

New platforms for social computation and web-gaming

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Techno-social systems

Social dynamics



ICT-based
social-communities

New ICT-driven opportunities

Understand and control information dynamics

- social annotations, social bookmarking
- search engines
- recommendation systems
- collaborative editing (wiki, blogs, forum, ...)
- collaborative filtering
- ...

Web as a laboratory for social sciences

- opinions formation
- consumers behaviors, marketing strategies
- cultural trends, globalization
- birth and evolution of communication systems
- language evolution
- ...

Raise awareness and participation

- Monitoring of common resources and environment
- Monitoring of societies
- Feedback to policy makers
- Sustainable development
- ...

Understand and control information dynamics

- social annotations, social bookmarking
- search engines
- recommendation systems
- collaborative editing (wiki, blogs, forum, ...)
- collaborative filtering
- ...

a short history of the web

1989-1991

WWW is created at CERN

1991-2000

mass adoption, users are consumers,
taxonomic approach

1998

Google is born

2000

the Semantic Web vision by T. Berners-Lee

2000-2004

users become content providers,
rise of online communities

2005

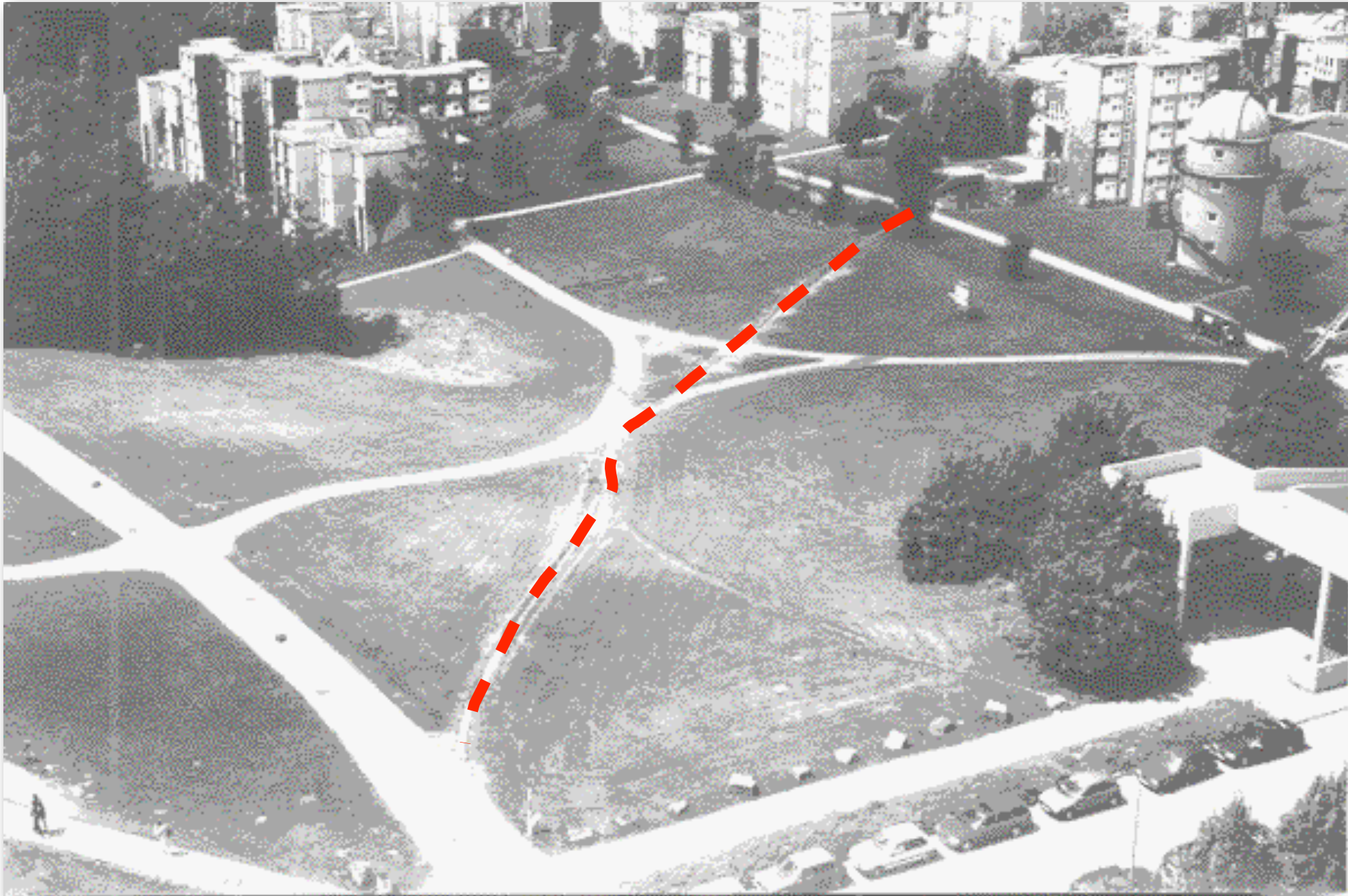
“bottom-up” information architecture

“bottom-up architecture”



"I hate intellectuals. They are from the top down. I am from the bottom up." F. Lloyd Wright

“bottom-up architecture”



"I hate intellectuals. They are from the top down. I am from the bottom up." F. Lloyd Wright



