

Exploring Generative Graph Constructions Using Google Colab

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Generative graph constructions play a central role in combinatorics, graph theory, and network science by providing systematic methods for studying structural properties and emergent behavior in large and complex graphs. This paper explores a range of generative graph constructions through a computational framework implemented in Google Colab, integrating classical graph-theoretic models with modern, reproducible experimentation. Using Python-based tools within the Colab environment, we demonstrate how interactive computation and visualization support exploratory analysis, facilitate rapid experimentation, and uncover structural patterns that complement theoretical results. The proposed framework emphasizes transparency and reproducibility, enabling experiments to be easily shared, modified, and extended. Computational outcomes are compared with established theoretical expectations, highlighting both agreements and deviations that motivate further combinatorial investigation. Overall, this work illustrates how cloud-based computational tools can enhance the study of generative graph constructions and provide a practical platform for advancing research at the intersection of graph theory and computing.

Keywords: Generative graph constructions, random graph models, graph structural properties, computational graph theory, reproducible experimentation, cloud-based computation