



**IMT Atlantique**  
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# COMMUNITY DYNAMICS ANALYSIS

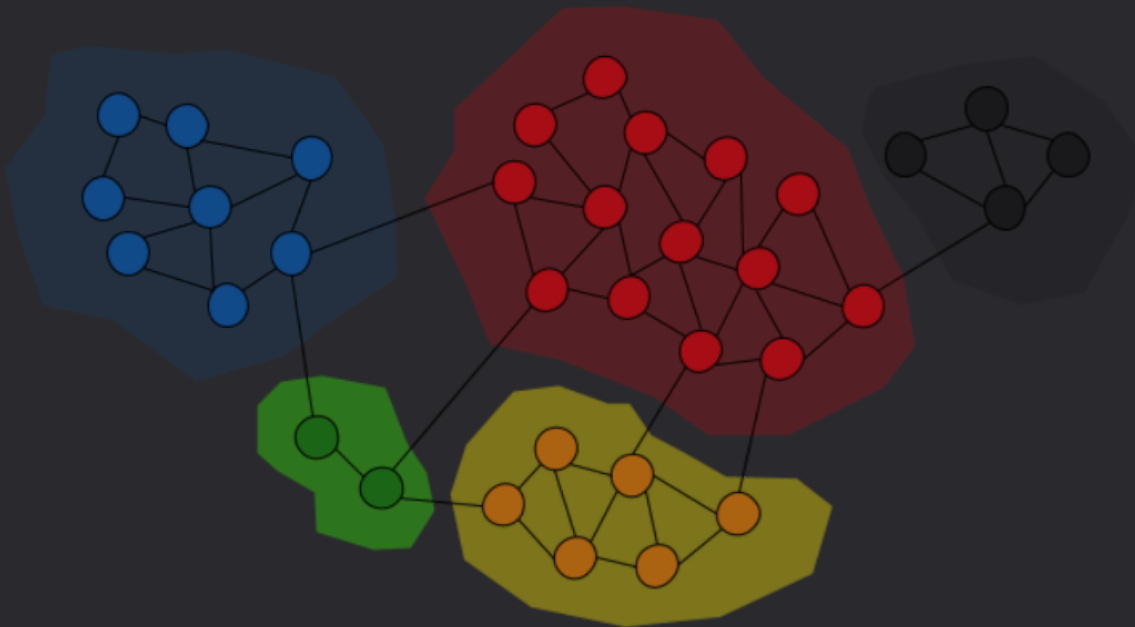
LAB-STICC (CNRS, UMR 6285)

Cécile Bothorel, Laurent Brisson

The term community is used here in the sense used in the field of **social network analysis**.

## Definition

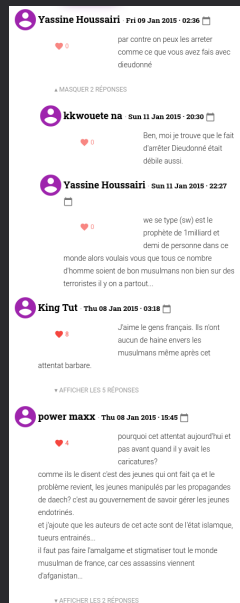
It is a grouping of individuals created by applying a clustering algorithm that maximizes interactions within groups and minimizes interactions between groups.