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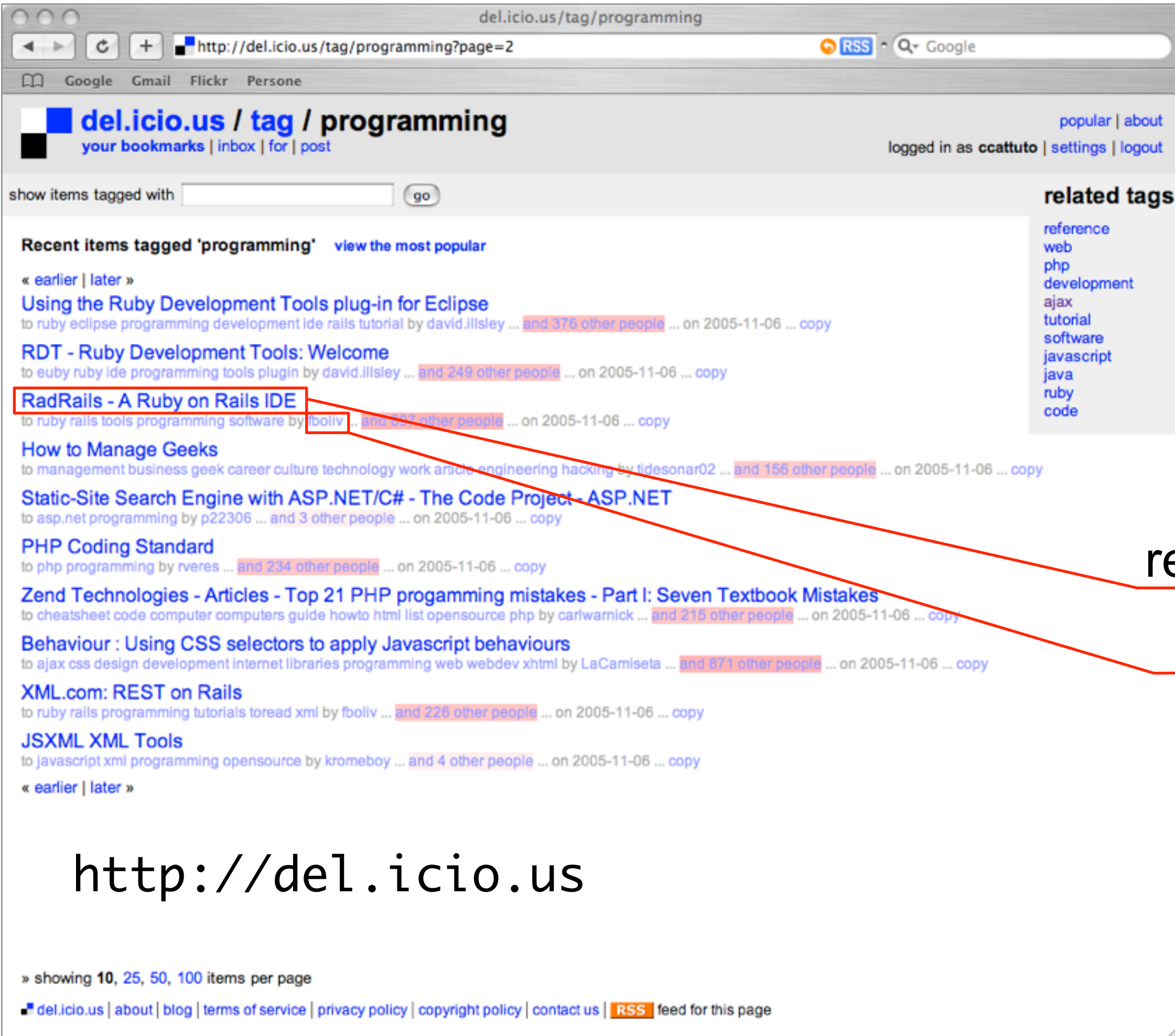
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resource

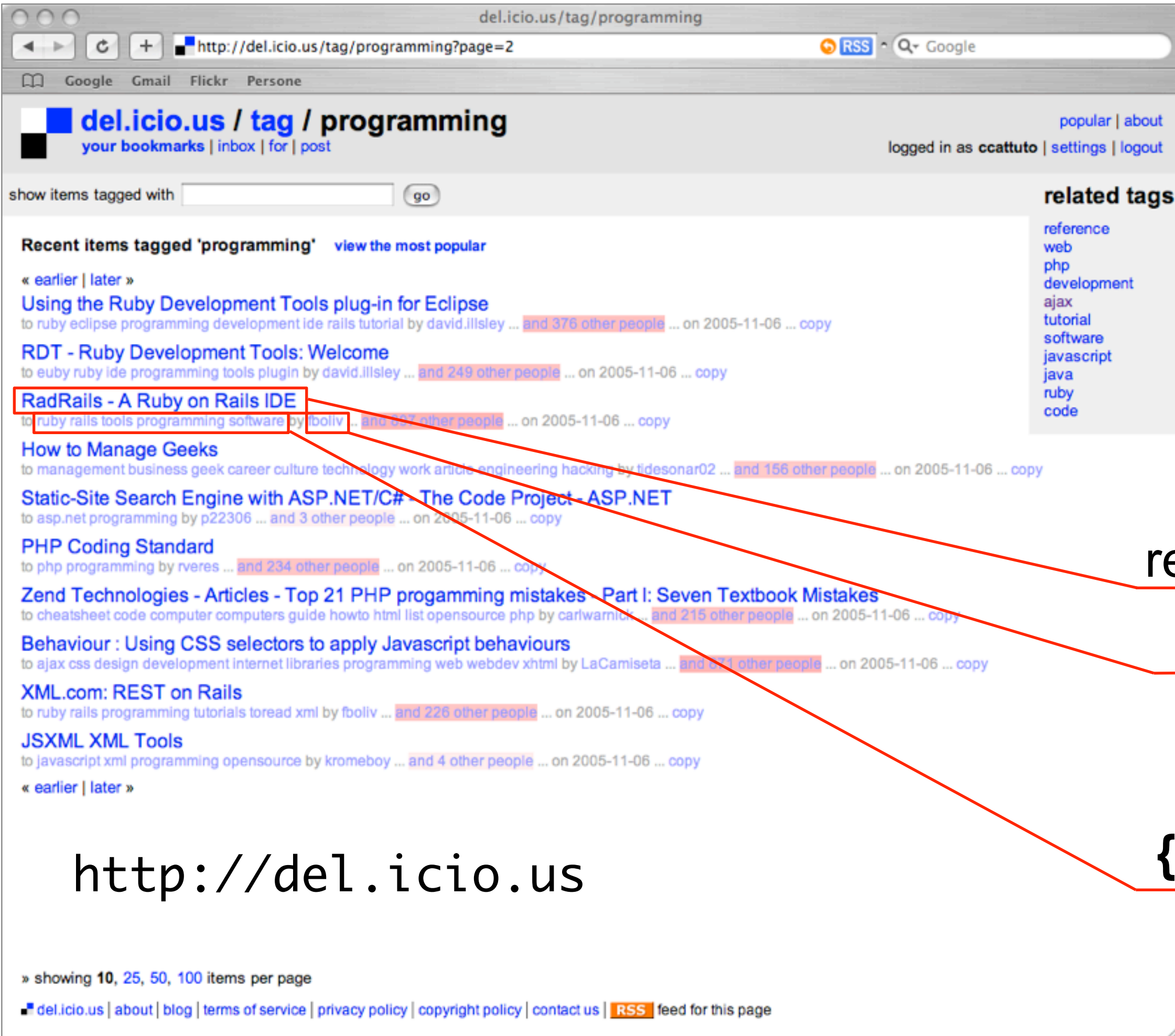
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resource

