Appendix
Toward Recognizing Social Media Recommenders Under Absent Recommendations: A Graph Neural Network-Based Approach

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Synthetic Ground Truth Calculation

For each infosphere, we calculate the synthetic ground truth based on the maximum number of co-authors computed previously. The procedure is as follows:

Algorithm 1: Synthetic Ground Truth Calculation

```
 1: // Gather author node's 2-hop neighborhood
 2: union(info(a),hist(a))
 3:
 4: // Connection matrix (symmetric)
 5: C = sym_sparse()
 6:
 7: // Connection probabilities (symmetric)
 8: P = sym_sparse()
 9:
10: for a in [0..n] do
11:     // Sample max degree for author
12:     maxD[a] = model(a).sample()
13: end for
14: for a in [0..n] do
15:     // Co-author candidate set
16:     S = expand(union(info(a), hist(a)))
17:
18:     // Current degree from matrix C
19:     d[a] = degree(a, C)
20:
21:     // Sorted by descending prob. or shuffled
22:     for b in sorted(S) do
23:         // b already processed
24:         if b ≤ a then
25:             continue
26:         end if
27:         if d[a] ≥ maxD[a] then
28:             break
29:         end if
30:         if degree(b, C) ≥ maxD[b] then
31:             continue
32:         end if
33:         if P(a,b) == empty then
34:             // Compute connection probability
35:             P(a,b) = prob(embed(a), embed(b))
36:         end if
37:         // Sample connection from probability
38:         C(a,b) = P(a,b).sample()
39:     end for
40: end for
```

Explanation: This algorithm synthesizes a co-authorship graph by iteratively expanding each author's neighborhood (infosphere + history), sampling a maximum degree per author, and adding edges based on embedding similarity until the degree constraint is met. The inner loop visits candidate co-authors (either randomly shuffled or sorted by descending edge probability), and samples a connection only if both nodes have not yet reached their maximum allowed degree.