Estimating Subgraph Generation Models

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Abstract—**Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.**

Index Terms—**Networks, Graphs, ERGM, SUGM, Subgraphs**

I. INTRODUCTION

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II. SUBGRAPH GENERATION MODEL

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The observed network (left in Fig. 1) is the union of all subgraphs (right in Fig. 1), where the generated subgraphs may overlap. Multiple subgraphs may incidentally form additional structures such as triangles or squares.
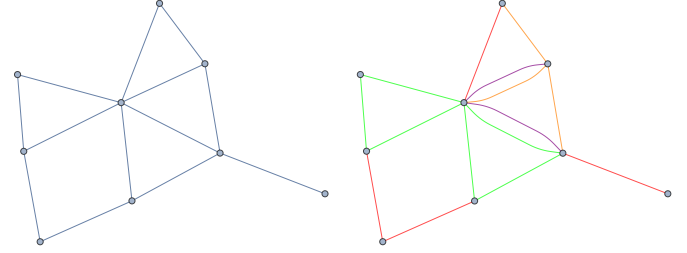

Fig. 1. The observed network (left) and the underlying, randomly generated links (red), 2-paths (purple), triangles (green) and 3-stars (yellow).

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$$f(x_1, \cdots, x_k; p_1, \cdots, p_k) = \frac{\Gamma(\sum_i x_i + 1)}{\prod_i \Gamma(x_i + 1)} \prod_{i=1}^{k} p_i^{x_i} \quad (1)$$

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III. FURTHER RESEARCH

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[1] A. G. Chandrasekhar and M. O. Jackson, "Tractable and consistent random graph models," *ArXiv*, 2014. [Online]. Available: https://arxiv.org/abs/1210.7375

TABLE I
PROBABILITIES IN THE SUBGRAPH CENSUS

Model	Subgraphs			
Links	p_L^3	$3\,p_L^2\,(1-p_L)$	$3\,p_L\,(1-p_L)^2$	$(1-p_L)^3$
Triangles	$p_T\,(p_T^{n-3})^3$	$3\,p_T\,(p_T^{n-3})^2\,(1-p_T^{n-3})$	$3\,p_T\,(p_T^{n-3})\,(1-p_T^{n-3})^2$	$(1-p_T) + p_T\,(1-p_T^{n-3})^3$
Links & Triangles	$p_T\,(p_L\,p_T^{n-3})^3$	$3\,p_T\,(p_L\,p_T^{n-3})^2\,(1-p_L\,p_T^{n-3})$	$3\,p_T\,(p_L\,p_T^{n-3})\,(1-p_L\,p_T^{n-3})^2$	$(1-p_T) + p_T\,(1-p_L\,p_T^{n-3})^3$