user

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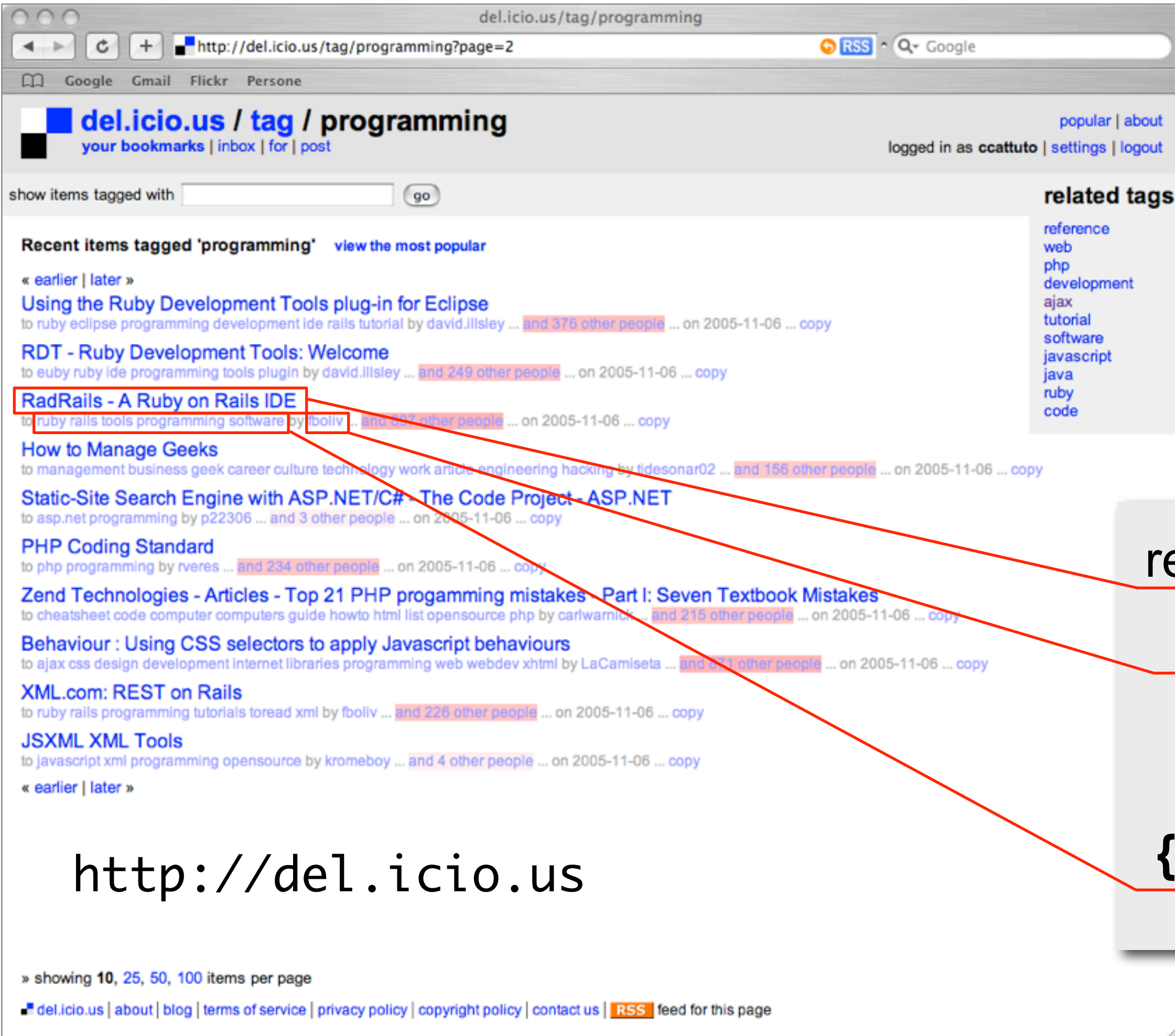


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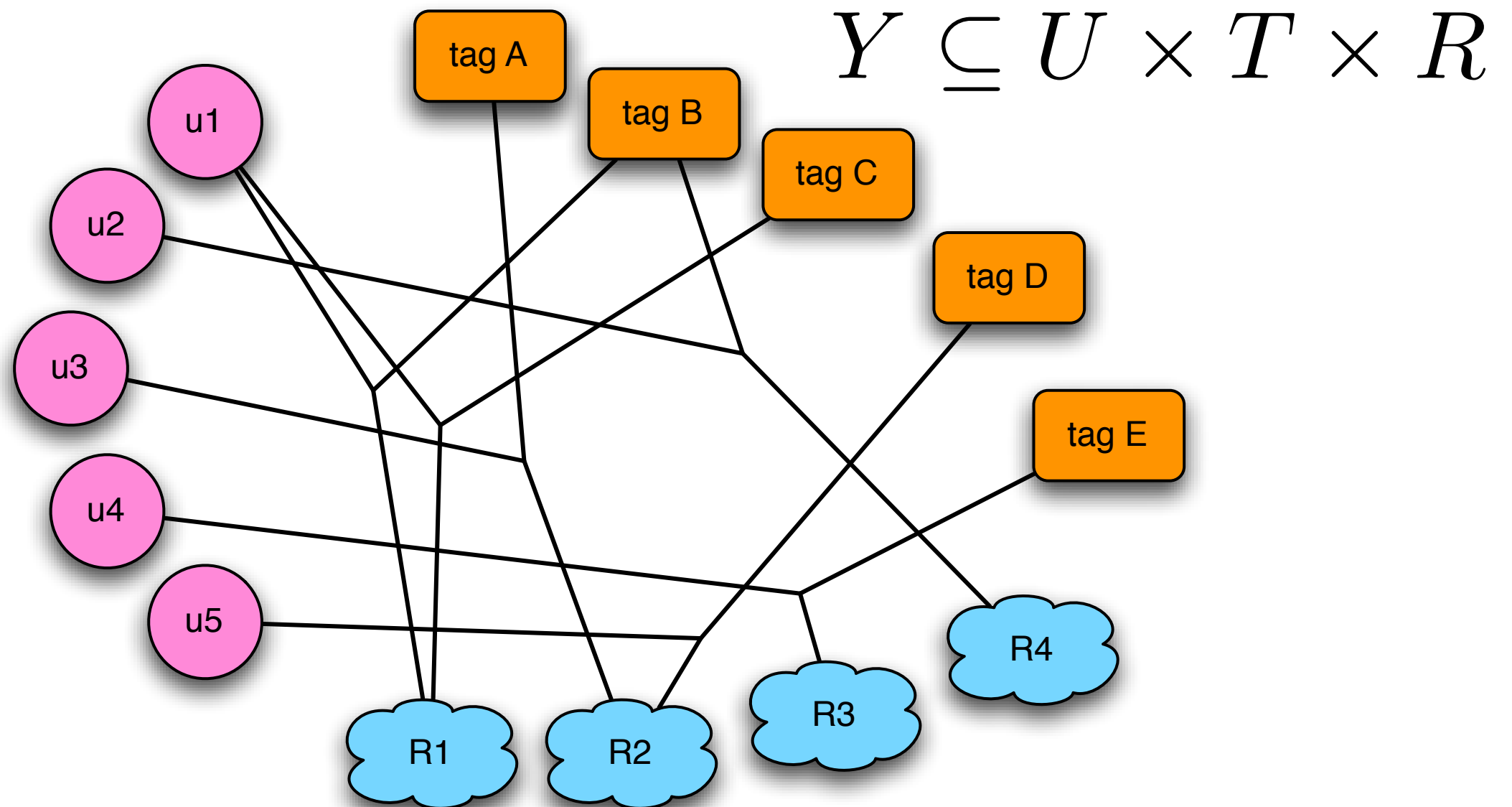
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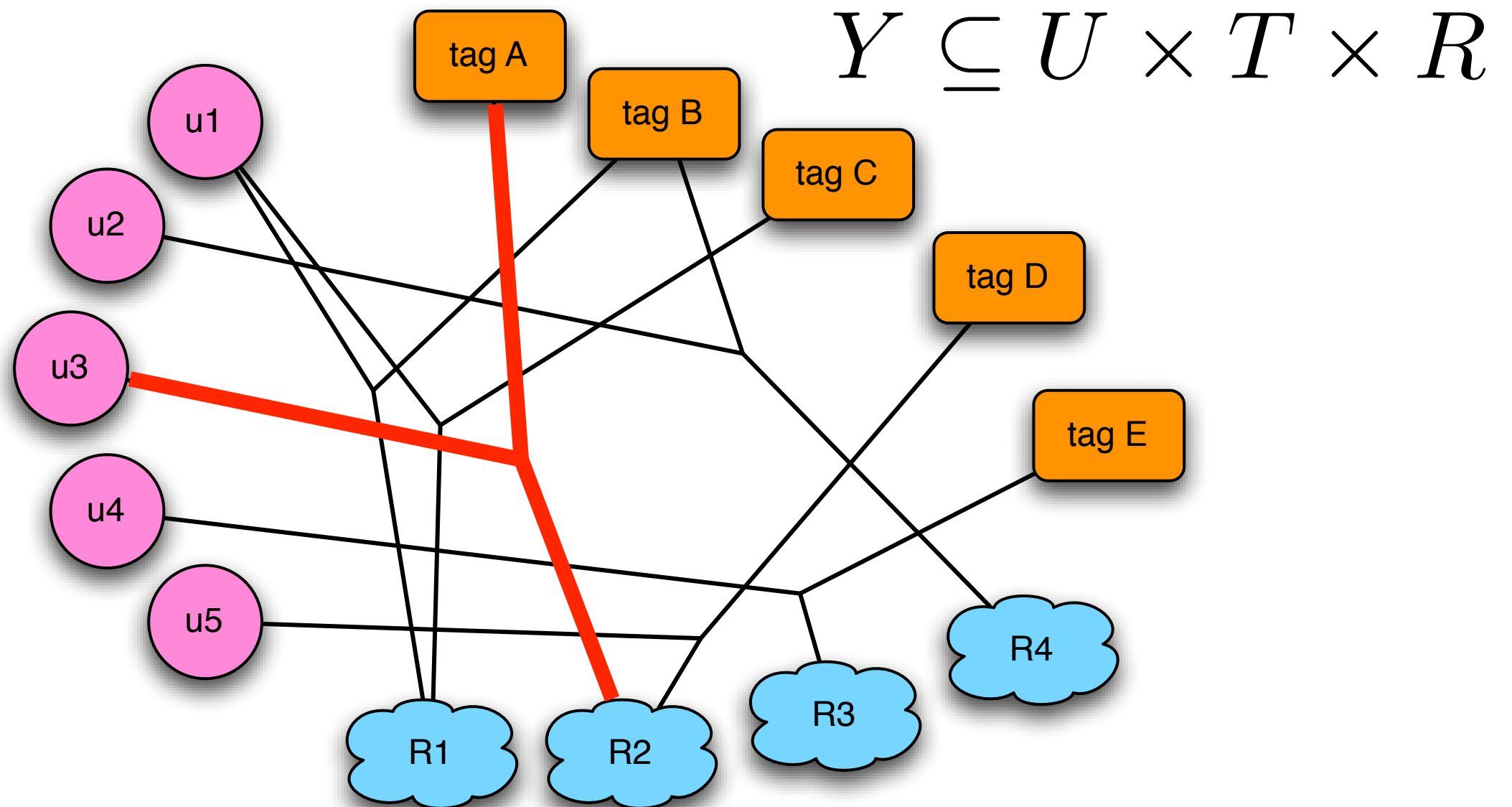
folksonomy structure

