

The Role of Research Leaders on the Evolution of Scientific Communities

Bruno Leite Alves

Fabrício Benevenuto Alberto H. F. Laender

Federal University of Minas Gerais
Belo Horizonte, Brazil



Instituto Nacional de Ciência e Tecnologia para a Web



Society is Organized in Communities

- There are a lot of kinds of communities
- In a social networks, individuals influence and are influenced by others
- Communities have opinion leaders

A group of leaders or influential members are able to affect the dynamics of the entire community

Our Goal

- Study the dynamics of **scientific communities**
- Identify leaderships within **scientific communities** (Community Core)
- Investigate the properties of a Community Core

Outline

- Data Source about Scientific Communities
- Extracting the Community Core
- Properties of a Community Core

Data Source



2.2 million publications

from **1.2 million authors**

24 flagship conferences

of **major ACM SIGs**

We considered each **conference**

as a **scientific community**

ACM SIGs Considered

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

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:

$$\text{CoreScore}_{r,c,t} = h_r \times \#publications_{r,c,t}$$

How to Estimate H-index

Only **30%**

of **DBLP** authors had a profile at

Google Scholar

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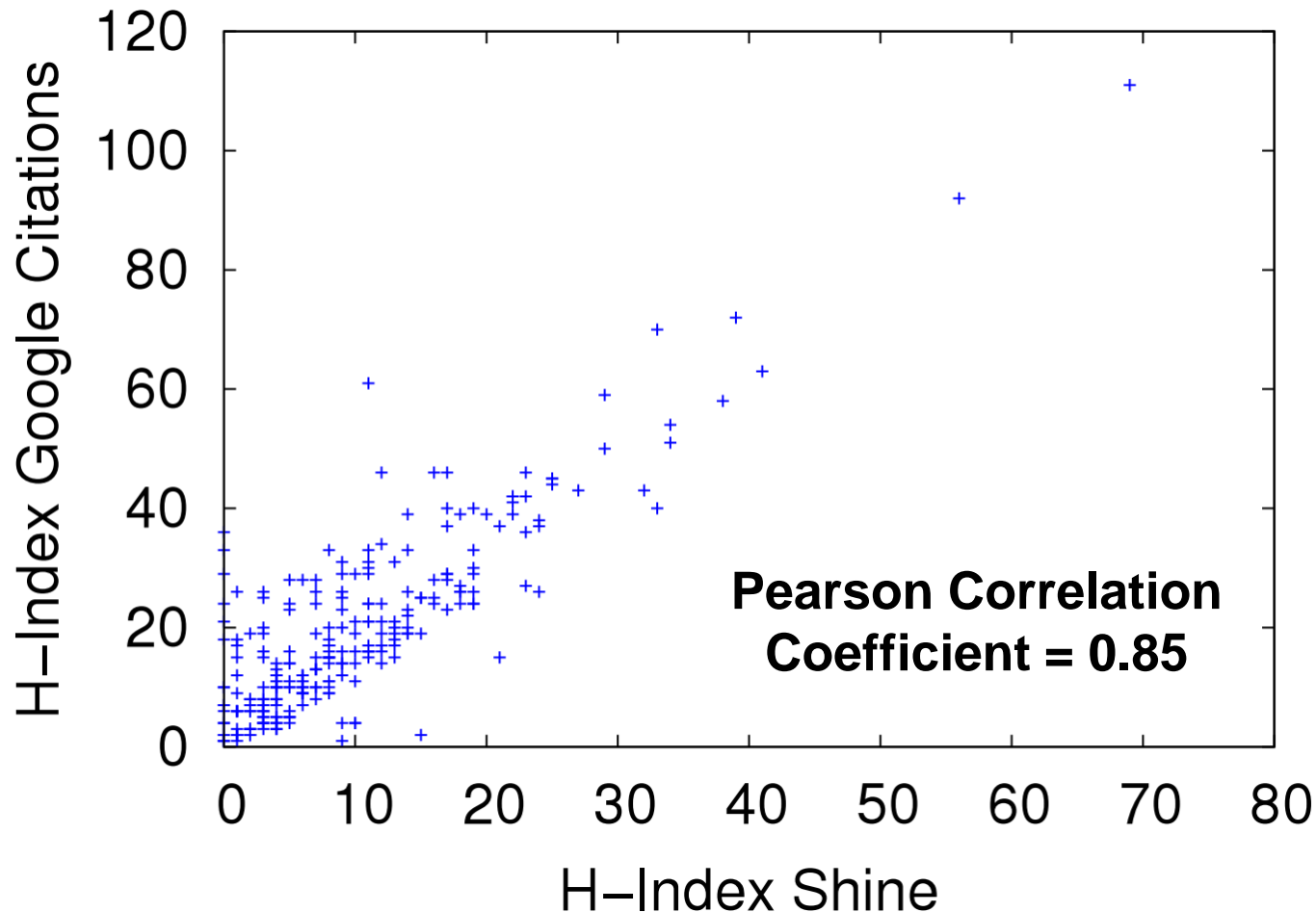
Google Scholar

