

Attributed Graph Modeling with Vertex Replacement Grammars

Satyaki Sikdar^{1,3} Neil Shah² Tim Weneringer¹

¹University of Notre Dame ²Snap Inc. ³Indiana University

Key Idea

We introduce the Attributed Vertex Replacement Grammar (AVRG) formalism and show:

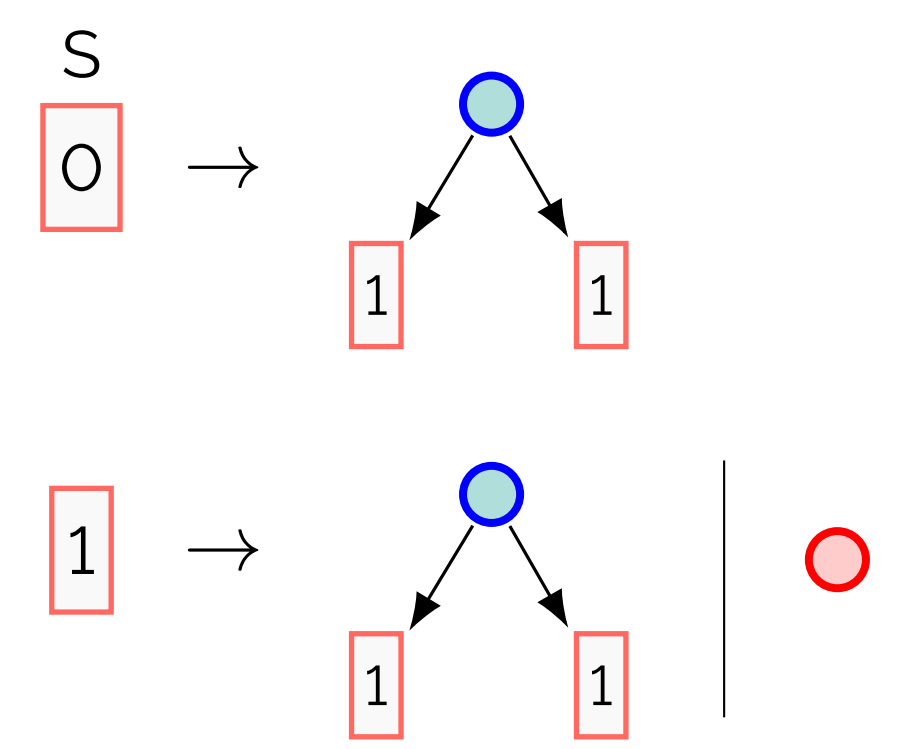
1. AVRGs extract interesting and frequently appearing attributed subgraphs,
2. AVRGs generate graphs that capture the topology and attribute patterns, and
3. AVRGs can handle a wide variety of assortative and disassortative graphs.