basic unit of information: (**user**, **resource**, **tag**)



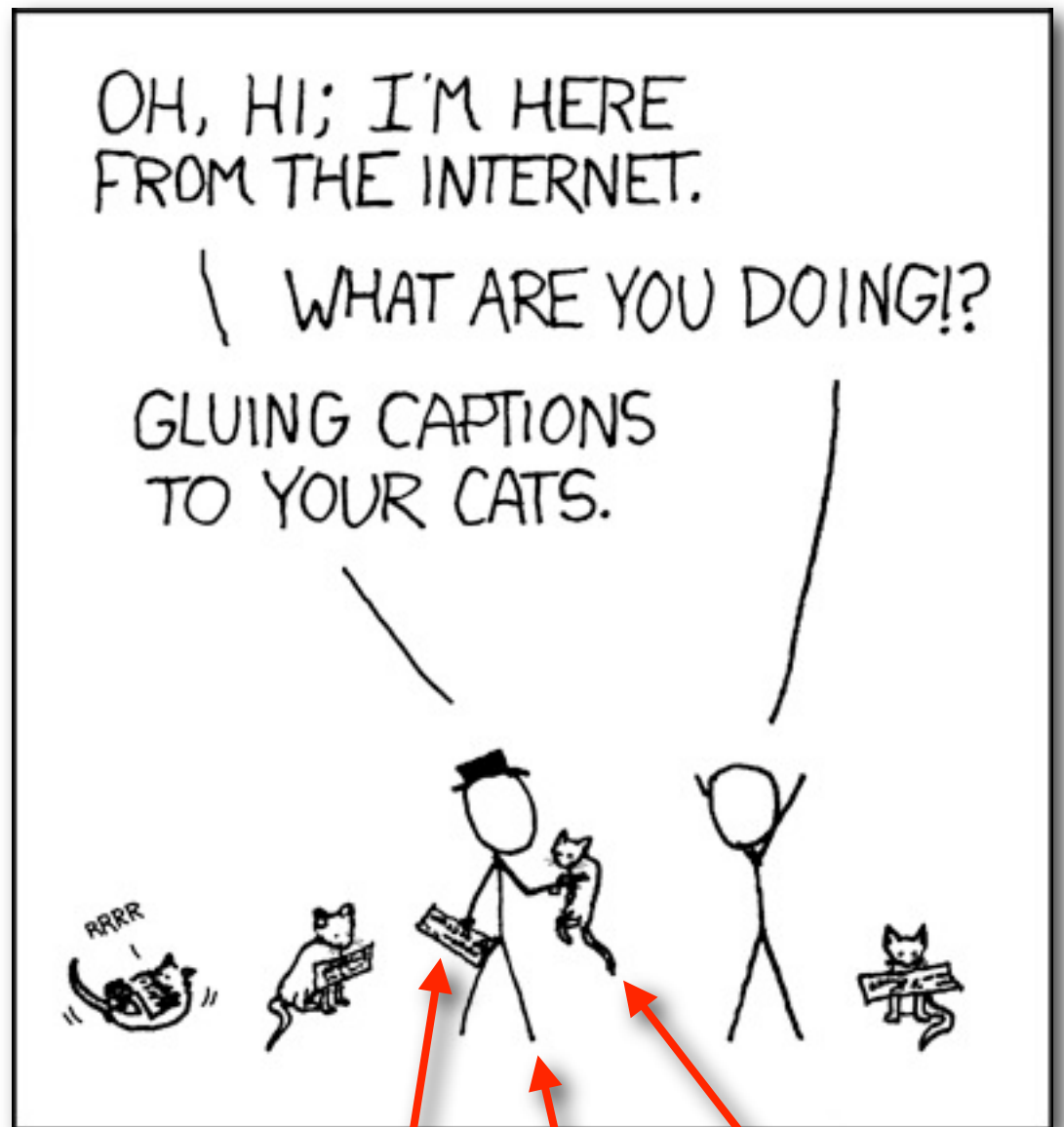
folksonomy structure

basic unit of information: (**user**, **resource**, **tag**)



