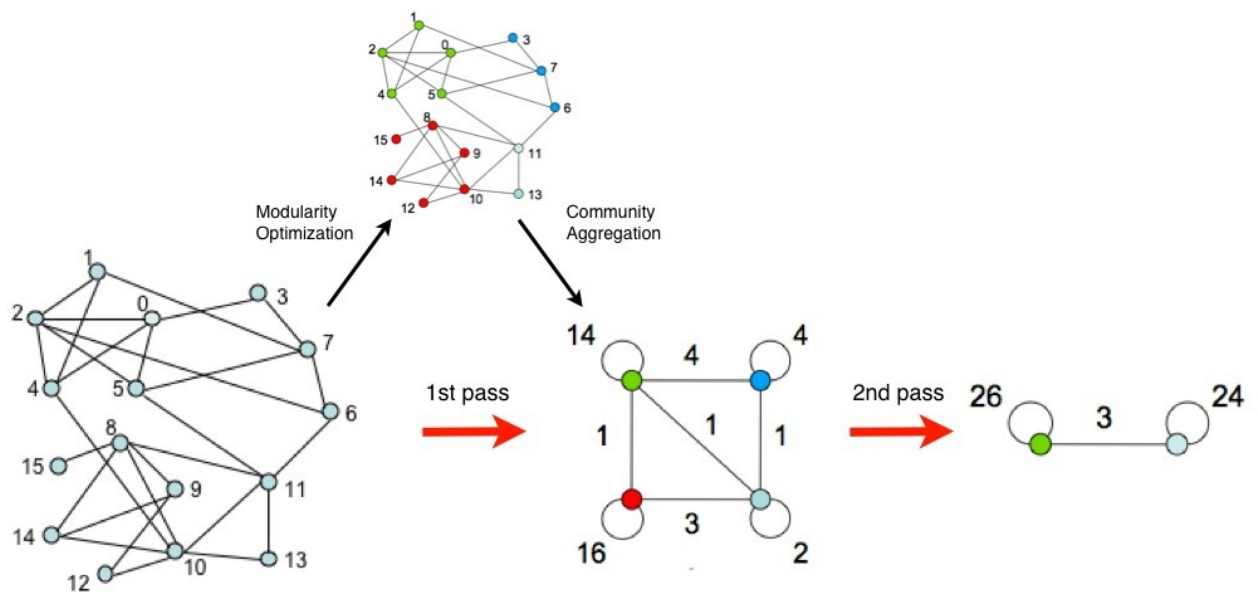


Advanced Human-Machine Interaction  
Interaction Data Analysis  
TD05: Social Network Analysis  
INSA Rouen Normandie - Normandie University

## Practical session : Community detection using Louvain/Blondel

1. Collect and analyze the Zachary's karate club dataset at <http://networkdata.ics.uci.edu/data/karate/> (NB : Wikipédia also propose a description of the dataset : [https://en.wikipedia.org/wiki/Zachary%27s\\_karate\\_club](https://en.wikipedia.org/wiki/Zachary%27s_karate_club)). The network captures 34 members of a karate club, documenting 78 pair-wise links between members who interacted outside the club.
2. Analyse the Louvain/Blondel algorithm, based on modularity optimization (e.g. [https://en.wikipedia.org/wiki/Louvain\\_Modularity](https://en.wikipedia.org/wiki/Louvain_Modularity), <https://www.youtube.com/watch?v=dGa-TXpoPz8> or <https://www.youtube.com/watch?v=QfTxqAxJp0U>). The algorithm can be divided into two phases. 1) it extracts "small" communities by optimizing modularity. 2) it aggregates nodes of the same community and builds a new network whose nodes are the communities. These two steps are repeated iteratively until a maximum of modularity is obtained. (see example below).



3. Process the Zachary's karate club dataset using Louvain/Blondel algorithm implemented in Python (e.g. <https://networkx.org/documentation/stable/tutorial.html> or <https://github.com/taynaud/python-louvain> + NetworkX library at <https://networkx.github.io/>), C++ (e.g. <https://sourceforge.net/projects/louvain/>) or Java (e.g. <https://github.com/hwyywh/louvain-1> or <http://www.ludowaltman.nl/slm/>).
4. Implement your own version.