Abstract Submitted
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Degree-based graph construction and sampling[1] HYUNJU KIM,
Virginia Tech — Network representation and modeling has been one of the most
comprehensive ways to study many complex systems. However, the network de-
scribing the system frequently has to be built from incomplete connectivity data,
a typical case being degree-based graph construction, when only the sequence of
node degrees is available. In this presentation I will introduce problems and re-
sults related to the construction of all the possible graphs and sampling from the
class of graphs with fixed degree-sequence. Firstly, for graph construction, I will
present necessary and sufficient conditions for a sequence of integers to be realized
as a simple graph's degree sequence under the condition that a specific set of con-
nections from an arbitrary node are avoided. Secondly, by using this result, I will
show how to provide an efficient, polynomial time algorithm that generates graph
samples with a given degree sequence. Unlike other existing algorithms, this method
always produces statistically independent samples, without back-tracking or rejec-
tions. Also, the algorithm provides the weight associated with each sample, allowing
graph observables to be measured uniformly over the graph ensemble.

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