hypergraph with 3-edges: T_{tur}

aspects of tagging



by R. Munroe

<http://xkcd.com>

tag

user

resource

aspects of tagging



by R. Munroe

<http://xkcd.com>

- * tagging is a **distributed process**
- * users bookmark and tag resources, with no explicit coordination
- * tagging has a small cognitive overhead
- * system contents can be browsed by tag
- * the system evolves in time: new resources, new users, new tags
- * there may be an underlying social network, explicitly exposed or not

aspects of tagging



by R. Munroe

<http://xkcd.com>

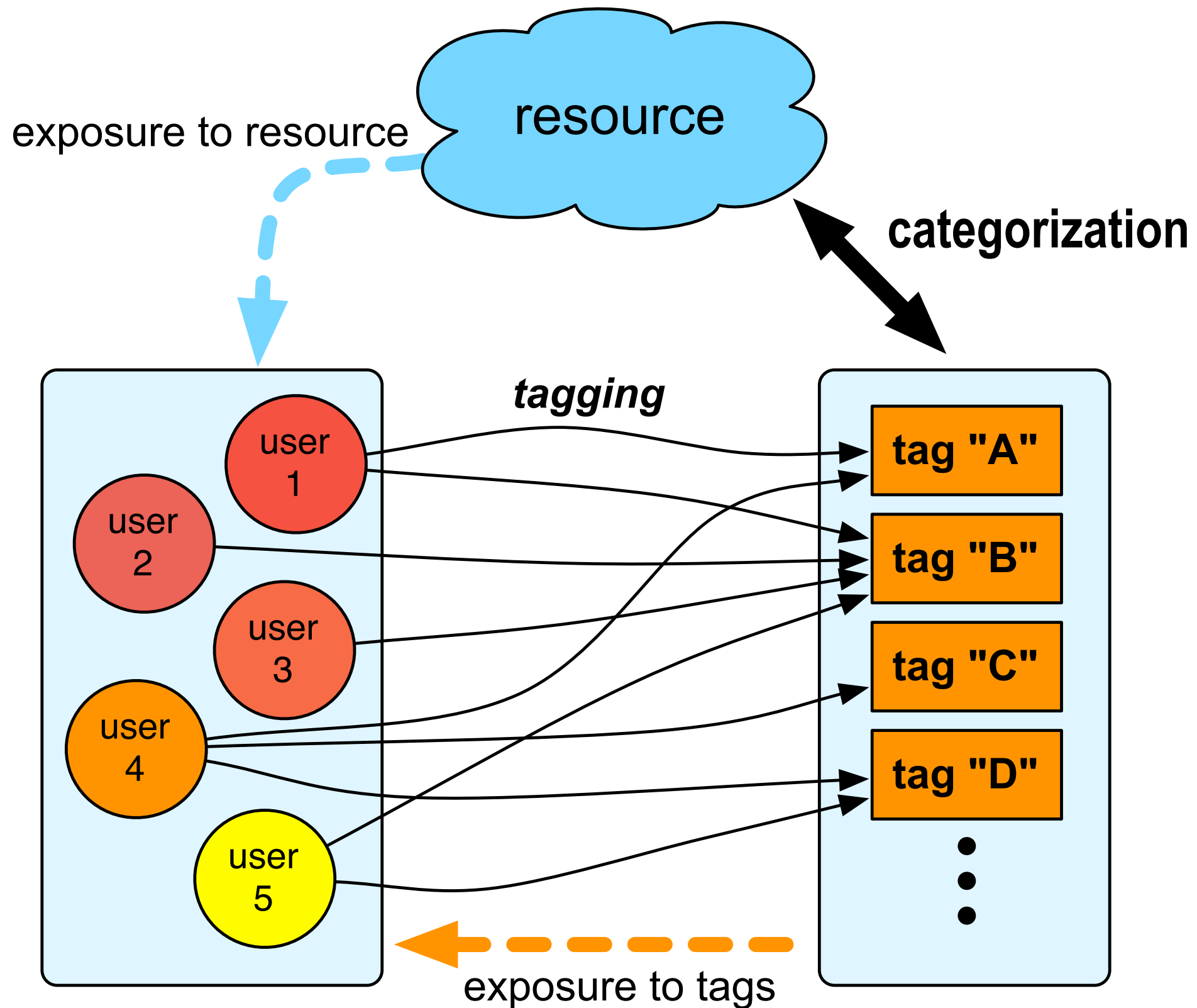
tag

user

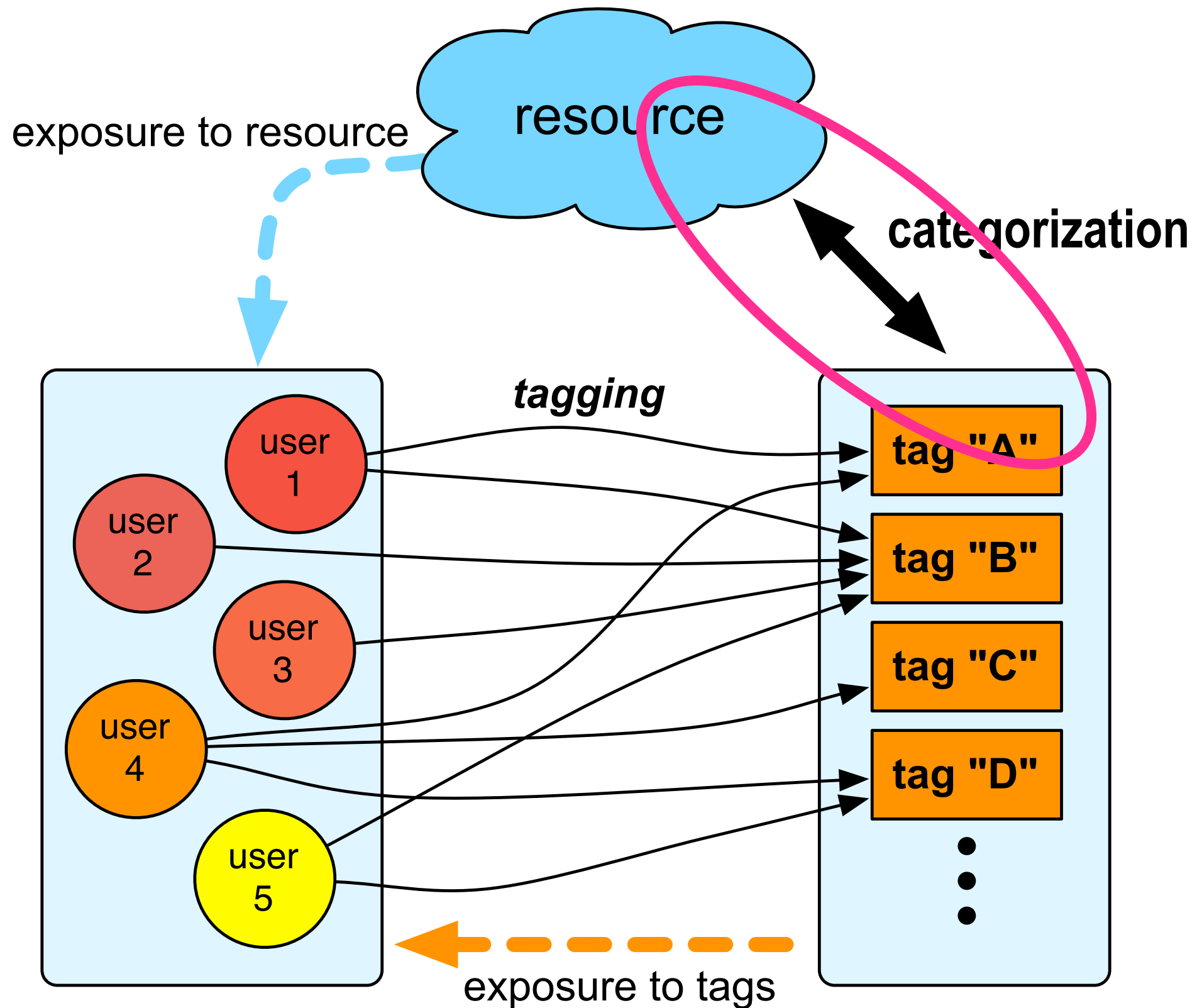
resource

- * tagging is a **distributed process**
- * users bookmark and tag resources, with no explicit coordination
