THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering
Seminar

Learning how to segment flows in the dark
by
Dr. Francesco De Pellegrini (Fondazione Bruno Kessler)
University of Trento
Italy

Date : **14 Dec., 2017 (Thur.)**
Time : **11:00am – 12:00noon**
Venue : **Room 1009, William M.W. Mong Engineering Building**
The Chinese University of Hong Kong

Abstract
To optimize routing of flows in datacenters, SDN controllers receive a packet-in message whenever a new flow appears in the network. Unfortunately, flow arrival rates can peak to millions per second, impairing the ability of controllers to treat them on time. Flow scheduling, e.g., copes with such sheer numbers by segmenting the traffic between elephant and mice flows and by treating elephant flows in priority, as they disrupt short lived TCP flows and create bottlenecks.
We formulate a flow segmentation problem that segment elephant from mice flows; the aim is to schedule a maximum amount of traffic under a constraint on the maximum rate of packet-in events. We propose a learning algorithm able to perform optimal online flow segmentation. Our solution, based on stochastic approximation techniques, is implemented at the switch level and updated by the controller, with minimal signaling over the control channel.
Our approach is blind, i.e., it is agnostic to the flow size distribution. It is also adaptive, since it can track traffic variations over time. We prove its convergence properties and its message complexity. Moreover, we specialize our solution to be robust to traffic classification errors and we provide conditions under which our algorithm still converges to the optimal solution. Extensive numerical experiments characterize the performance of our approach in vitro. Finally, results of the implementation in a real OpenFlow controller demonstrate the viability of our method as a solution in production environments.

Biography
Francesco De Pellegrini (Fondazione Bruno Kessler) is the Chief Scientist of the Distributed Computing and Information Processing group (DISCO). He serves as lecturer at the University of Trento and of Avignon for the master degree course of Wireless Networks (Master Degree course). He has worked in the past on location detection, multirate systems, routing, epidemics, wireless mesh networks, VoIP, Ad Hoc and Delay Tolerant Networks. His expertise is algorithms on graphs, stochastic control of networks and game theory. Francesco was the Vice General-chair for the first edition of ICST Robocomm and is one of the promoters of COMPLEX 2012. Francesco has been General Co-Chair for the 2012 edition of IEEE NetGCoop, and TPC Chair for the 2014 edition. He is acting or acted as Project Manager for the several industry-funded projects. Francesco has been the Coordinator for the FET EU Project CONGAS, whose focus is on the Dynamics and COevolution in Multi-Level Strategic INteraction GAmeS. He has received the best paper award at WiOPT 2014 and at NetGCoop 2016. He is currently the Principal Investigator of the H2020 FET Resource AuctiOning Engine for the Mobile Digital Market (ROMA).

** ALL ARE WELCOME **

Host: Professor Jianwei Huang (Tel: 3943-8353, Email: jwhuang@ie.cuhk.edu.hk)
Enquiries: Information Engineering Dept., CUHK (Tel.: 3943-8385)