Alternative



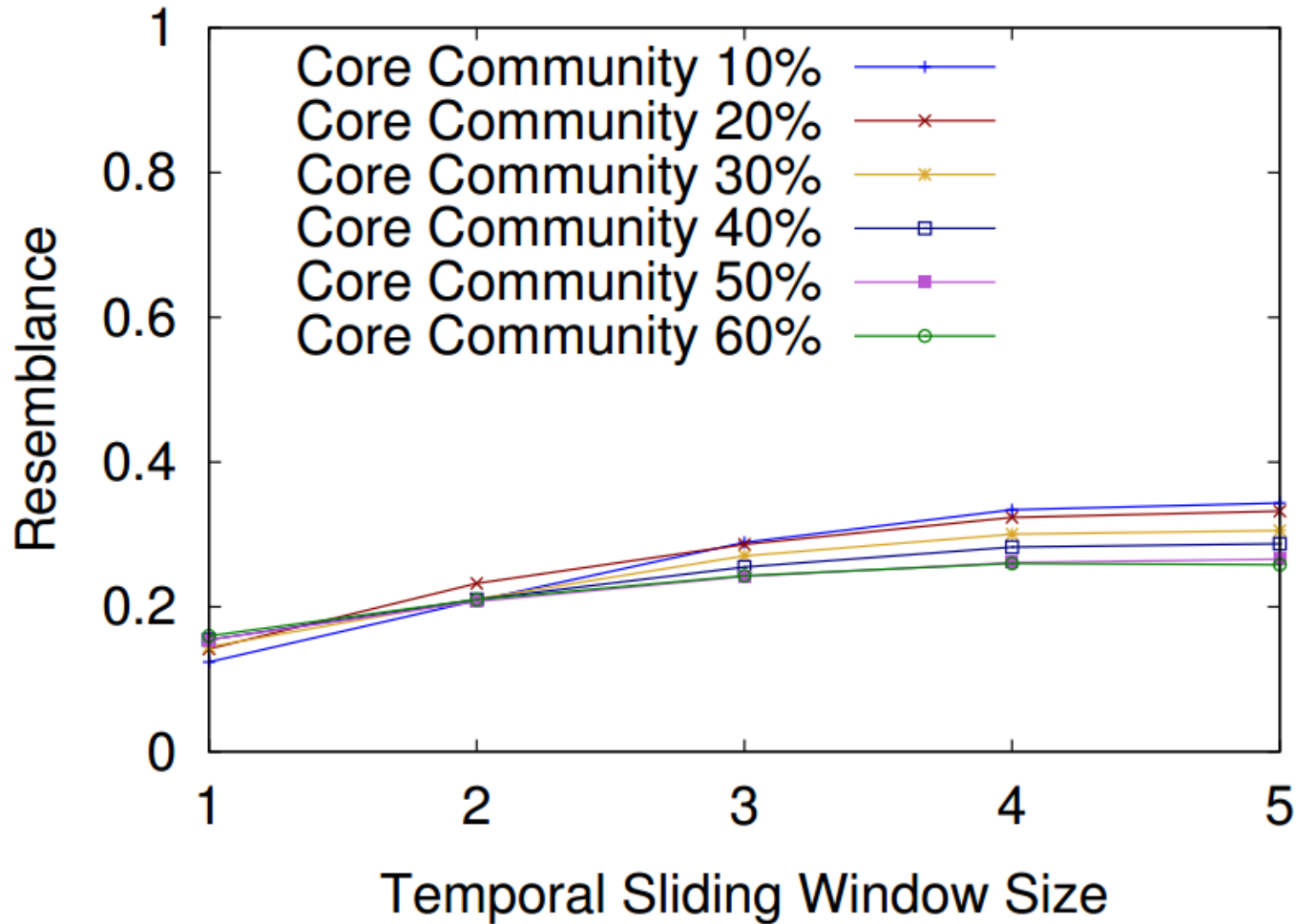
www.shine.icomp.ufam.edu.br

Shine vs. Google Scholar



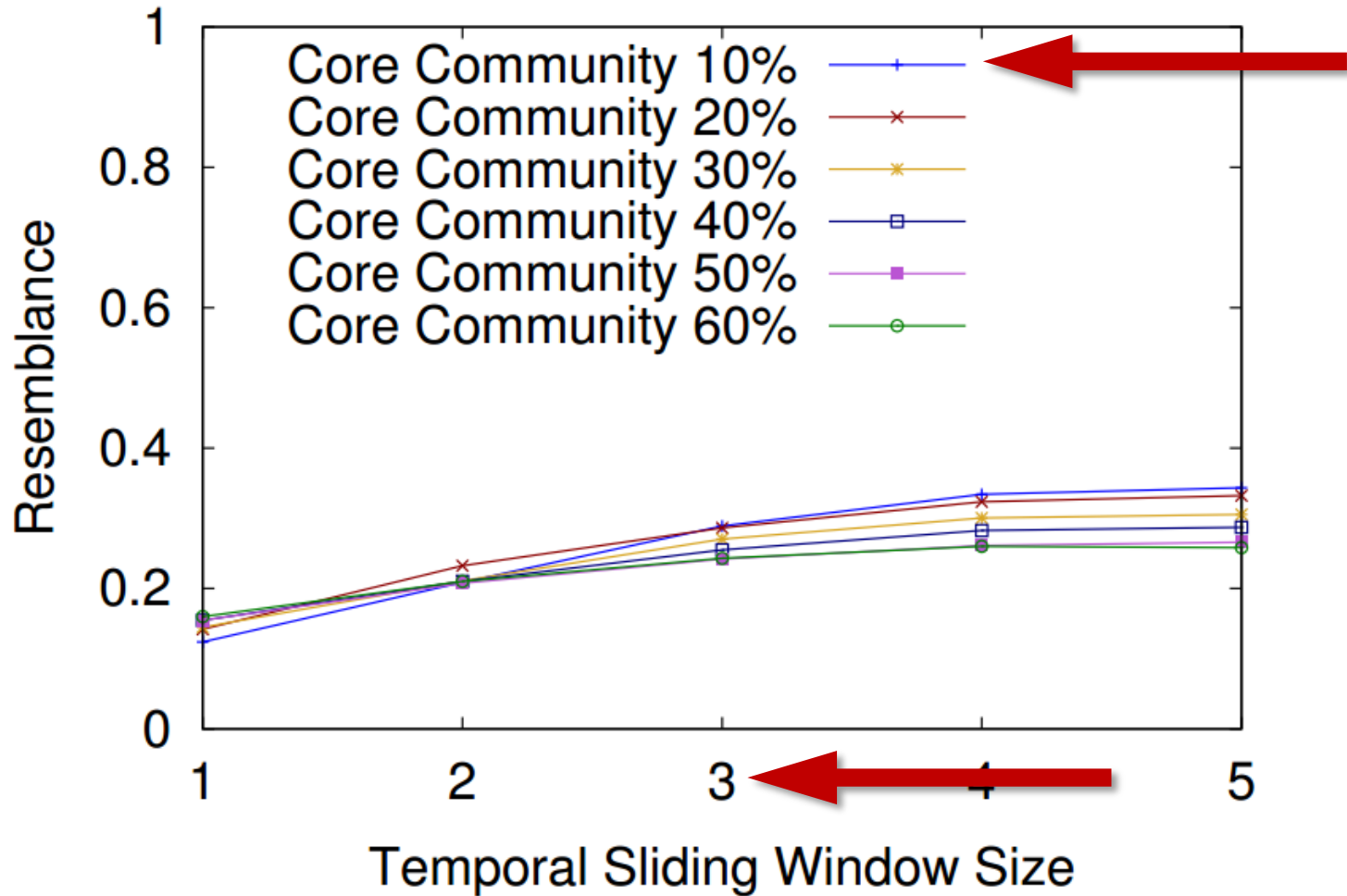
Shine offers a good estimation for H-Index