- * tagging has a small cognitive overhead
- * system contents can be browsed by tag
- * the system evolves in time: new resources, new users, new tags
- * there may be an underlying social network, explicitly exposed or not
- * the behavior of users is “**selfish**”, but
- * they are **exposed to each other's activity**
- * they **share implicit knowledge** (language, cultural background)

aspects of tagging



aspects of tagging



the complexity

the complexity

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community level

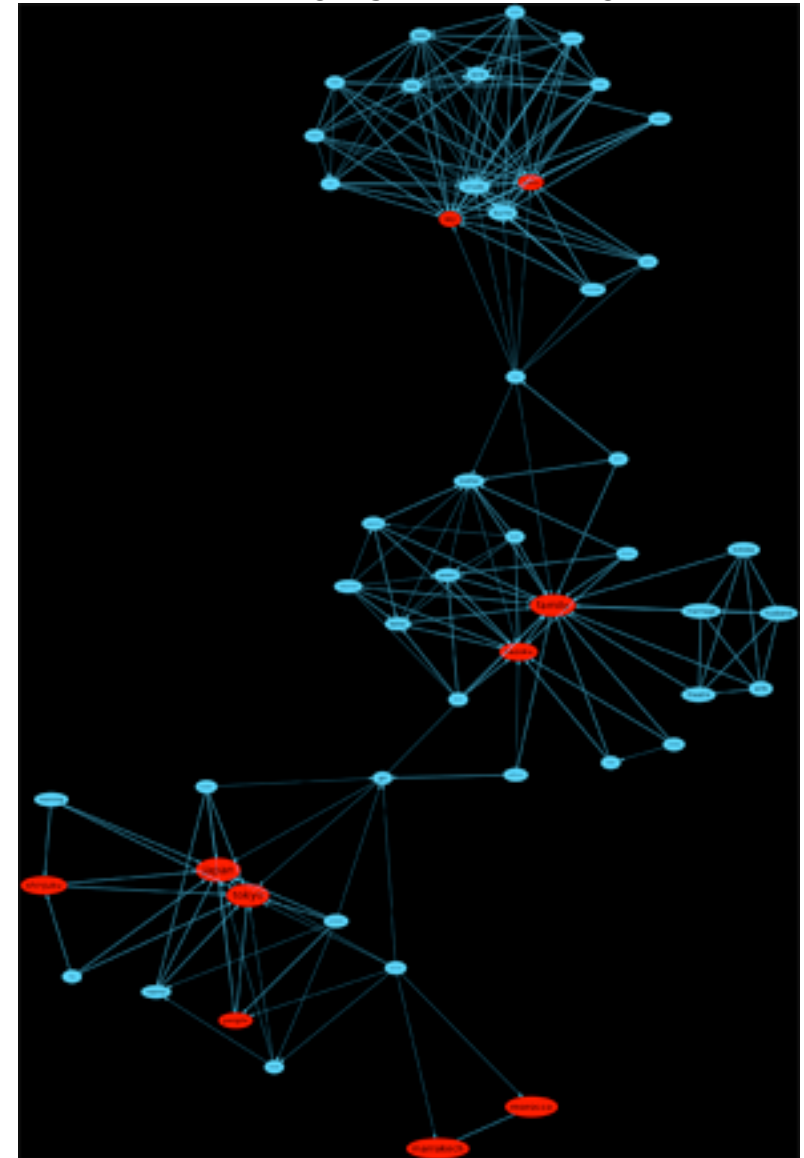
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community level

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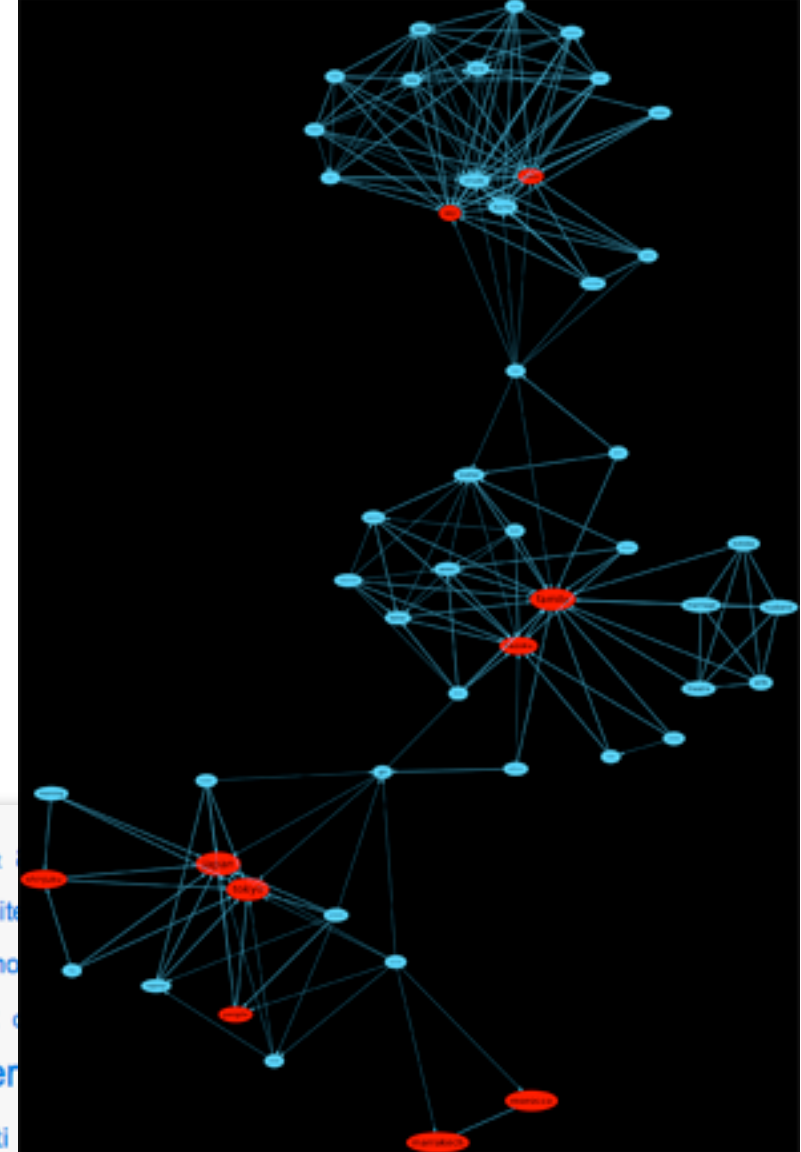
user level

