Qeios

Peer Review

Review of: "The Evolving Landscape of Neuroscience"

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The work entitled *The evolving landscape of neuroscience* by Mario Senden uses modern computational techniques — specifically, text embedding, clustering algorithms, and large language models — to map the structure of the neuroscience field between 1999 and 2023. The article identifies major research domains, how these areas cite each other, and how they relate to broader scientific themes (like experimental vs. theoretical work). It also assesses trends over time, such as the rise in applied research and the decline of foundational or theoretical integration. I believe this work is a beautiful example of how computational/machine learning tools can be used to create order out of the exponentially increasing number of articles in any scientific field. Using the methodological approaches, findings, and interpretations stemming from this work, future studies and/or individuals will be able to more easily access targeted information on specific neuroscience domains.

I only have a few minor comments on this manuscript, which I believe will help improve its general readability.

Introduction

1. "Hand in hand with an ever-increasing pace of scientific discoveries also came diversification of the field into increasingly specialized research domains, such as work specifically devoted to the neural mechanisms underlying rare neurological syndromes"

Is there any research endeavor quantifying this diversification in neuroscience? If yes, please include a citation.

On the same note, the citations provided at the end of this sentence are all about synesthesia, which is not a medical condition nor a syndrome, but a symptom occurring in certain brain-related conditions. Can

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the author please provide a more diversified citation set for this claim?

2. "While this is a natural tendency of scientific disciplines[17][18], it can obfuscate the interconnectedness of phenomena and research questions and may thus hinder further progress[19][20]."

Can the author please expand on the likely reasons why this is naturally happening in scientific disciplines?

3. "The largest cluster involves research on the mechanisms of neuropathic pain including spinal cord modulation, glial activation, and receptor-mediated processes. The smallest cluster is concerned with the effects of electromagnetic fields emitted by mobile devices on brain function."

What is the author's opinion on these different clusters in terms of their matching real distinct neuroscience sub-fields?

4. "In terms of content, several clusters exhibit some degree of thematic overlap."

Is there a systematic way to try and merge these clusters into single, more comprehensive sets of clusters? I think it would be worth the effort, as this would provide an even clearer way to access specific information on neuroscience domains and sub-domains.

5. "These clusters predominantly cite and are cited externally, suggesting diffusion of knowledge across clusters." Are there particular reasons why we observe this diffusion of knowledge across these clusters? If yes, please expand on this.

6. "My last goal was to identify trends in neuroscience."

Please be more specific about which kinds of trends you were interested in.

Discussion

In general, the Discussion section is for a good part dedicated to reporting a summary of the main findings. I think this section could benefit from the integration of the author's interpretations of such

findings, such as a discussion of the 'hub clusters', or why the author finds no cluster reflecting theoretical frameworks.

1. "While several clusters are devoted to specific diseases, modalities, methods, and cognitive function, notably not a single cluster is dedicated to a theoretical framework."

Isn't this result very surprising? Please expand on this. (Could it be due to the way of analysing the data, e.g., some internal bias of the computational tools used?)

2. "An analysis of the cluster-level citation network revealed that most clusters integrate and spread insights from diverse research domains. Key hub clusters play a central role in shaping neuroscience by providing methodological and conceptual foundations for other clusters."

Can the author please expand on these key hub clusters and why they are important in shaping the modern neuroscience landscape? I think this could be one of the most im

Declarations

Potential competing interests: No potential competing interests to declare.