random words for comparison
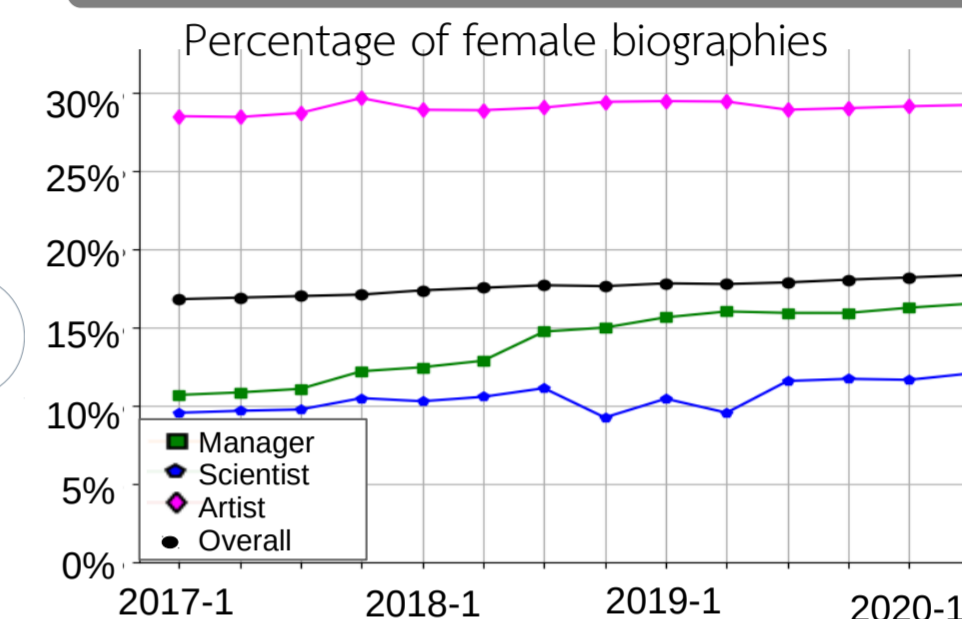
conclusion

6

Category	p-value
Career	$4.37 \cdot 10^{-4}$
Science	$1.91 \cdot 10^{-6}$
Family	$1.43 \cdot 10^{-4}$
Arts	$2.42 \cdot 10^{-5}$

Family >> **Stereotypically female biased**, especially marriage, wedding and children, **has decreased** over time.

Career >> **Stereotypically male biased which has decreased**.

Science >> Used to be male biased, but **reversed and has an increased female bias**, despite only 12% female scientists biographies. Possibly due to the principle of default gender: describing men as 'scientist', women as 'female scientist'.

Arts >> **Female bias that has increased** since 2006.

biographies

3

Percentage of female biographies

>> Less than 19% of Wikipedia biographies is female
>> The Artist occupation has a lot higher % female

computation

4

Using category set C, male set M and female set F:

>> $bias(C,F,M) = mean_{\,c\,in\,C}\,(assoc(c, M) - assoc(c, F))$

>> $assoc(w, A) = mean_{\,a\,in\,A}\,(cos(w, a))$

Career	Executive, management, professional, corporation, salary, office, business, career
Family	Home, parents, children, family, cousins, marriage, wedding, relatives
Arts	Poetry, art, dance, literature, novel, symphony, drama, sculpture, Shakespeare
Science	Science, technology, physics, chemistry, Einstein, NASA, experiment, astronomy
Female	She, her, woman, female, girl, daughter, sister, mother, aunt, lady
Male	He, his, man, male, boy, son, brother, father, uncle, gentleman