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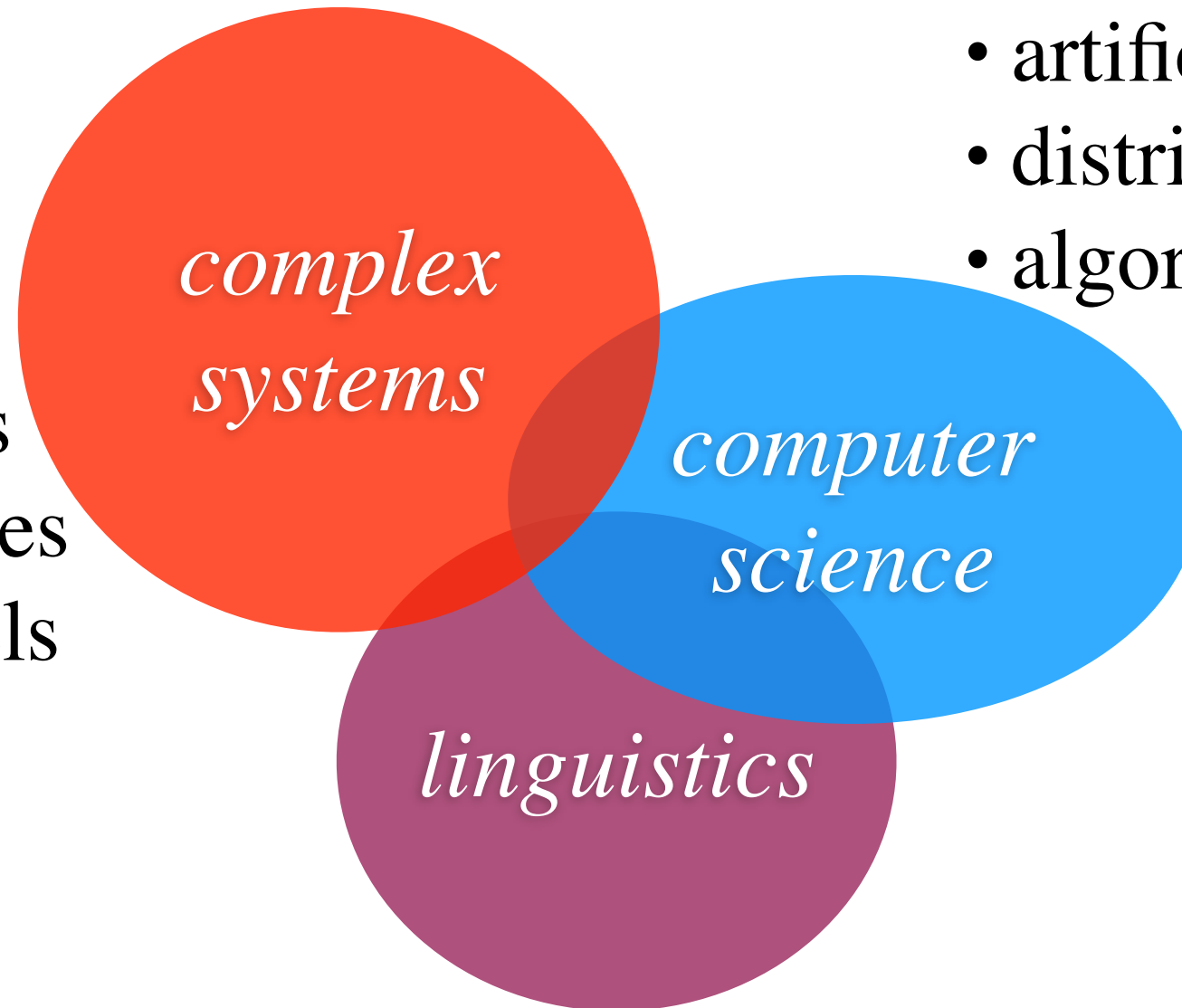
community level

user level

california cameraphone camping canada cand
china christmas church city clouds color concert
england europe fall family festival florida flower
friends fun garden geotagged germany girl graffiti
hiking holiday home honeymoon hongkong house india ireland italy japan july kids
lake landscape light london losangeles macro me mexico moblog mountain mountains
museum music nature new newyork newyorkcity newzealand night nyc
ocean october paris park party people photo portrait red river roadtrip rock rome
FOLKSONOMY
summer sunset sydney taiwan texas thailand thanksgiving tokyo toronto travel
tree trees trip uk urban usa vacation vancouver washington water
wedding white winter xmas yellow york zoo

research fields

- statistical physics
- self-organization
- pattern formation
- growth processes
- complex networks
- stochastic processes
- agent-based models