Resemblance and Angular Coefficient



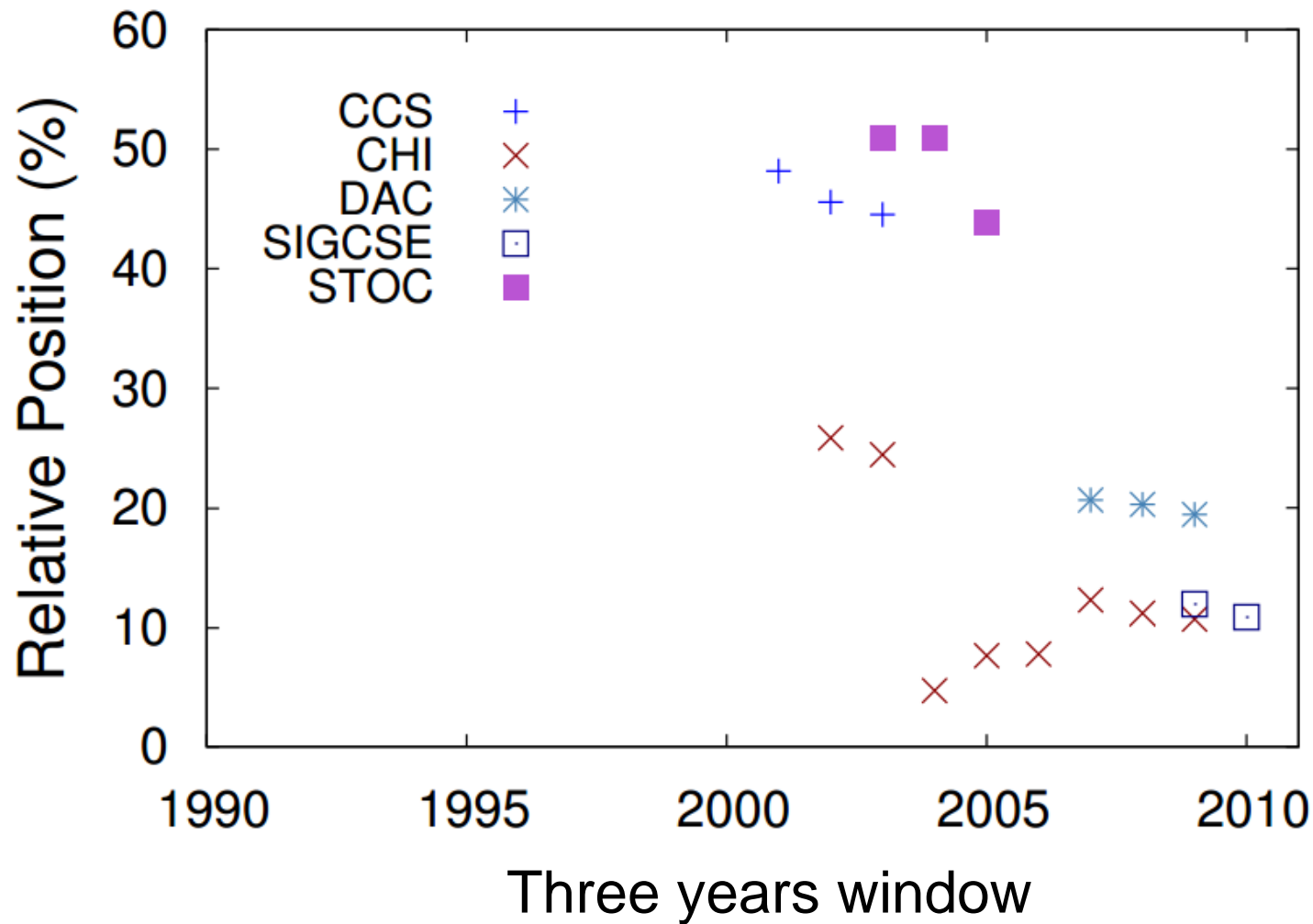
SIGMOD

Resemblance and Angular Coefficient



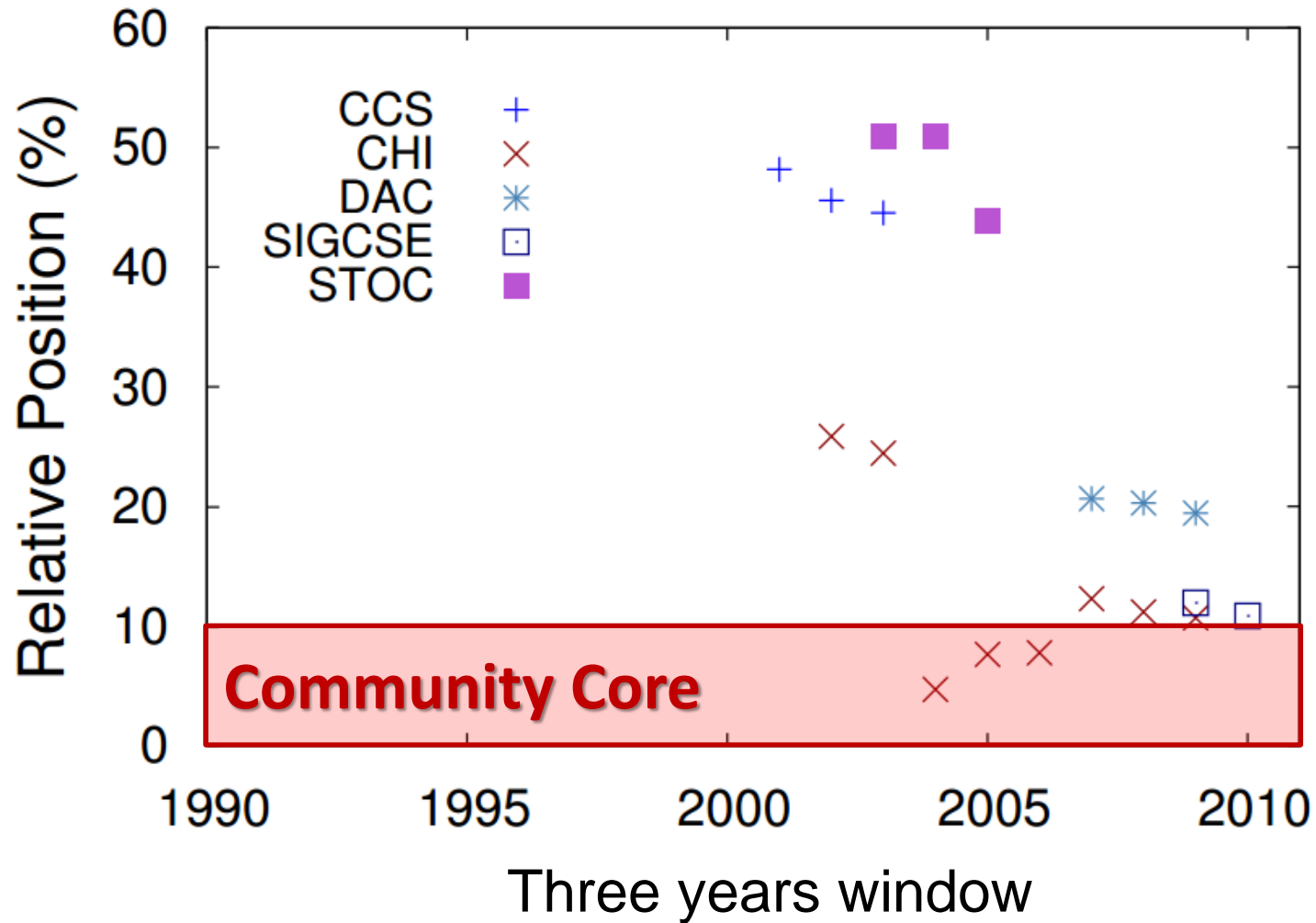
SIGMOD

Luis von Ahn's Communities



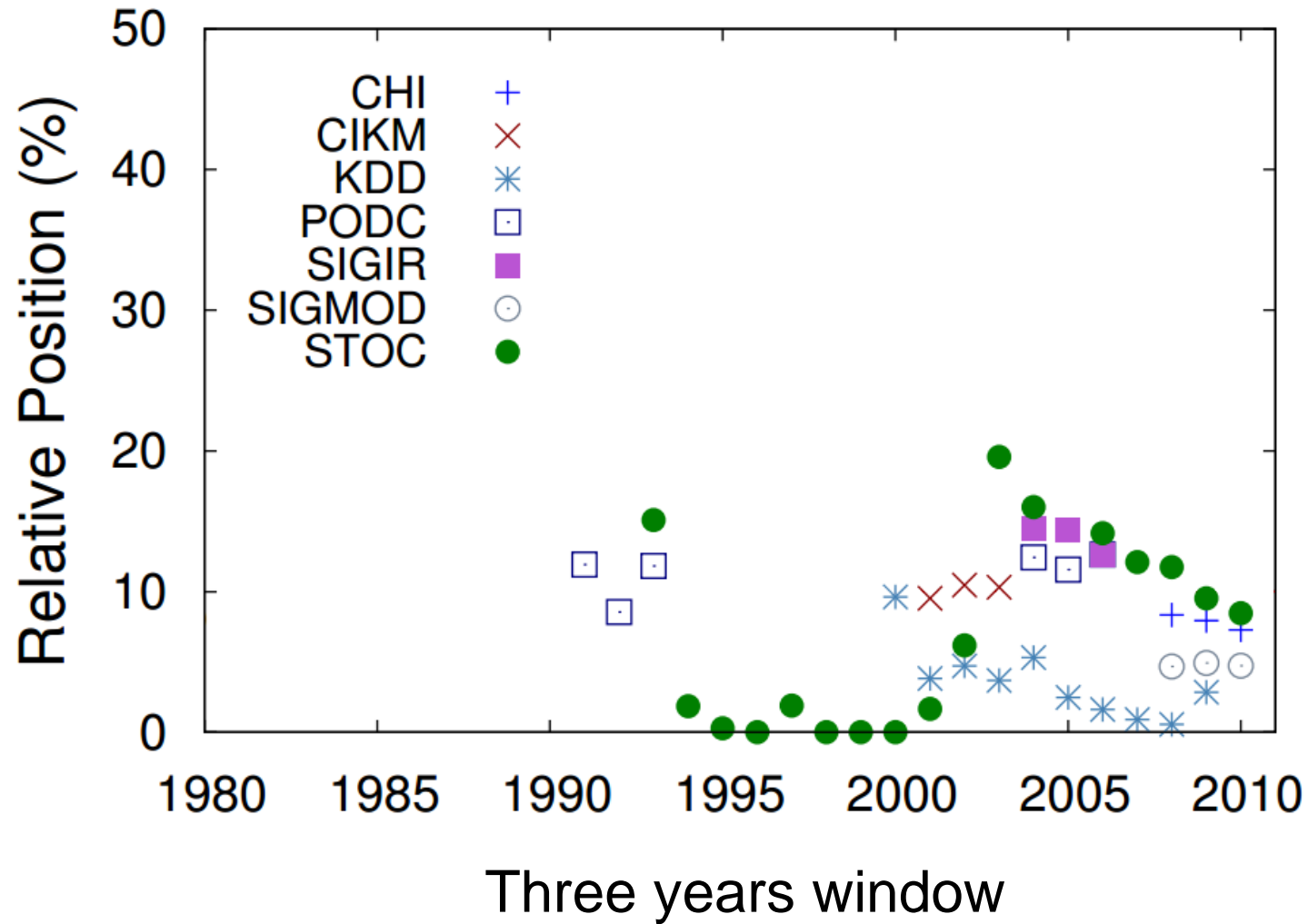
