Global gender estimation from distribution of first names

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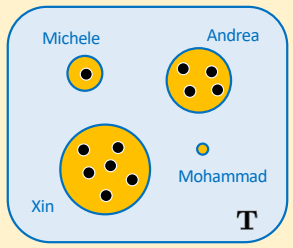
https://ggem.app

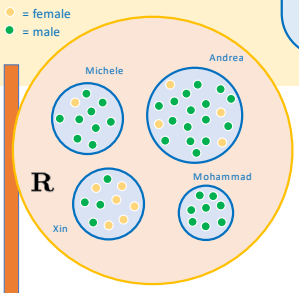
Problem: Find gender makeup given a list of names

β = female fraction

Andrea: 4
Michelle: 1
Mohammad: 0
Xin: 6

(Example)

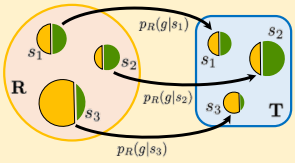




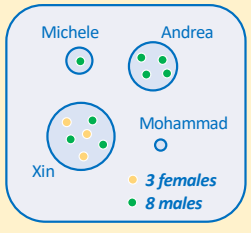
"Cheat sheet": Population at large

$p(\text{male}|\text{name} = \text{"Andrea"}) = 86.5\%$
$p(\text{male}|\text{name} = \text{"Michele"}) = 95.4\%$
$p(\text{male}|\text{name} = \text{"Mohammad"}) = 99.99\%$
$p(\text{male}|\text{name} = \text{"Xin"}) = 52.5\%$

Solution from the literature: Distribute according to the observed proportions

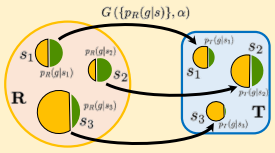


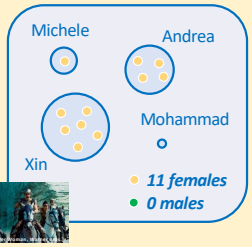
Implicit assumption of *fair sampling*:
... gender independence?!?



(effectively, a gender-balance approximation)

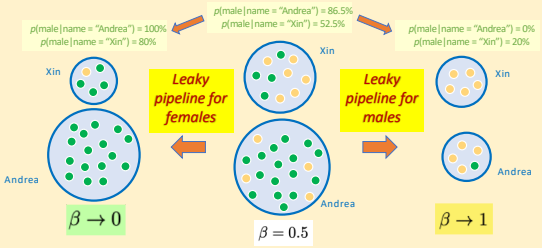
global Gender Estimation Method (gGEM): Estimate how a social dynamic shapes the name list





$p(\text{male}|\text{name} = \text{"Andrea"}) = 0\%$
$p(\text{male}|\text{name} = \text{"Michele"}) = 0\%$
$p(\text{male}|\text{name} = \text{"Mohammad"}) = 0\%$
$p(\text{male}|\text{name} = \text{"Xin"}) = 0\%$

How do conditional probabilities transform? A "leaky pipeline" model of social dynamic



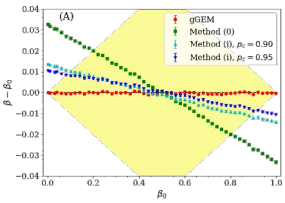
$$p(g|s) = p(g|s;\beta) = G(\{p_R(g|s)\}, \beta)$$

Results: Performance comparison

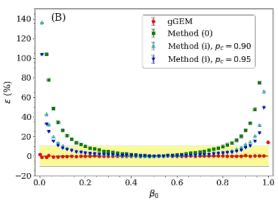
- SSN + census data for: US, Brazil, France
- 1000 test populations
- 1000 individuals per test population

- Better than 1 percentage point in gGEM estimate

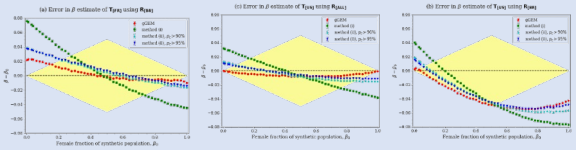
Absolute error



Relative error



Mismatched populations



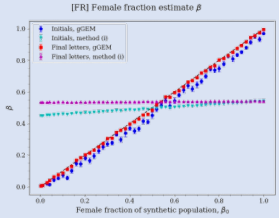
Conclusion: Performance comparison

Methods in the literature:
Accurate if target population is gender-balanced
[but: assumption not true in several cases of interest]
More accurate if gender-ambiguous names are removed
[price: smaller sample]
=> Otherwise, ***systematic overestimation***

Global gender estimation method:
Works for any gender mix
Uses the whole set of names
Robust against mismatches in gender-name correlations
Picks up very weak correlations (e.g. first-names initials)
Interpretation in terms of social dynamic shaping gender distribution
Accuracy: No intrinsic methodological systematic effects

Incomplete information

- Using only initials or final letters



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