Size and community structure affect abstract graph learning

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Abstract

Cognitive graphs represent relationships of learned associations between items or concepts, such as social relationships within a friend group or a network of streets. It is unknown what properties of graphs affect the ability of individuals to mentally represent and navigate these structures. Primary candidates are 1. the number of states (nodes) within a graph, 2. the number of connections among states (edges), and 3. community structure. We independently manipulate these factors to examine how they affect both the ability to identify paths between nodes and the efficiency of paths chosen in abstract graphs (associative networks) of object pictures with no overt spatial properties. Consistent with our hypotheses that changes in graph size, edge number, and community structure impact learning, we observed that these factors affected accuracy and efficiency in reaching targets. The findings demonstrate the influence of graph structure on learning, with implications for both spatial and non-spatial graphs.

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