High core score in CHI and SIGCSE

Luis von Ahn's Communities



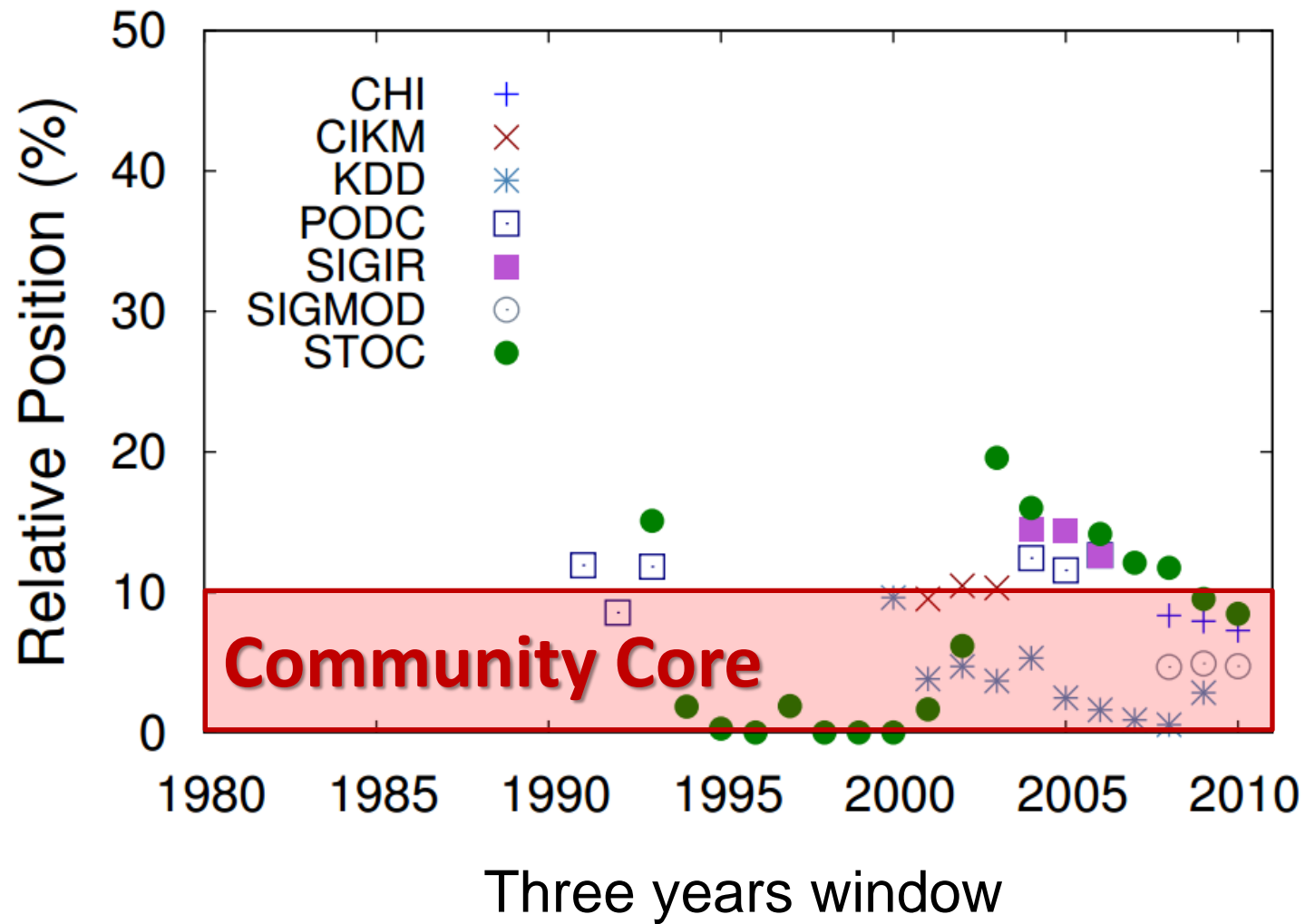
Member of the Community Core of CHI

Jon Kleinberg's Communities



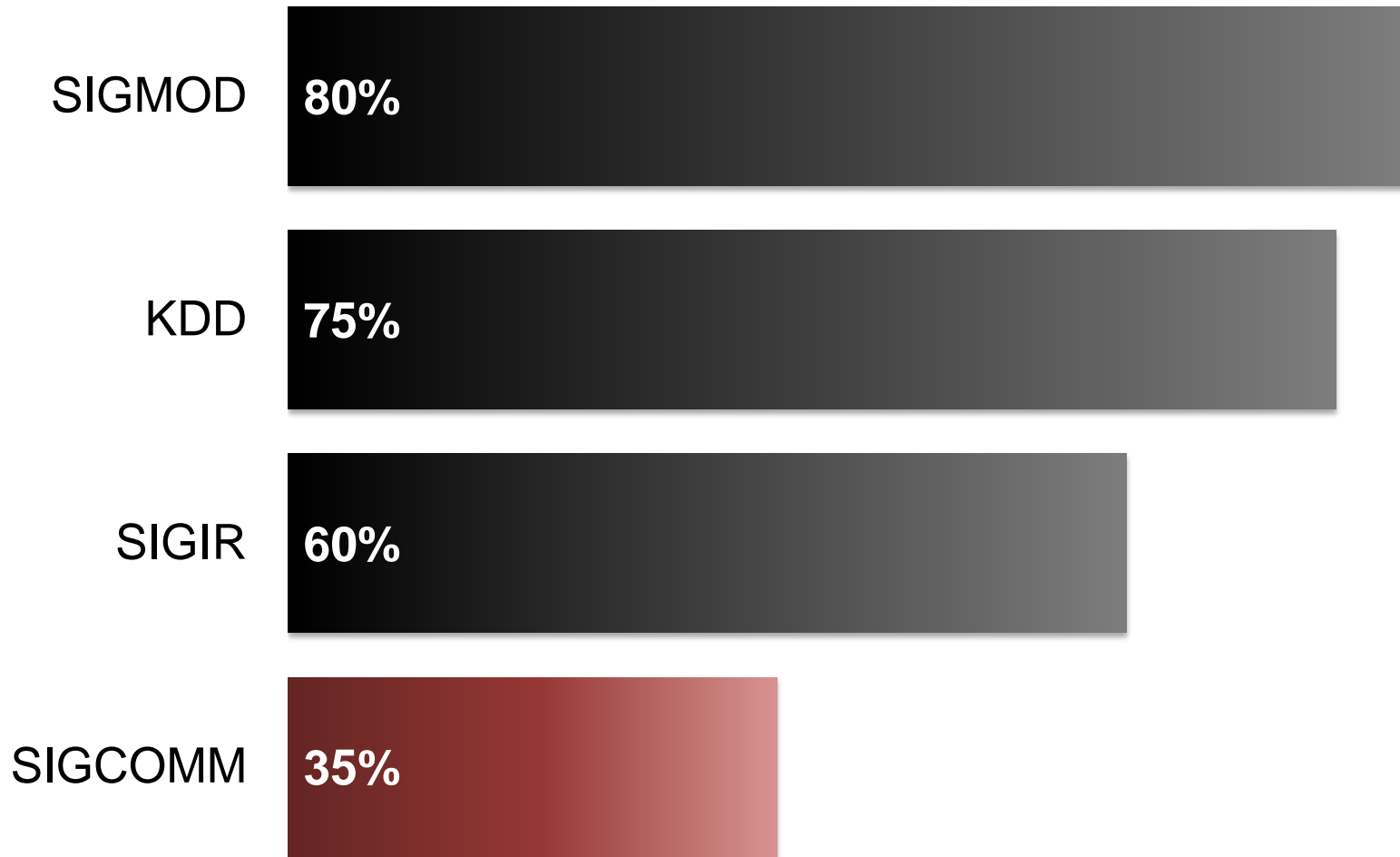
High core score in several communities

