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Assignment 3: Review

1 Introduction

Based on our student number (0529279), we had the option between paper 2, 4 and 9 to write our review about. We went for paper number 4(Dandekar, Goel, & Lee, 2013) discussing the issue of opinion polarisation within society. This phenomenon is brough about by social factors such as homophily –interaction between like-minded individuals– and biased assimilation whereupon individuals –when confronted with inconclusive evidence on a complex issue– draw undue support to their own position on the matter. Noticeable is the tendency for individuals to directly accept information defending their own standings but to reject it when not enforcing their own personal beliefs. Furthermore, homophily on its own is not sufficient to cause polarization but it can be the case when coupled with biased assimilation.
After a brief introduction to the issue of polarisation and their contributing factors, it mentions DeGroot's mathematical model(DeGroot, 1974) used for the explanation of divergence in opinions. It criticizes the built model for not including biased assimilation all the while proposing an improvement on the model that includes this social factor. From the start, the paper informed us of the mathematical capabilities for consensus reaching and its applications such as measuring the degree of disagreement within a group. It's a surprise to read that even the most complex social problems can be mathematically expressed as models and explained using graph theory.

2 Opinion

The paper's subject is interesting –trying to mathematically explain the social problem of polarisation– but it lacks the necessary touch to make it attractive for members of both categories for a number of reasons. Its introduction might deter pure mathematical researchers of reading further but the content following upon it is too advanced for the average social scientist to follow.

2.1 Readability

If we were only to base ourselves on the introduction of the paper –its writing style and title– we might convince ourselves that it was written for a target audience with no explicit mathematical background such as political scientists or psychologists. However, the paper shifts directly towards a mathematical focus introducing rather complex notions about graph theory and models. It also lists pure definitions to the reader while not providing any additional explanations or figures to clarify the context. It demands a certain level of expertise of the reader not previously made clear from the introduction.

2.2 Structure

Another fault of the paper is its lack of a clear structure. Though it provides an introduction, the separation between related work, experiments and conclusion is not sufficient. When reading the paper, I had trouble distinguishing previous work from the paper's contribution. It also does not help that paragraphs and definitions in the paper have the same heading making for more confusion.

2.3 Algorithm Description & Comparison

The model uses three recommender algorithms as to calculate the relative disagreement between members of a node graph: SALSA(Lempel & Moran, 2001), Personalized PageRank(Page, Brin, Motwani, & Winograd, 1999), and item-based collaborative filtering(Linden, Smith, & York, 2003) respectively. Though they are properly referred, they only provide mathematical formulas to explain the workings of each algorithm. As to increase readibility, the inclusion of pseudocode[1] for each algorithm should not be missed providing a high-level description of each of their operation.
Although all three algorithms operate by ways of random walks on a node graph G, there is a performance comparison to be made. One of the biggest concerns in Computer Science is to perform work as efficient as possible without wasting resources. This is why a table of the best, worst and average case performance of each algorithm should be provided in Big-O notation[2]

2.4 Graph Theory

Strengths

Weaknesses

3 Improvements

4 Conclusion

References

Dandekar, P., Goel, A., & Lee, D. T. (2013). Biased assimilation, homophily, and the dynamics of polarization. *Proceedings of the National Academy of Sciences*, *110*(15), 5791–5796.

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Linden, G., Smith, B., & York, J. (2003). Amazon. com recommendations: Item-to-item collaborative filtering. *IEEE Internet computing*(1), 76–80.

Page, L., Brin, S., Motwani, R., & Winograd, T. (1999). *The pagerank citation ranking: Bringing order to the web.* (Tech. Rep.). Stanford InfoLab.

[1] `https://en.wikipedia.org/wiki/Pseudocode`
[2] `https://www.khanacademy.org/computing/computer-science/algorithms/asymptotic-notation/a/big-o-notation`