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University of Zurich[UZH]

Prof. Santo Fortunato

An Introduction To Complex Networks

Syllabus

Fall Semester 2013

Chair for Marketing and Market Research
Department of Business Administration
University of Zurich, Switzerland

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Preamble

Welcome to the seminar "An Introduction To Complex Networks" syllabus!

This course will take place during the fall semester 2013. You'll find all necessary information concerning the course within this syllabus. From time to time, updates will be communicated on the webpage of the Chair of Marketing and Market Research: ***http://www.business.uzh.ch/professorships/market-research.html***.

I am very happy to welcome you to my seminar.

Enjoy this introduction.

All the best,

Santo Fortunato

Quick Overview

Instructor:

Prof. Santo Fortunato

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Web: ***http://becs.aalto.fi/en/personnel/staff/fortunato_santo.html***

Type:

Seminar

Target Audience:

This course is acknowledged for PhD students.

Frequency:

Fall Semester 2013

AP (ECTS):

NA

Content:

Lecture I: Basic concepts on networks: introduction, paths, distance, trees, degree, clustering coefficient, degree correlations, centrality, statistical approach, weighted networks.

Lecture II: Real networks, small-world experiment. Random graphs, small-world networks.

Lecture III: Models: Price model, Barabasi-Albert model and its variants, copying model, ranking model, weighted network model. Resilience: basics, models. Opinion dynamics on networks: voter, Axelrod, bounded confidence models (Deffuant, Hegselmann-Krause).

Lecture IV: Community detection I. Introduction. Elements of community detection: community, partition, quality functions. Traditional techniques: graph partitioning, hierarchical clustering, partitional clustering, spectral clustering.

Lecture V: Community detection II. The algorithm by Girvan and Newman and variants thereof. Modularity optimization: greedy algorithms, simulated annealing, extremal optimization, spectral optimization, modifications of modularity, limits. Dynamic methods: spin models, synchronization, random walks. Infomap. Methods to find overlapping communities: C-Finder, LFM, Link clustering, COPRA. Multiresolution methods. Dynamic clustering. Testing algorithms.

Language:

English

Required reading:

- M. E. J. Newman (2003): The structure and function of complex network, SIAM Review 45(2), 167-256, 2003.
- S. Fortunato (2010): Community detection in graphs, Physics Report 486, 75-174, 2010.

Prerequisite:

NA

Access:

By application to our chair and confirmation only. Applications need to be sent via email.

Dates:

25/11/2013 - 29/11/2013

Location:

Andreasstrasse 15

Further information:

- *www.market-research.uzh.ch*

Registration:

Please send an email to our chair and wait for our informal acceptance notification.

Note:

In cases of doubt, please don't hesitat to contact our chair for more information.