

Accounting for Confirmation Bias in Crowdsourced Label Aggregation

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Cognitive Biases in Crowdsourcing

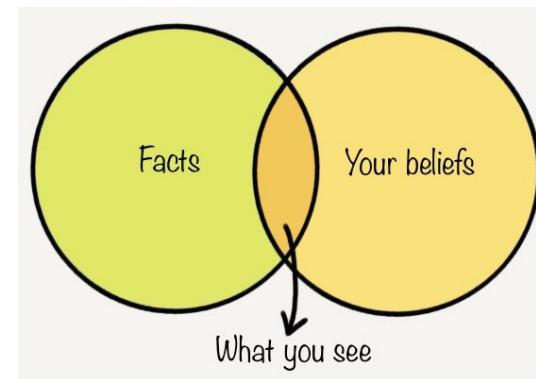
Crowd workers are prone to a wide range of biases!

In-batch annotation bias

Sequential bias

In-group bias

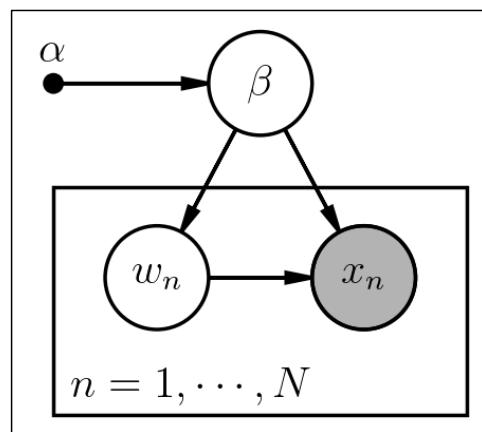
Confirmation bias



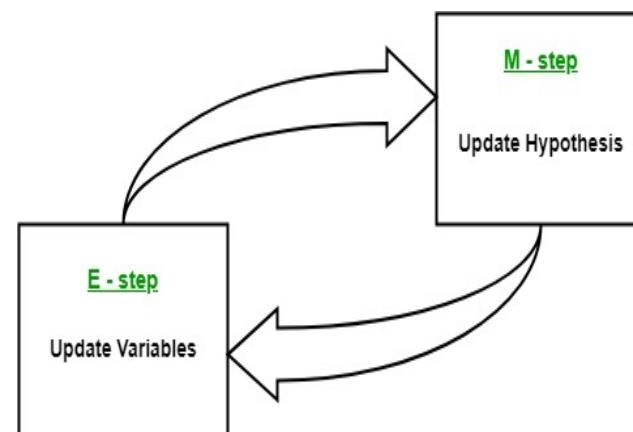
Label aggregation algorithms are developed, but they seldom take worker biases into account...

Our Approach: Bias-Aware Label Aggregation

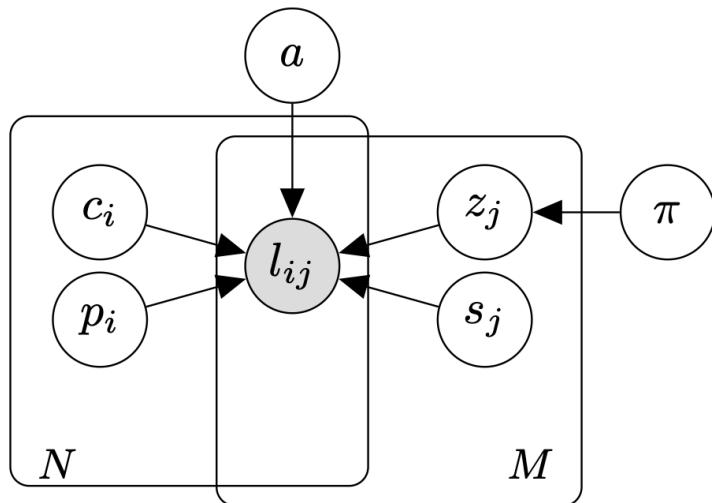
Model explicitly how worker's confirmation bias sneaks into annotations.



Design an algorithm based on the proposed model to reduce bias in the aggregated labels.



Probabilistic Model of Label Generation



$$P(l_{ij} = 0 | c_i, p_i, s_j, z_j, a) = \frac{1}{e^{a[(1-p_i)(s_j - c_i)^2 + p_i z_j]}}$$

$\mathbf{c}_i \in [0, 1]$: the values of annotator i

$\mathbf{s}_j \in [0, 1]$: the values of information contained in task j

$\mathbf{z}_j \in \{0, 1\}$: ground truth label of the task j

$\mathbf{\Pi} = P(z_j = 0)$: the prior probability for a task to have the preferable label

$\mathbf{p}_i \in [0, 1]$: extent to which annotator i is subject to confirmation bias

$\mathbf{a} \in [0, +\infty)$: annotators' base rate of providing the preferable label

Evaluate Our Approach with Real-World Data

Label a statement as either
“Opinion” or “Factual”

Task 5 out of 13

Read the following statement carefully and decide whether it is an opinion or a factual statement.

“Guns easily freed USA from British Forces.”

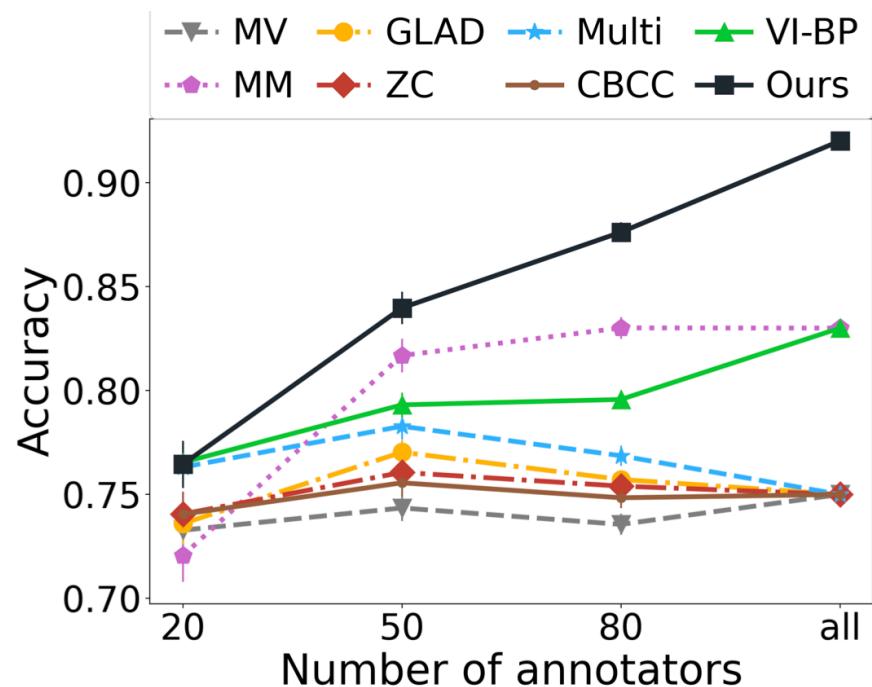
Opinion

Factual

I don't know

Next

110 workers \times 12 statements
 $= 1320$ labels



Our algorithm almost always achieves the highest accuracy!

Scan the code to check out our paper!