Context-free Grammars

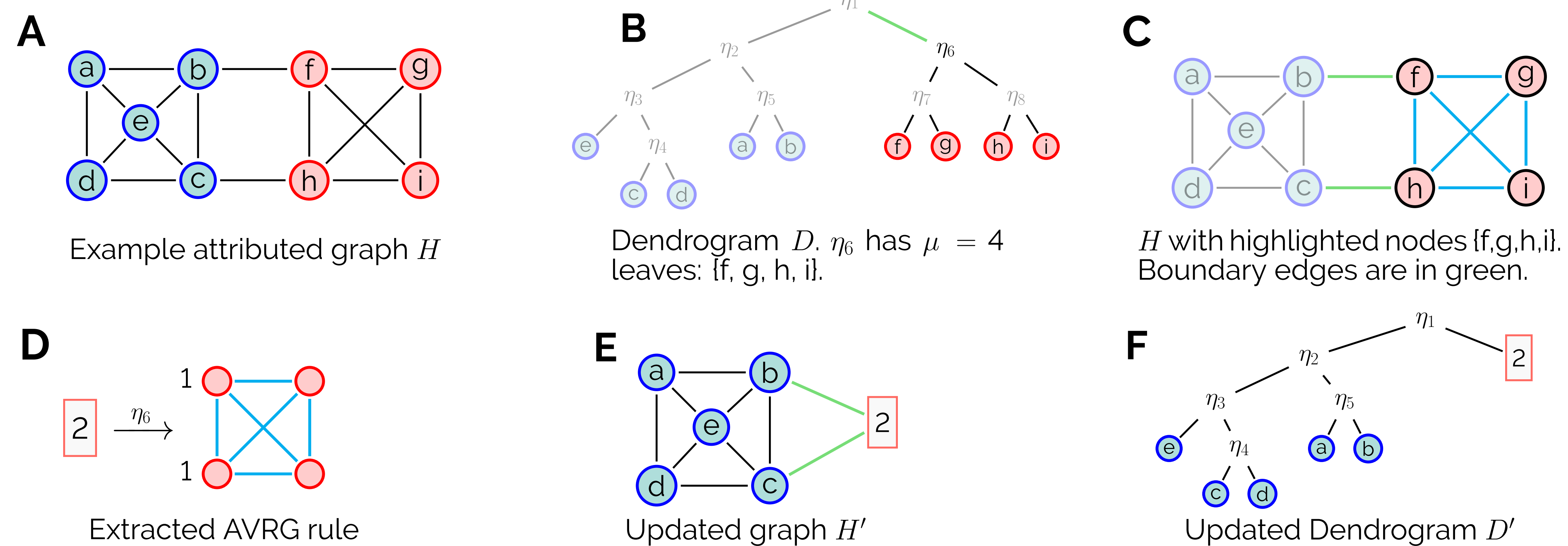
String Grammars

- $S \rightarrow NP VP$
- $NP \rightarrow \text{the } N$
- $VP \rightarrow V NP$
- $N \rightarrow \text{cat} \mid \text{song}$
- $V \rightarrow \text{sings} \mid \text{eats}$

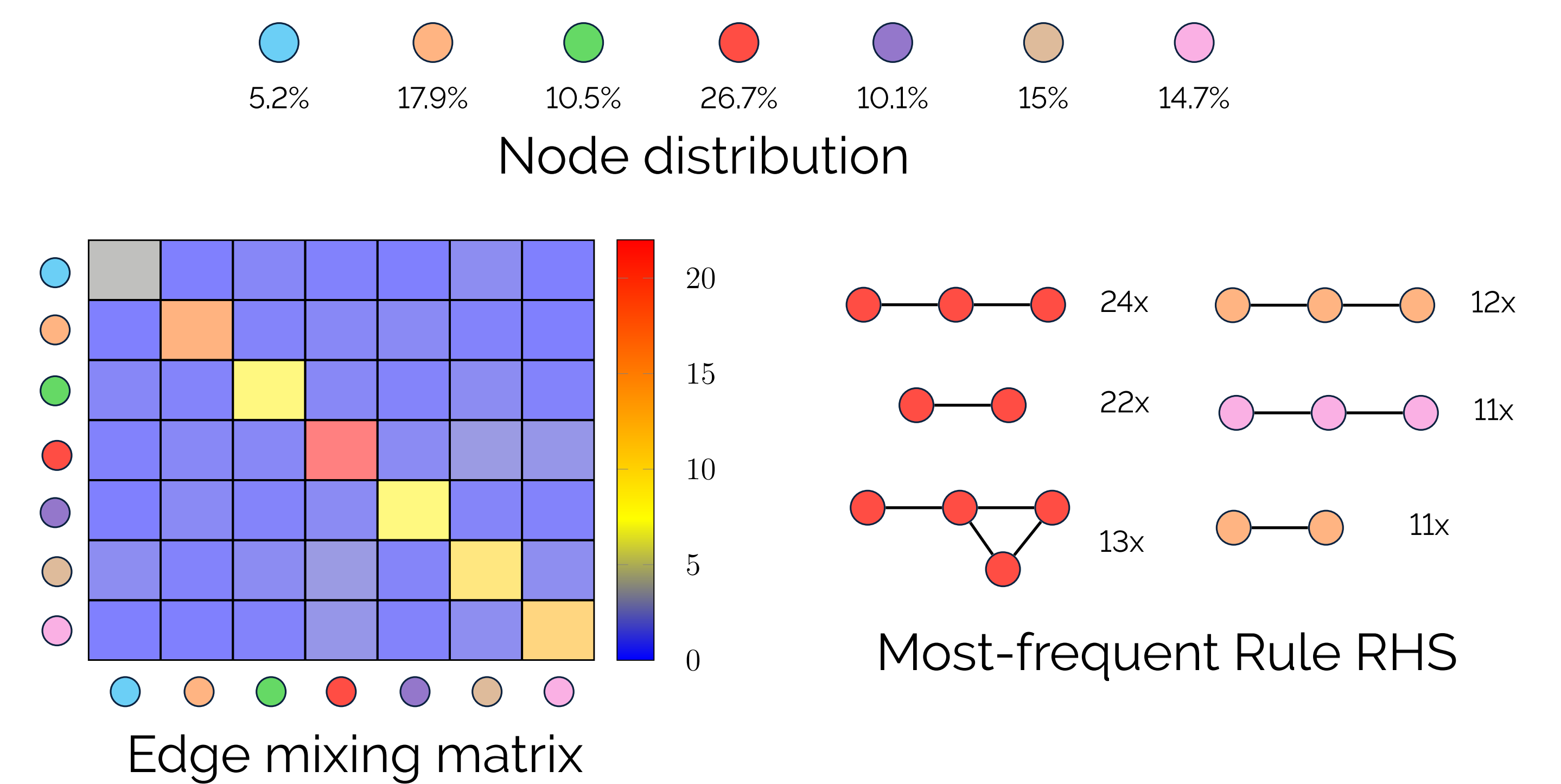
Graph Grammars



Grammar Extraction



Cora Grammar Rules



Graph Generation Performance

