The Role of Research Leaders on the Evolution of Scientific Communities

Bruno Leite Alves, Fabrício Benevenuto, Alberto H. F. Laender

MSDN@WWW2013 *{bruno.leite,fabricio,laender@dcc.ufmg.br}*

Abstract: *In this work, we provide a wide investigation of the roles that members of the core of scientific communities play in the collaboration network structure formation and evolution. To do that, we define a community core based on an individual metric, core score, which is an h-index derived metric that captures both, the prolificness and the involvement of researchers in a community. Our results provide a number of key observations related to community formation and evolving patterns. Particularly, we show that members of the community core work as bridges that connect smaller clustered research groups. Furthermore, these members are responsible for an increase in the average degree of the whole community underlying network and a decrease on the overall network assortativeness. More important, we note that variations on the members of the community core tend to be strongly correlated with variations on these metrics.*

Introduction

Since its beginning, society has been organizing itself into communities, which are groups of individuals with common interests. Communities exhibit a wide range of characteristics and serve a variety of purposes, from small groups engaged in tightly niche topics such as a very specific scientific community, to millions of users linked by an interest such as a community related to a sport team or fans of a celebrity.

Recent efforts have focused on identifying a group of influential individuals with the power to a affect not only the underlying network structure of a community, but also to interfere on the spread and flow of information within a community.

In this work, we take a different perspective and study a complementary problem. Here, we focus on studying the roles that influential individuals from a scientific community play on evolving properties of such communities.

Scientific Communities

- 24 flagship conferences of major ACM SIGs
- We considered each conference as a scientific community
- 2.2 million publications from 1.2 million authors taken from DBLP

SIGACT	SIGDOC	SIGMOD
SIGAPP	SIGGRAPH	SIGOPS
SIGARCH	SIGIR	SIGPLAN
SIGBED	SIGKDD	SIGSAC
SIGCHI	SIGMETRICS	SIGSAM
SIGCOMM	SIGMICRO	SIGSOFT
SIGCSE	SIGMM	SIGUCCS
SIGDA	SIGMOBILE	SIGWEB

Community Core

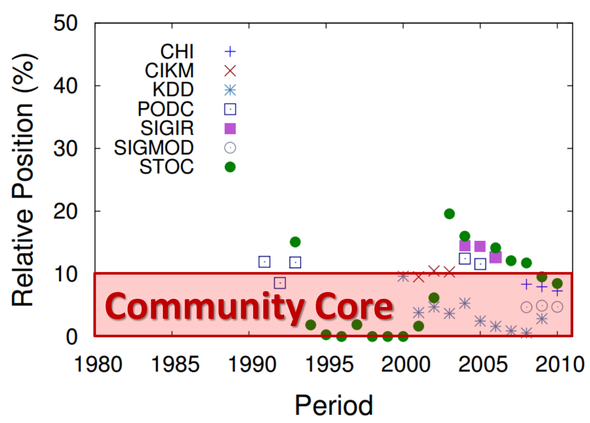
The Core Score estimates a researcher's importance within a community. The core score of a researcher *r* into a community *c* in a period of time *t* is given by:

$$CoreScore_{r,c,t} = h_r \times \#publications_{r,c,t}$$

Validations

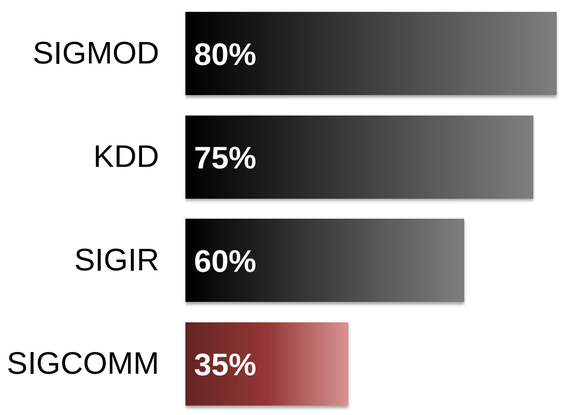
Step one:

Jon Kleinberg's Communities



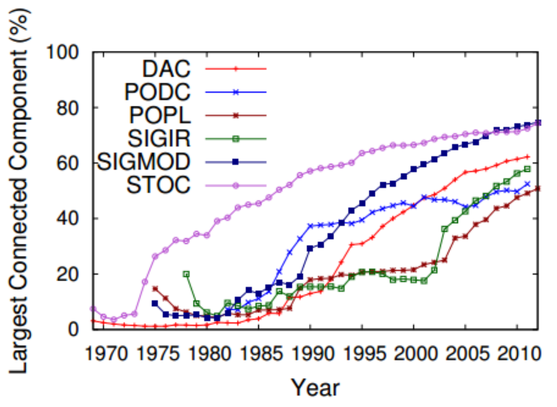
Step two:

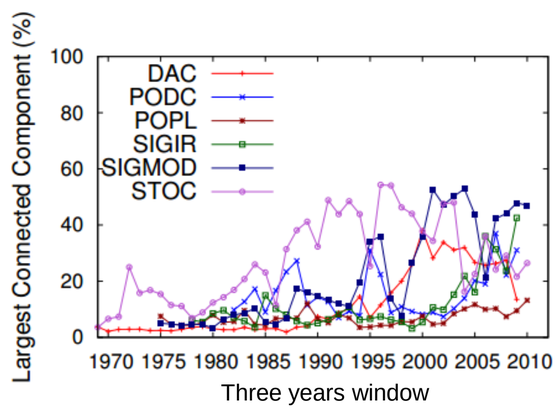
Awarded Researchers



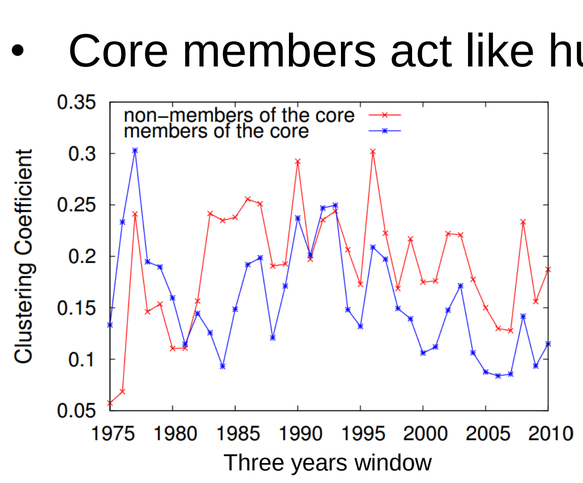
Properties of C. Cores

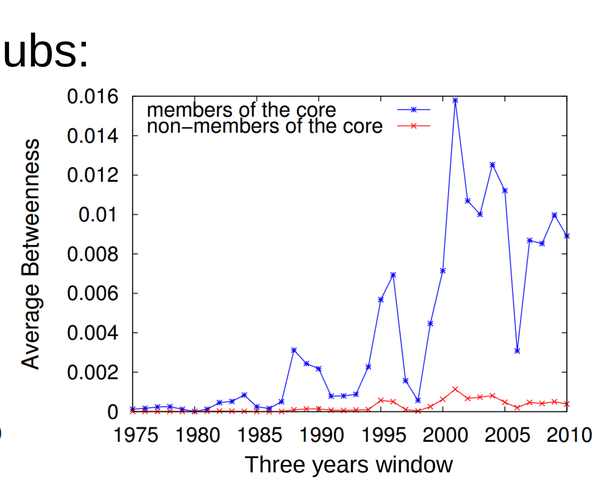
- Evolution of the network:





- Core members act like hubs:





- How the community core affect the network: