

# Development of an R package for computing network centrality based on solution for coalitional games

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Classical centrality measures have been used in many applications to measure the relative importance of the nodes of a network, but may fail to reflect the importance of each node in interaction with the others. For this reason, solutions for coalitional games have been recently proposed to understand the importance of each node of a network in terms of its contributions when combined with other set of nodes (see, for instance, Aadithya et al. (2010) and Szczepański et al. (2012)).

During the stage, the student will implement some algorithms available from the literature for the computation of network centrality notions based on solutions for coalitional games on networks. The objective of this stage is to create a package in R language, a free software environment for statistical computing and graphics (<http://www.r-project.org/>) [Leisch (2008)].

Candidates must have a strong familiarity with programming languages like R (the language that will be used during the stage) or python, or Matlab or Java.

A basic knowledge about coalitional games is also appreciated.

The internship duration will be 4-5 months and will be supported by the ANR project NETLEARN.

## References:

Aadithya, K. V., Ravindran, B., Michalak, T. P., & Jennings, N. R. (2010). Efficient computation of the shapley value for centrality in networks. In *Internet and Network Economics* (pp. 1-13). Springer Berlin Heidelberg.

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Leisch, F. (2008). Creating R Packages: A Tutorial.

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Szczepański, P. L., Michalak, T., & Rahwan, T. (2012, June). A new approach to betweenness centrality based on the shapley value. In *Proceedings of the 11th International Conference on Autonomous Agents and Multiagent Systems-Volume 1* (pp. 239-246). Systems,

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