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Final Grade: 12

The thesis report has been attached as a pdf.

Recommendation:

The thesis of Marilena Hohmann titled "Ideological and affective polarization in social networks" proposes innovative measures to quantify social media induced polarization along two axes. The ideological component estimates how isolated different opinions on social media are: are people with different worldviews refusing to engage with each other, generating isolated echo chambers? The affective component quantifies the emotions expressed in interactions between people disagreeing on a topic: high affective polarization means that disagreement leads to toxic behavior.

Marilena approaches the problem by developing a coherent methodology that can tackle both issues. She applies graph theory and complex system theory to estimate the distances between opinions on a graph by means of exploiting the graph Laplacian. The methodological developments are then integrated in a data science framework, using millions of tweets to validate the methods and to extract useful knowledge. The results show increasing levels of polarization in US politics, and a high degree of affective polarization during the COVID-19 pandemic.

I believe Marilena's thesis is of exceptional quality and well-deserving of the highest awards. I feel justified in this belief because Marilena's work shows terrific strength both at an academic and at a practical level.

The academic achievements of Marilena's thesis work are outstanding. She has been able to produce, from her thesis work, not one but two research papers. One has already been published in the prestigious journal Science Advances (impact factor 13.6). The second will be submitted soon, potentially to be published on the same journal.

At the academic level, Marilena makes use of and develops advanced methods from graph theory, connecting them to data science and creating a new way to perform complex network analysis. She extensively tests the most popular alternatives to estimate ideological and affective polarization in the literature and shows that none so far can capture these phenomena as well as her innovative methods. Differently from any other attempt in the literature, her methods share key methodological aspects, furthering the merits of Marilena's achievement: she is the first researcher who can propose a methodology that can analyze the complex phenomenon of polarization in all of its aspects (ideological and affective) in synergy.

As a consequence, the practical ramifications of Marilena's thesis work are also exceptionally important. On the one hand, they can be used to inform social media platforms about the effect of their products on society at large. Marilena's methods can be used to guide the development of new way to use and interact with social media content, which can lead to improved mental health and better societal outcomes.

Moreover, the methods that Marilena has developed could be utilized for other practical purposes. The idea of measuring opinion distances and correlations on complex networks is innovative and generally applicable to other fields such as marketing, economics, and politics, to cite a few.

Working with Marilena has been a pleasure as she has a keen intellect, a positive can-do attitude, and a strong work ethics.

In summary, I recommend Marilena's thesis with my strongest possible endorsement.