

## **RANKING ALGORITHMS ON DIRECTED RANDOM NETWORKS**

**Ningyuan Chen**, IEOR, Columbia University, nc2462@columbia.edu

**Nelly Litvak**, University of Twente, N.Litvak@utwente.nl

**Mariana Olvera-Cravioto**, IEOR, Columbia University, molvera@ieor.columbia.edu

The probabilistic analysis of information ranking algorithms on directed random networks, e.g., Google's PageRank, has recently led to natural approximations based on stochastic fixed-point equations whose explicit solutions can be constructed on weighted branching trees and whose tail behavior can be described in great detail. In this talk we present a model for generating directed random graphs with prescribed degree distributions where we can prove that the rank of a randomly chosen node does indeed converge to the solution of the corresponding fixed-point equation as the number of nodes in the graph grows to infinity. The proof of this result is based on classical random graph coupling techniques combined with the now extensive literature on the behavior of branching recursions on trees. The results we present are applicable to a wide class of linear algorithms on directed graphs, and have the potential to be extended to other max-plus type of recursions.