Jon Kleinberg's Communities



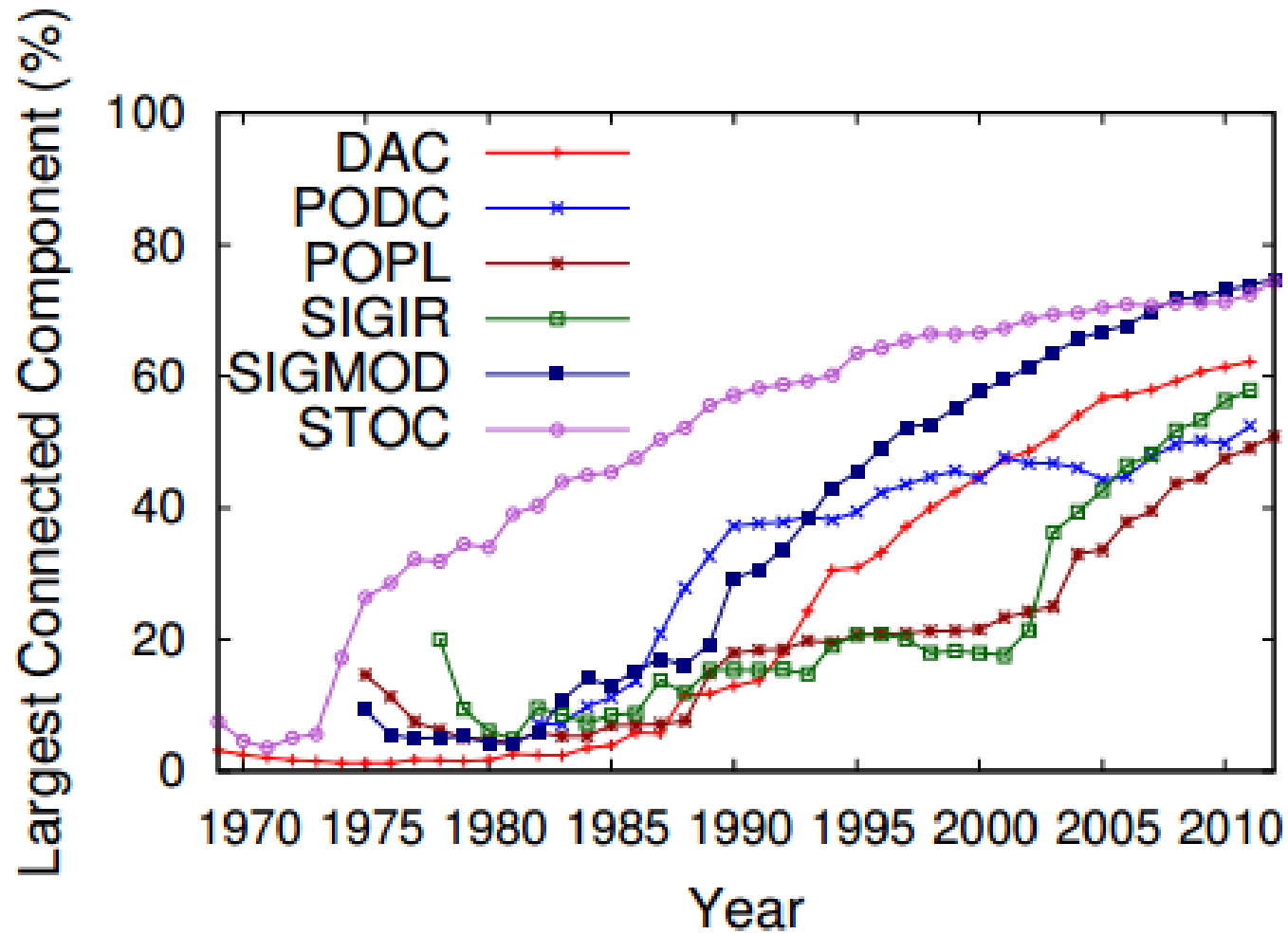
Moving from STOC to KDD

Awarded Researchers



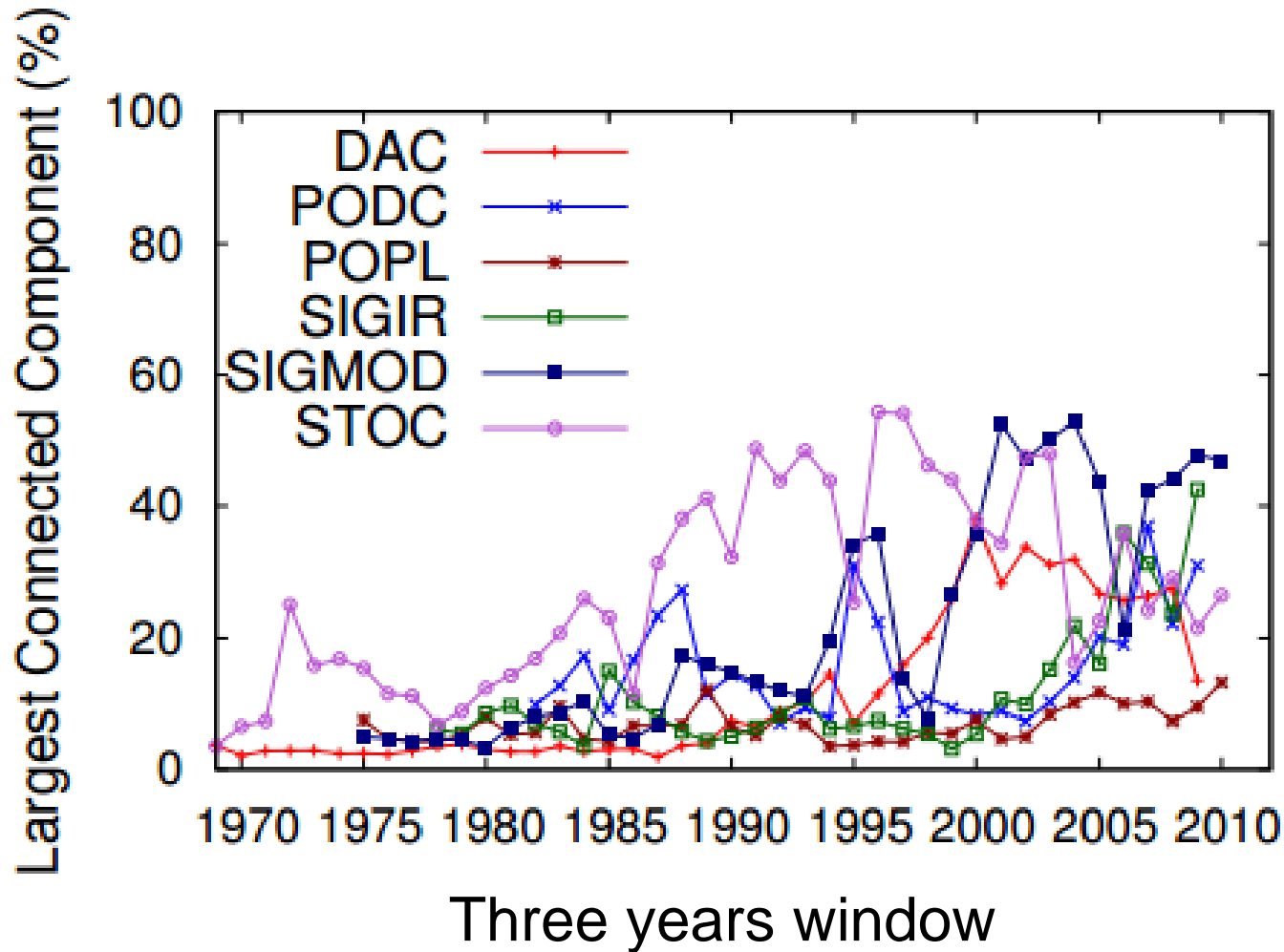
Members of the core community awarded

Evolution of the Scientific Communities



