2017-18 Prestige Lecture Series on Science of Information

"The Structure of Complex Networks: Scale-free and Small-world Random Graphs"

Remco van der Hofstad

Department of Mathematics and Computer Science
Eindhoven University of Technology

April 23rd, 2018
2:00pm - 3:00pm
LWSN 1142, Purdue University

Many phenomena in the real world can be phrased in terms of networks. Examples include the World-Wide Web, social interactions and Internet, but also the interaction patterns between proteins, food webs and citation networks.

Many large-scale networks have, despite their diversity in backgrounds, surprisingly much in common. Many of these networks are small worlds, in the sense that one requires few links to hop between pairs of vertices. Also the variability of the number of connections between elements tends to be enormous, which is related to the scale-free phenomenon.

In this lecture for a broad audience, we describe a few real-world networks and some of their empirical properties. We also describe the effectiveness of abstract network modeling in terms of graphs and how real-world networks can be modeled, as well as how these models help us to give sense to the empirical findings. We continue by discussing some random graph models for real-world networks and their properties, as well as their merits and flaws as network models. We conclude by discussing the implications of some of the empirical findings on information diffusion and competition on such networks.

We assume no prior knowledge in graph theory, probability or otherwise.

Center for Science of Information
NSF Science & Technology Center
soihub.org