University of Victoria | Graduate Studies

Notice of the Final Oral Examination
for the Degree of Doctor of Philosophy

of

DIANA POPOVA

MSc (National Research University, Moscow, 1976)

"Scalable Analytics of Massive Graphs"

Department of Computer Science

Friday, December 14, 2018
2:00 P.M.
Clearihue Building
Room B007

Supervisory Committee:
Dr. Alex Thomo, Department of Computer Science, University of Victoria (Supervisor)
Dr. Bruce Kapron, Department of Agriculture, UVic (Member)
Dr. Wendy Myrvold, Department of Computer Science, UVic (Member)
Dr. Lin Cai, Department of Electrical and Computer Engineering, UVic (Outside Member)

External Examiner:
Dr. Lijun Chang, School of Information Technologies, University of Sydney

Chair of Oral Examination:
Dr. Andrea Walsh, Department of Anthropology, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

Graphs are commonly selected as a model of scientific information: graphs can successfully represent imprecise, uncertain, noisy data; and graph theory has a well-developed mathematical apparatus forming a solid and sound foundation for graph research. Design and experimental confirmation of new, scalable, and practical analytics for massive graphs have been actively researched for decades. Our work concentrates on developing new accurate and efficient algorithms that calculate the most influential nodes and communities in an arbitrary graph. Our algorithms for graph decomposition into families of most influential communities compute influential communities faster and using smaller memory footprint than existing algorithms for the problem. Our algorithms solving the problem of influence maximization in large graphs use much smaller memory than the existing state-of-the-art algorithms while providing solutions with equal accuracy. Savings in space complexity allow to compute analytics for large networks on a consumer-grade machine. The algorithms and their implementations can efficiently handle networks of billions of edges using a single consumer-grade machine. These claims are supported by extensive experiments on large real-world graphs of different types.