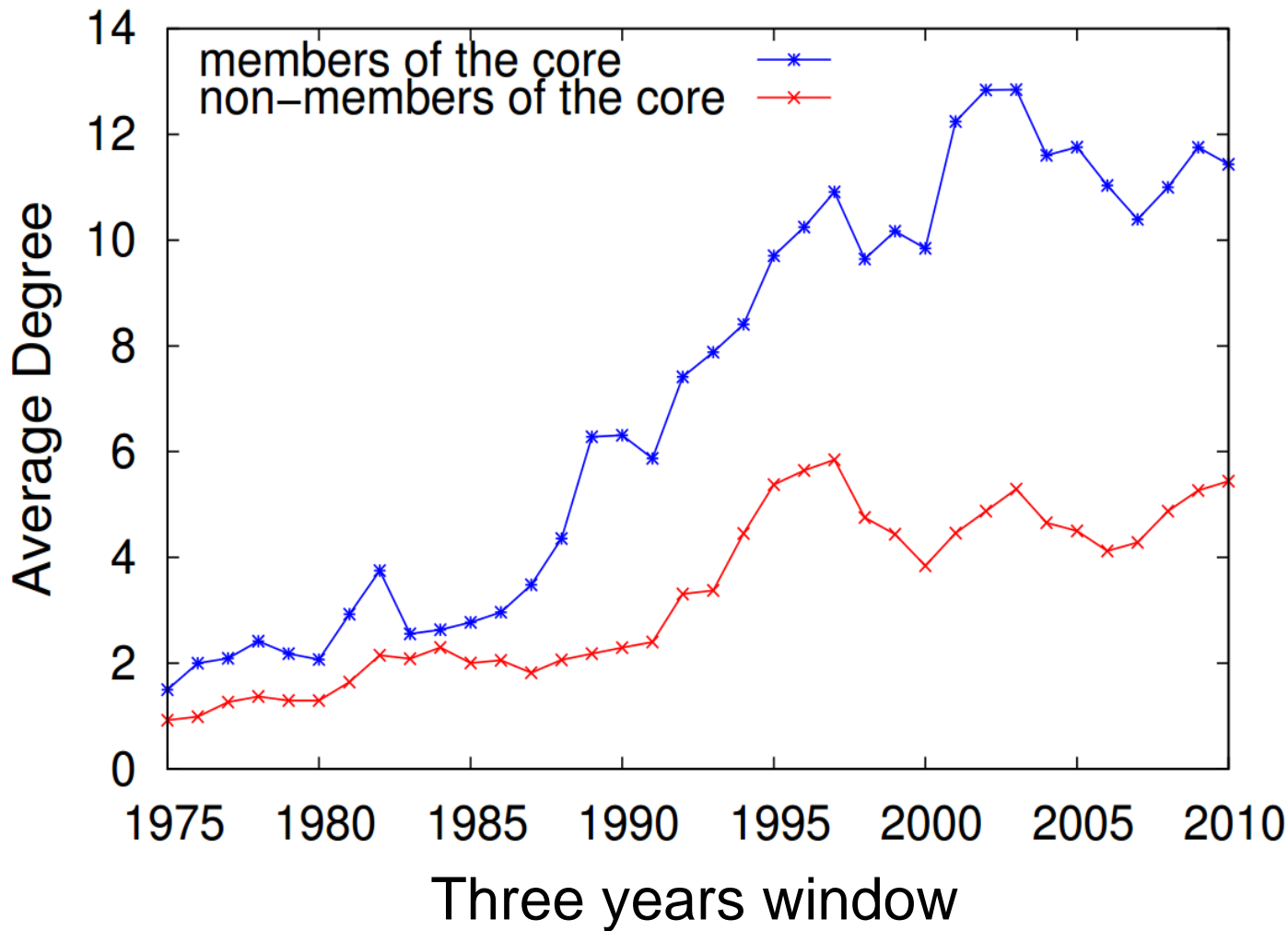
Year by year by accumulating nodes and edges

Evolution of the Scientific Communities



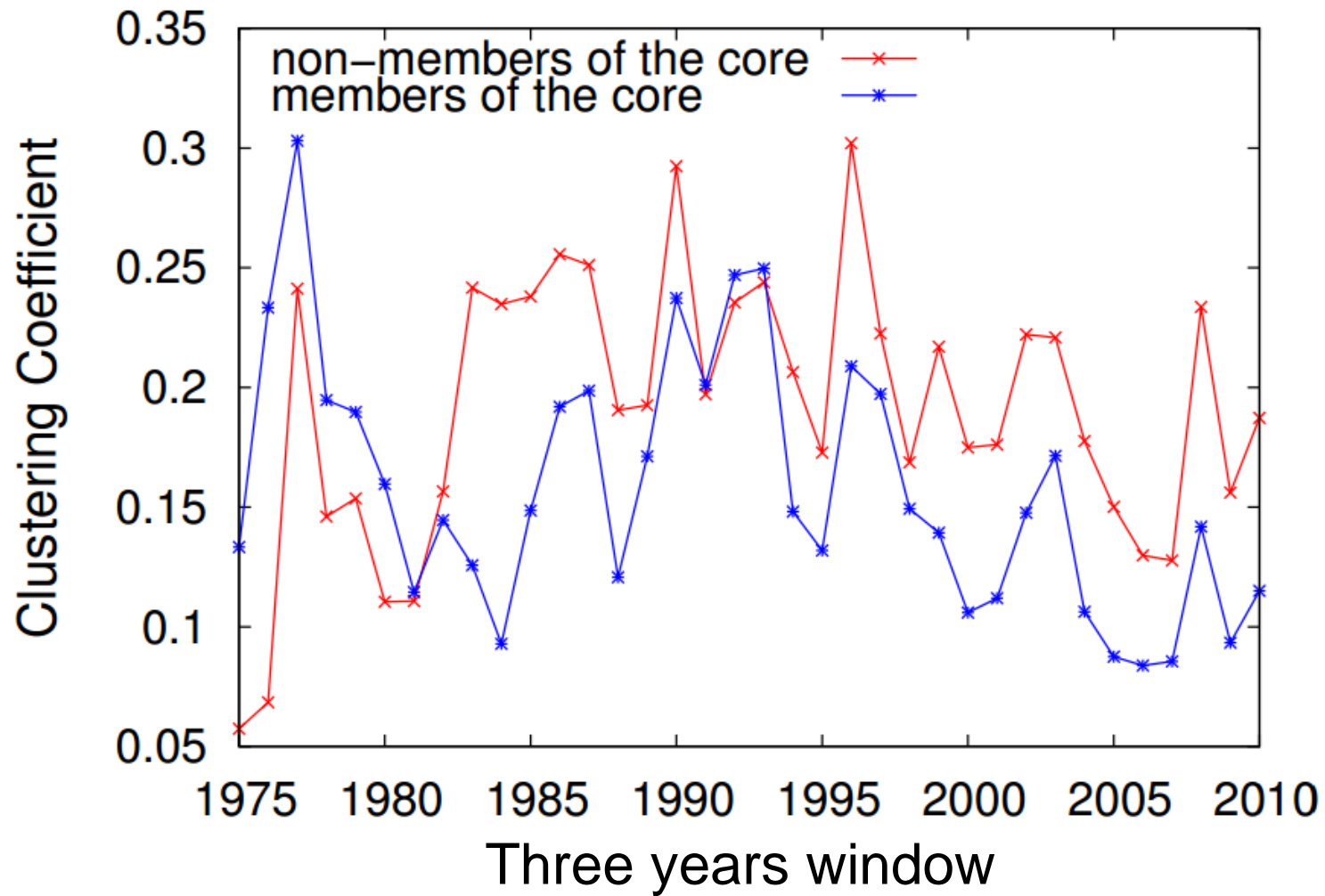
Snapshots (3 years) constructed based on nodes and edges

