

Social (complex) Networks Analysis

COURSE ORGANISATION

Rushed Kanawati

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<https://www.kanawati.fr>



Introductory example: **Telecom** customer data

ID	Average profit	ID	Average profit
1	0	18	100
2	100	19	200
3	200	20	200
4	200	21	50
5	50	22	100
6	100	23	200
7	100	24	200
8	200	25	50
9	200	26	100
10	50	27	200
11	100	28	200
12	200	29	50
13	200	30	100
14	50	31	200
15	50	32	200
16	100	33	50
17	200	34	-20

Which customer to retain ?

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Naïve solution :

- Sort data by increasing order of average profit
- Let K-top customer leave and try to retain the others
- 3-top customer to let go : 34, 0, 11

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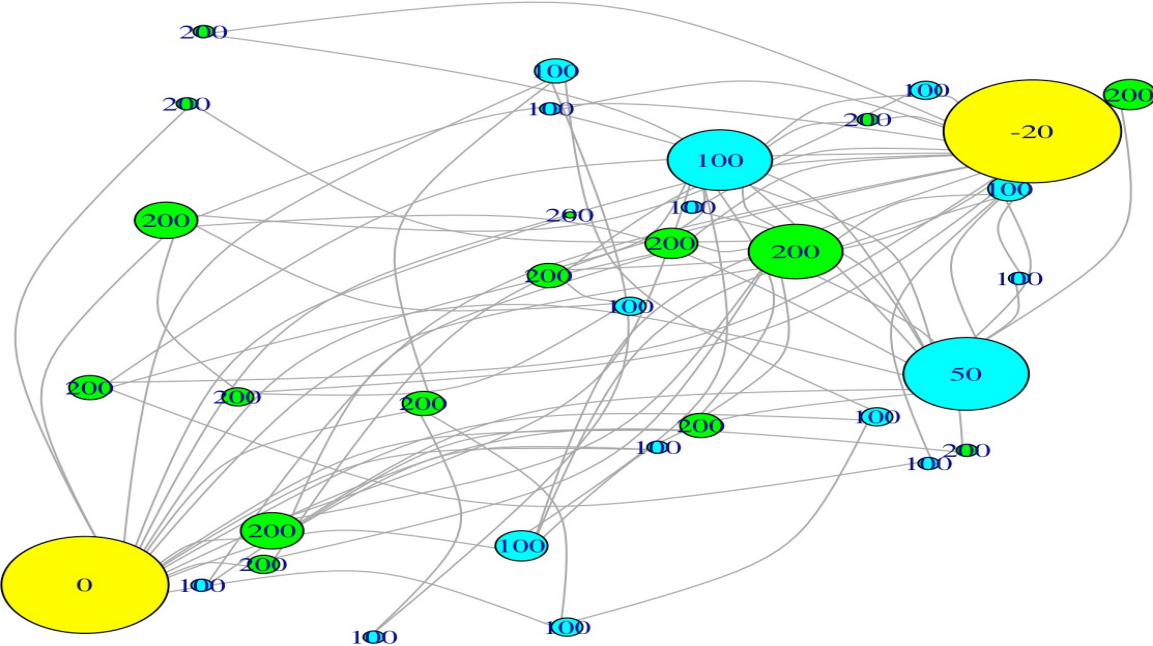
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Hypothesis

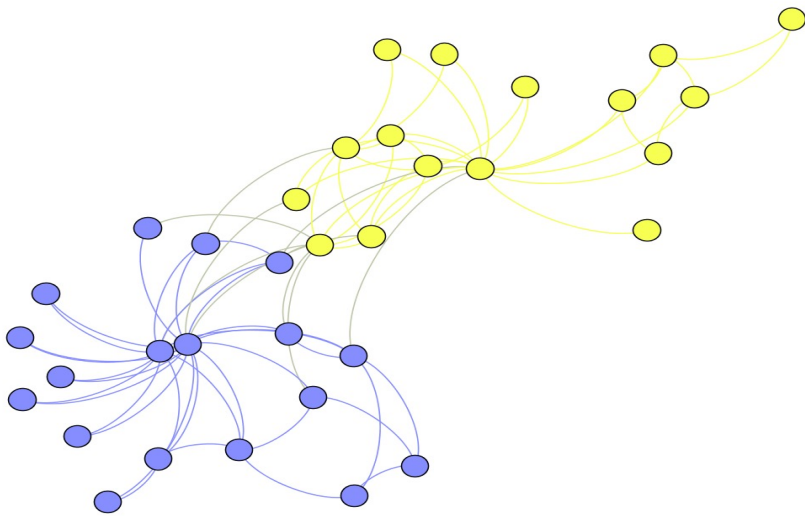
Examples are independent one from other !

