

Review of: "AI-Generated Hallmarks of Aging and Cancer: A Computational Approach Using Causal Emergence and Dependency Networks"

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Potential competing interests: No potential competing interests to declare.

A major challenge in biomedicine is synthesizing information from diverse, large-scale datasets to represent the causal mechanisms underlying multiple diseases. This paper introduces "hallmarks engineering," a computational approach to generate quantifiable hallmarks of aging and cancer. Causal emergence analysis revealed that hallmark-level features show stronger disease associations than individual genes. Hallmark-based models achieved comparable predictive performance with fewer predictors compared to regular pathway-based models.

Dependency network analysis uncovered regulatory networks with power-law distributions and identified top-level "super-regulators" such as genomic stability. The results of this paper suggest that top-down modeling using computationally generated hallmarks may reveal common mechanisms across multiple diseases, offering a promising approach for modeling multimorbidity.

The results of this paper are correct, new, and interesting.

Here are some comments:

1. Throughout this paper, all formulas need to be rewritten.
2. Figure 7 is not displayed correctly; please redraw it.