Core Members vs. Non-Members



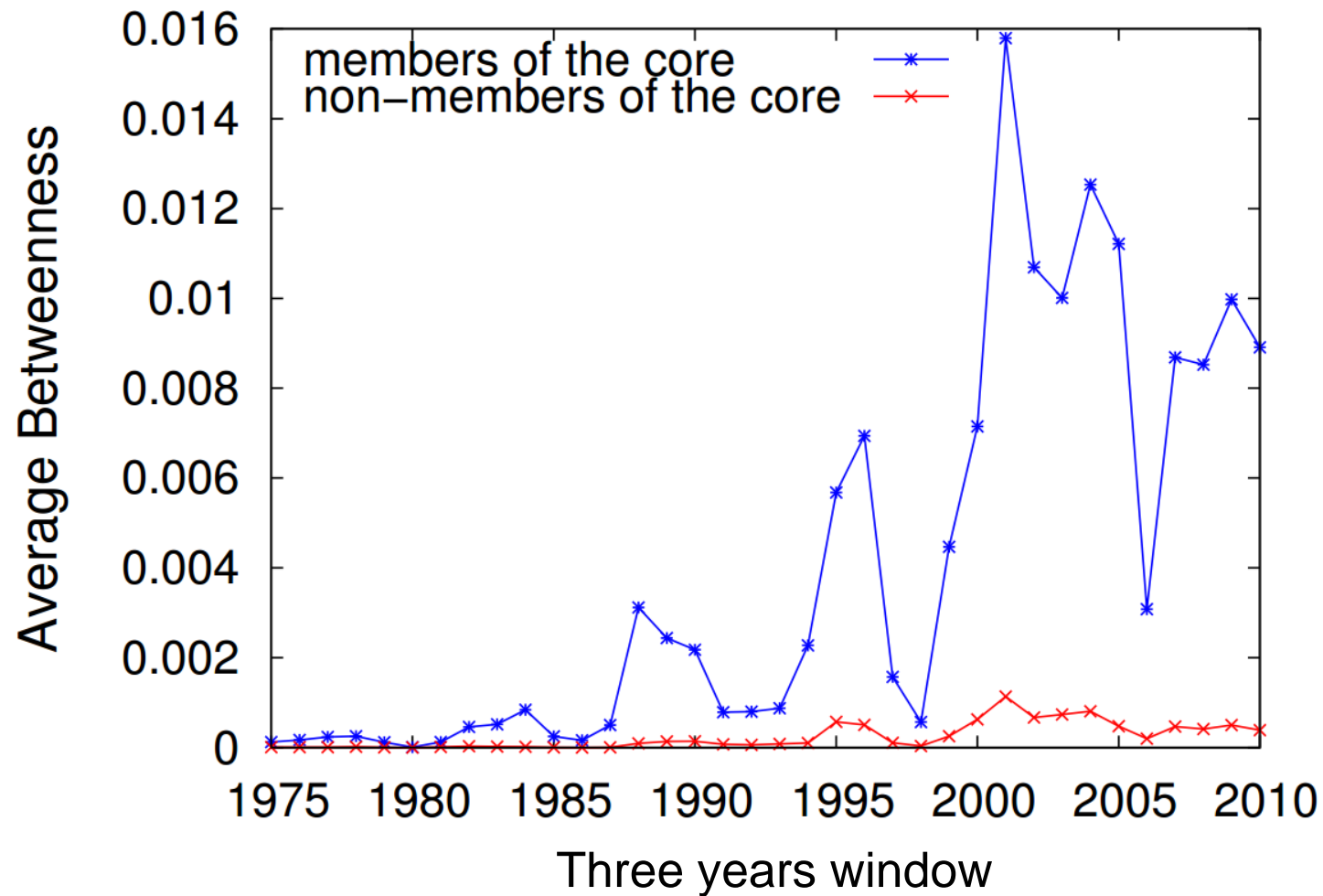
Average degree of core members is higher than those of non-members'

Core Members vs. Non-Members



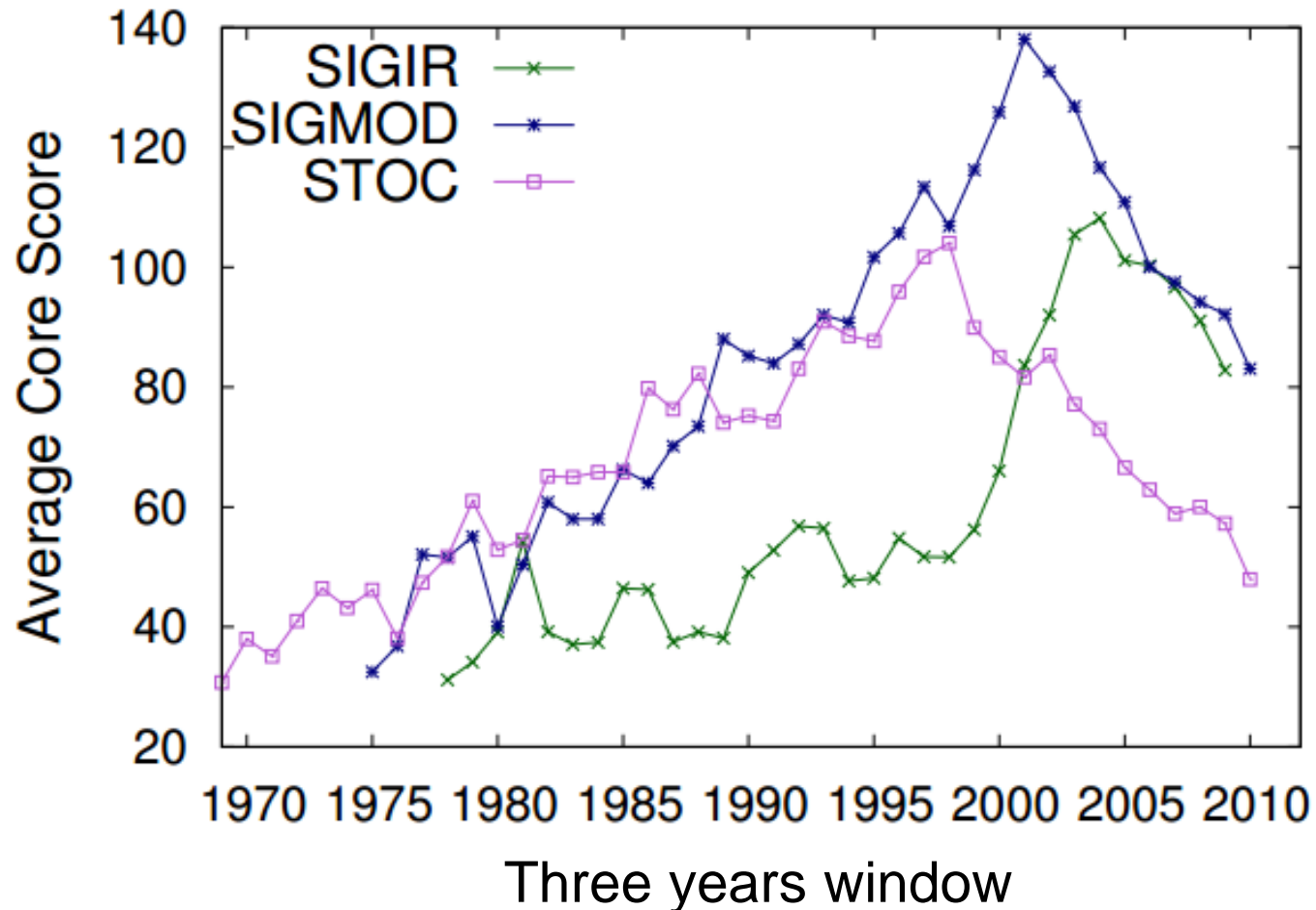
The core might act like hubs, by connecting different groups with small intersection