## Business Tasks and Data Scientist Tasks

1

Discussion  
Threads



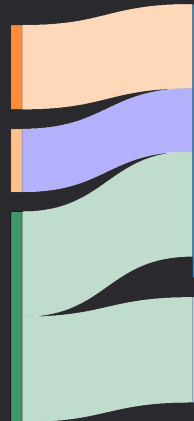
2

Interactions  
Graphs



3

Evolving  
Communities



4

4

Metrics  
Computation



5

Business  
Interpretation



## Differents kinds of metrics



### Use metrics

Number of members, messages  
Answer time, duration of threads



### Context-dependant metrics

Toxicity levels  
Topics



### Topological metrics

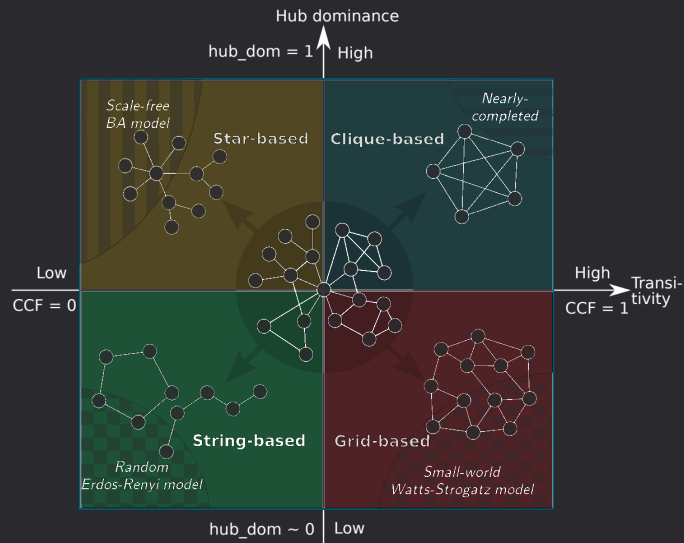
Static: hub dominance, clustering coefficient  
Dynamic: events, communities evolutions

## Different levels of analysis

- ▶ static communities (over a given period)
- ▶ evolving communities (over time)
- ▶ platform

## Community structures

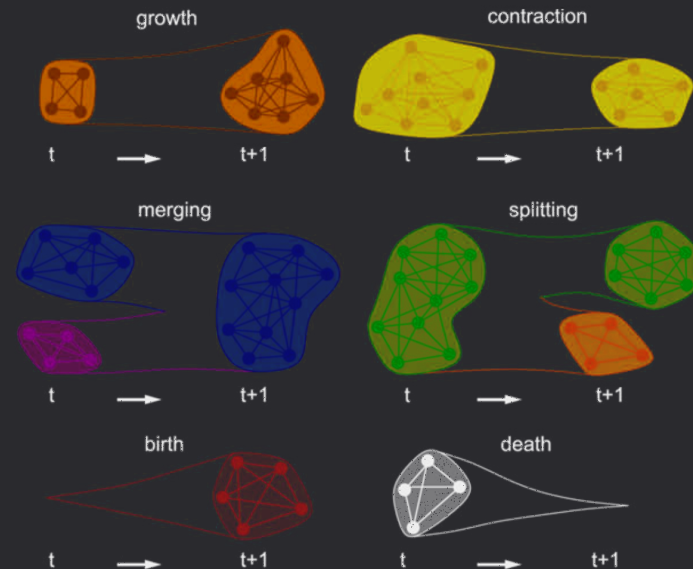
(On one period)



Vinh-Loc Dao. Characterizing community detection algorithms and detected modules in large-scale complex networks. Data Structures and Algorithms. Ecole nationale supérieure Mines-Télécom Atlantique, 2018. <https://tel.archives-ouvertes.fr/tel-02121358>

## Community evolution forms

(Between two periods)



Palla, G., Barabási, AL. & Vicsek, T. Quantifying social group evolution. Nature 446, 664–667, 2007. <https://doi.org/10.1038/nature05670>

## Backer profiles on the Ulule crowdfunding platform

Analysis of the static structure of the platform's community to detect different profiles of backers: sponsors, pre-cursors, experts, followers, etc.

Inna Lyubareva, Laurent Brisson, Cécile Bothorel, Romain Billot. Une plateforme de crowdfunding et son réseau social : L'exemple Ulule. Revue Française de Gestion, Lavoisier, 2020, Les mutations de l'accompagnement entrepreneurial, 1 (286), pp.135--151. <https://dx.doi.org/10.3166/rfg.2019.00402>

## Learner profiles on the squily e-learning platform

Detection of student behavioral profiles and analysis of posture changes to understand community dynamics in peer review.

Raphaël Charbey, Laurent Brisson, Cécile Bothorel, Philippe Ruffieux, Serge Garlatti, et al.. Roles in social interactions: graphlets in temporal networks applied to learning analytics. COMPLEX NETWORKS 2019 : 8th International Conference on Complex Networks and their Applications, Dec 2019, Lisbon, Portugal. [https://dx.doi.org/10.1007/978-3-030-36683-4\\_41](https://dx.doi.org/10.1007/978-3-030-36683-4_41)

## Detection of echo chambers on YouTube media channels

Dynamic analysis of community structures to detect inward-looking communities by excluding members with differing opinions.

Project funded by the French National Research Agency. <http://www.anr-pil.org/>