Quantitative Graph Theory Approaches to Mathematics Textbook Analysis

Haile Gilroy, McNeese State University

Textbook analysis has long been a cornerstone of mathematics education research, yet studies at the undergraduate level have relied predominantly on qualitative approaches. In this talk, we present a novel approach to analyzing undergraduate mathematics textbooks using quantitative graph theory methods. This approach enables a broader examination of textbook structure and content, revealing overarching patterns that are difficult to detect through qualitative analysis alone. We illustrate the versatility of these methods across multiple scales, from the level of individual tasks to the organization of entire chapters, and show how the resulting insights can meaningfully support mathematics departments in making evidence-based textbook adoption decisions.

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