Core Members vs. Non-Members



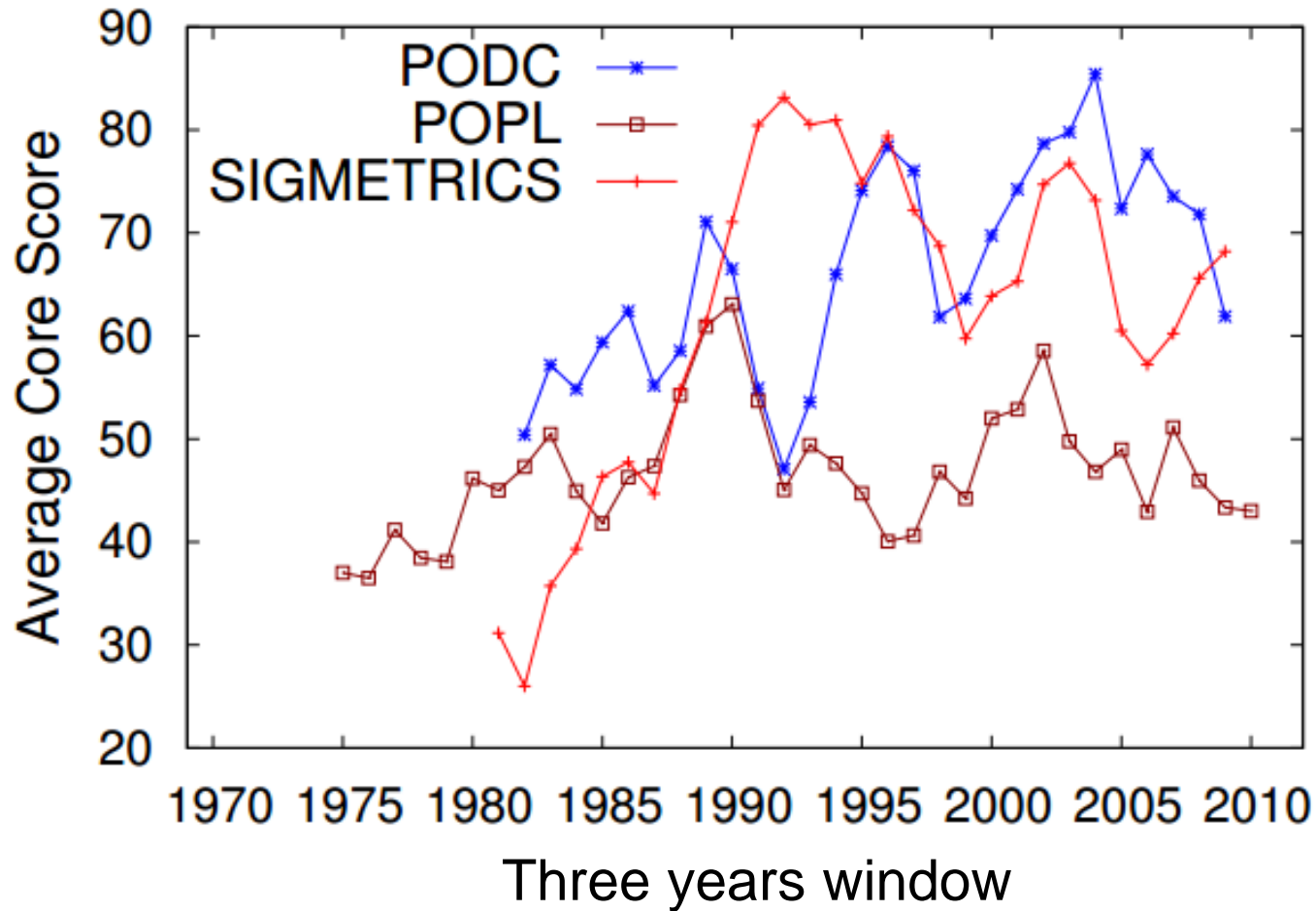
A higher number of shortest paths include the core

Influence of Core Members



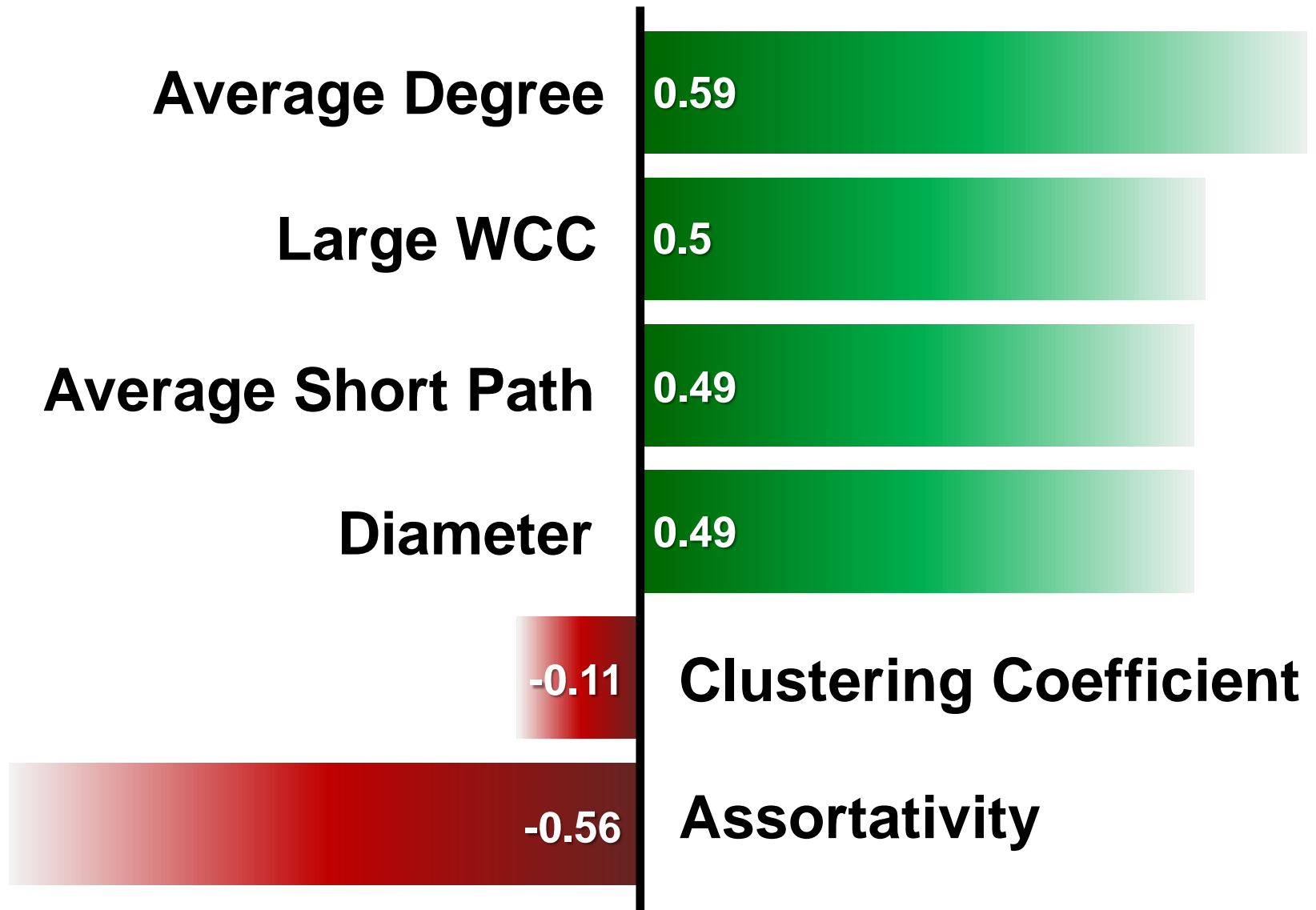
The average core score of a community, in general, rises along its life time

Influence of Core Members



How does it affect the network?

Strong Correlation with Average Core Score



Conclusions

The core community:

- is strongly correlated with variations on network properties
- works as bridges that connect groups
- increases the average degree
- decreases the assortativeness

Conclusions

Future Work:

- Analysis of other kinds of network such as massive multiplayer games and on-line social networks
- Estimation of the h-index as a function of time

Thank you!

Bruno Leite Alves

Fabrício Benevenuto Alberto H. F. Laender

Computer Science Department

Federal University of Minas Gerais

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