

DEPARTMENT OF STATISTICS



Sumit Mukherjee
Department of Statistics
Columbia University

Motif Counting via Subgraph sampling

Wednesday, October 20, 2021

11:45 AM EST

Zoom Meeting: Meeting ID: 924 8283 7055

Password: 378160

<https://rutgers.zoom.us/j/92482837055?pwd=TktKVUU2ZlJzZnZQbm1TNUs3K0pmZz09>

Virtual Coffee session before the seminar at 11:30 AM EST

Abstract: Consider the subgraph sampling model, where we observe a random subgraph of a given (possibly non random) large graph G_n , by choosing vertices of G_n independently at random with probability p_n . In this setting, we study the question of estimating the number of copies $N(H, G_n)$ of a fixed motif/small graph (think of H as edges, two stars, triangles) in the big graph G_n . We derive necessary and sufficient conditions for the consistency and the asymptotic normality of a natural Horvitz-Thompson (HT) type estimator.

As it turns out, the asymptotic normality of the HT estimator exhibits an interesting fourth-moment phenomenon, which asserts that the HT estimator (appropriately centered and rescaled) converges in distribution to the standard normal whenever its fourth-moment converges to 3. We apply our results to several natural graph ensembles, such as sparse graphs with bounded degree, Erdős-Renyi random graphs, random regular graphs, and dense graphons.

This talk is based on joint work with Bhaswar B. Bhattacharya and Sayan Das.

Bio: Sumit Mukherjee is currently an Associate Professor in Statistics at Columbia University. Prior to this, he received his PhD in Statistics at Stanford in 2014, after which he joined Columbia, where he has been ever since. His main research interests lie in the intersection of Mathematical Statistics, Probability, and Combinatorics. One of the common themes of his research is the study of inference in dependent settings, such as exponential families on the space of graphs (ERGMs), rankings (Mallows models) and spin configurations (Ising models). His research has been supported by NSF grants.