Introductory example



Core Topic

Interaction networks

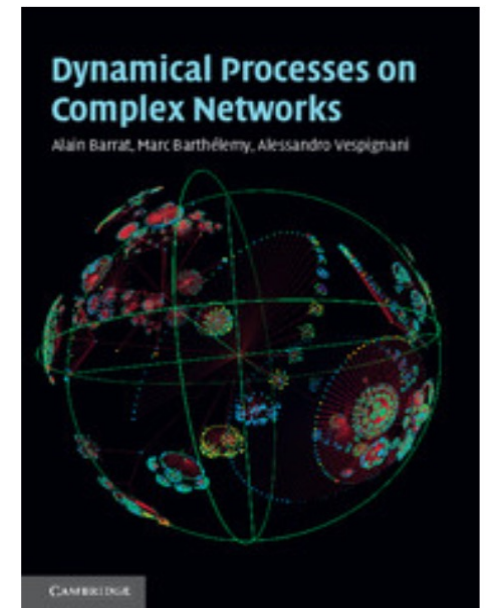
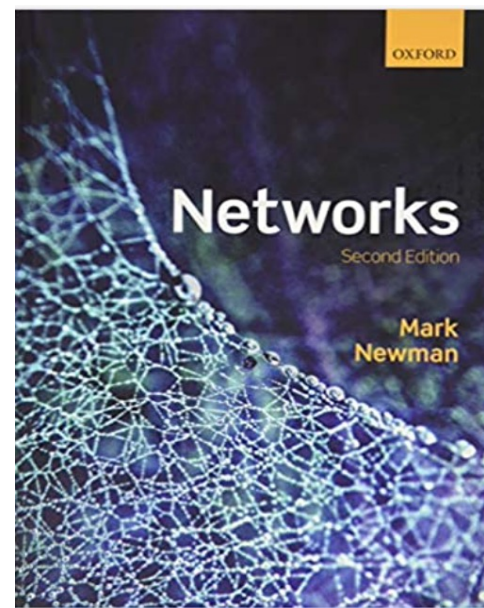
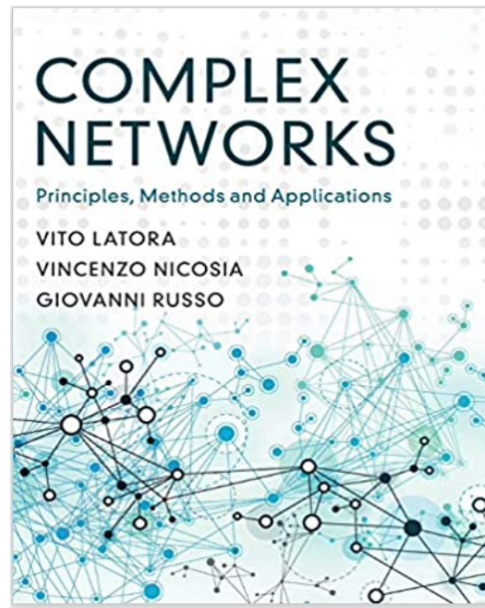
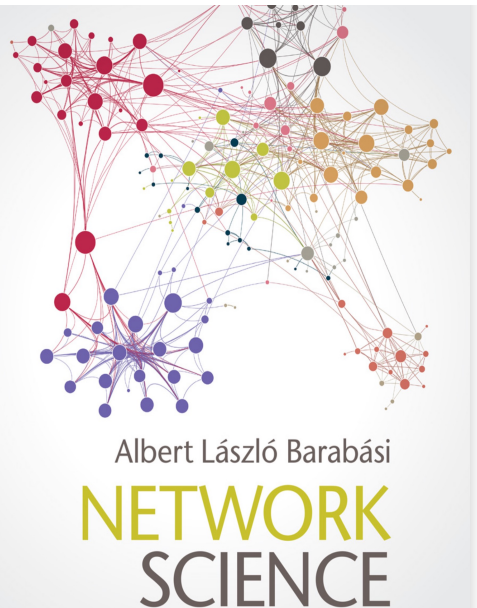


- Models of interaction networks
- Influential/Central actors
- Link prediction & evolution models
- Community detection
- Spreading phenomena (Epidemics, rumours, recommendations, etc.)
- ...

Friendship network in a Karate Club [Zachary]

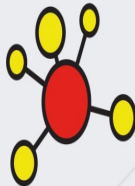
Readings

<http://networksciencebook.com>



Tools

<https://igraph.org>



igraph – The network analysis package

igraph is a collection of network analysis tools with the emphasis on efficiency, portability and ease of use. igraph is open source and free. igraph can be programmed in R, Python, Mathematica and C/C++.

[igraph R package](#) [python-igraph](#) [IGraph/M](#) [igraph C library](#)

<https://rstudio.com/products/rstudio/>



<https://gephi.org/>



Course organization

Theory

1. Complex networks basics
2. Node's centralities
3. Community detection

Practical labs

1. Igraph/R : initiation
2. Local community detection
3. Community detection