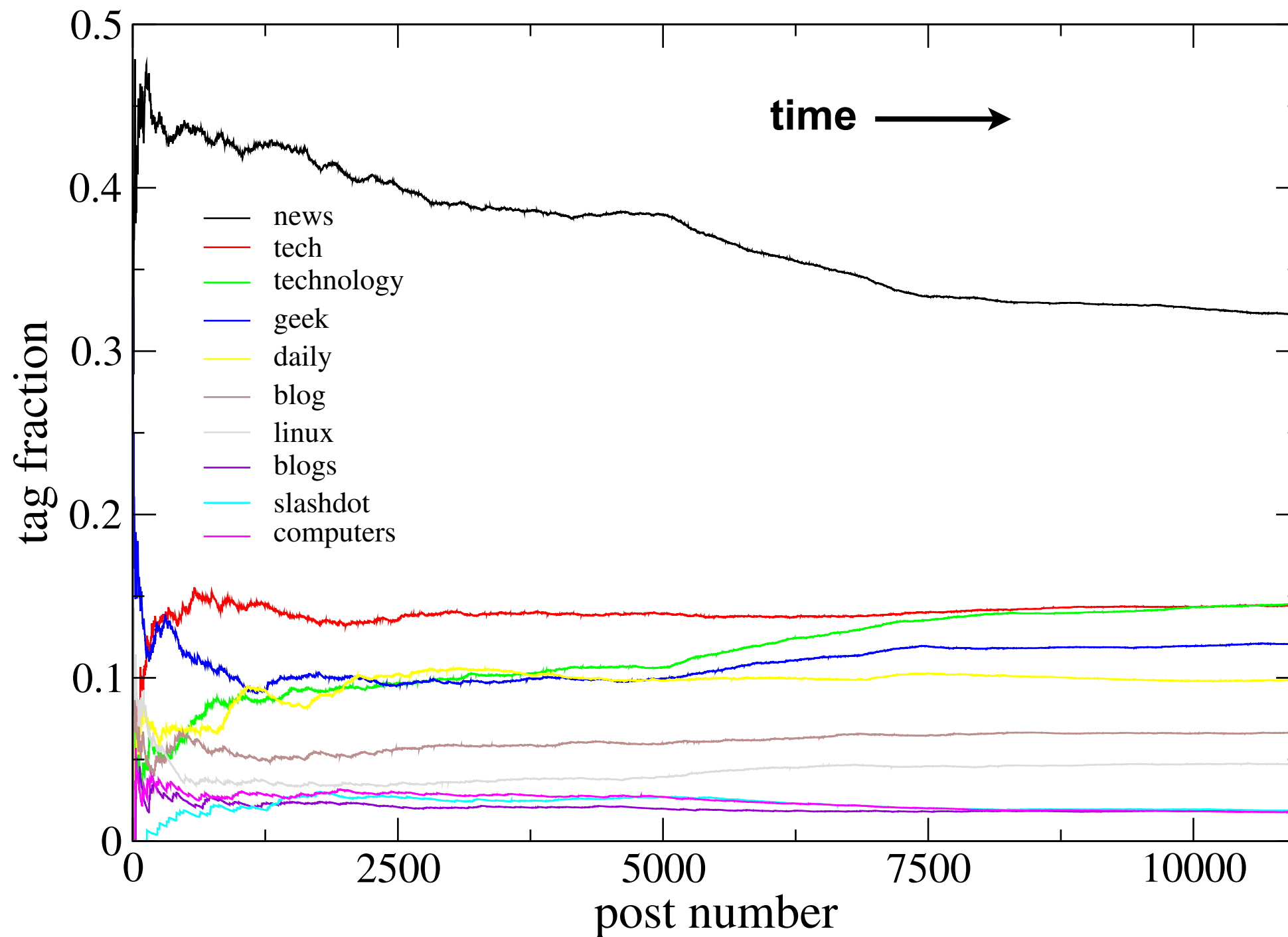


- information retrieval
- ontology learning
- artificial intelligence
- distributed systems
- algorithms

- semantic networks
- symbol grounding
- emergence of conventions

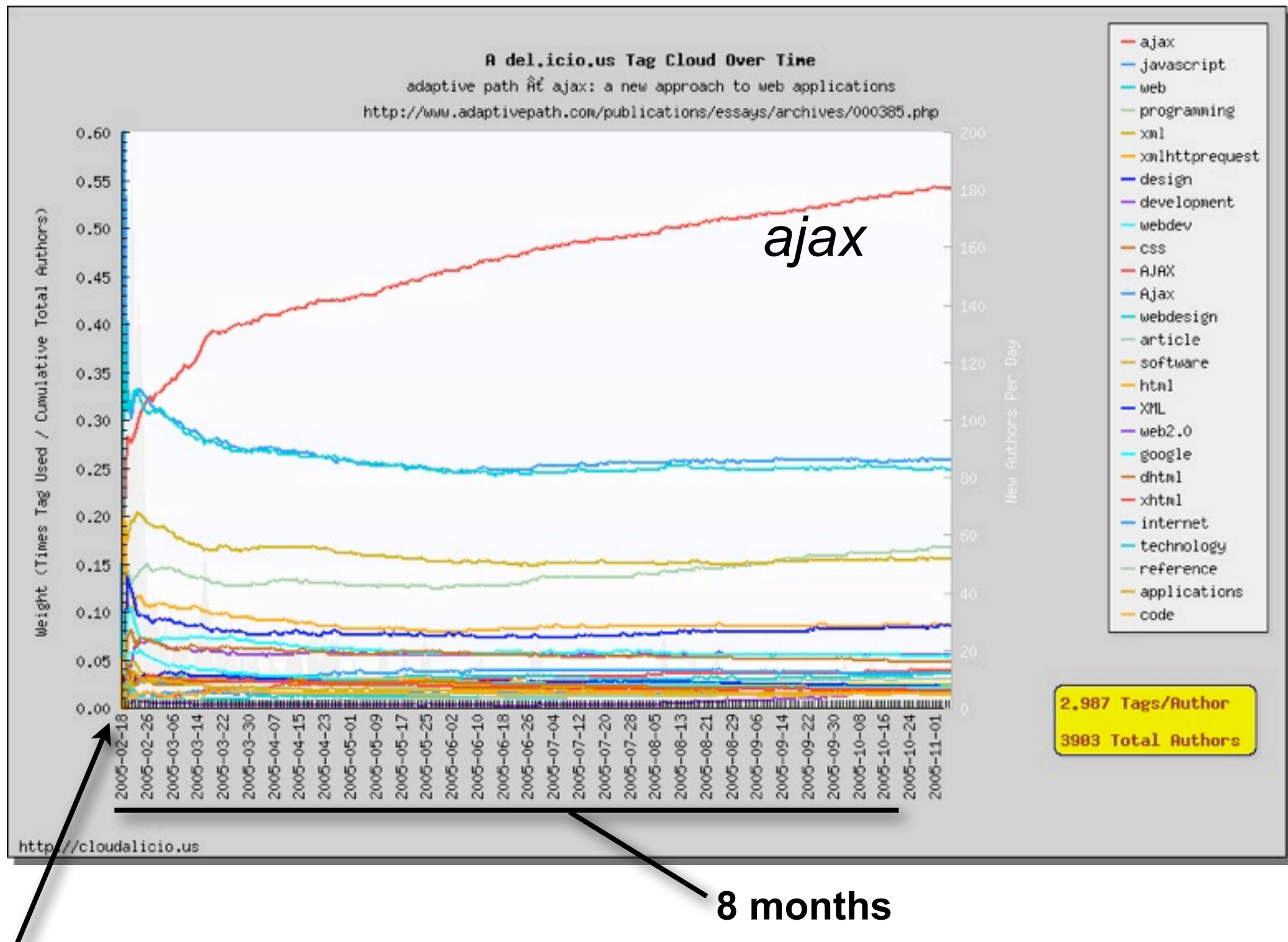
temporal dynamics and evolution

tag fractions



- “*rich get richer*” dynamics results in a **robust** categorization

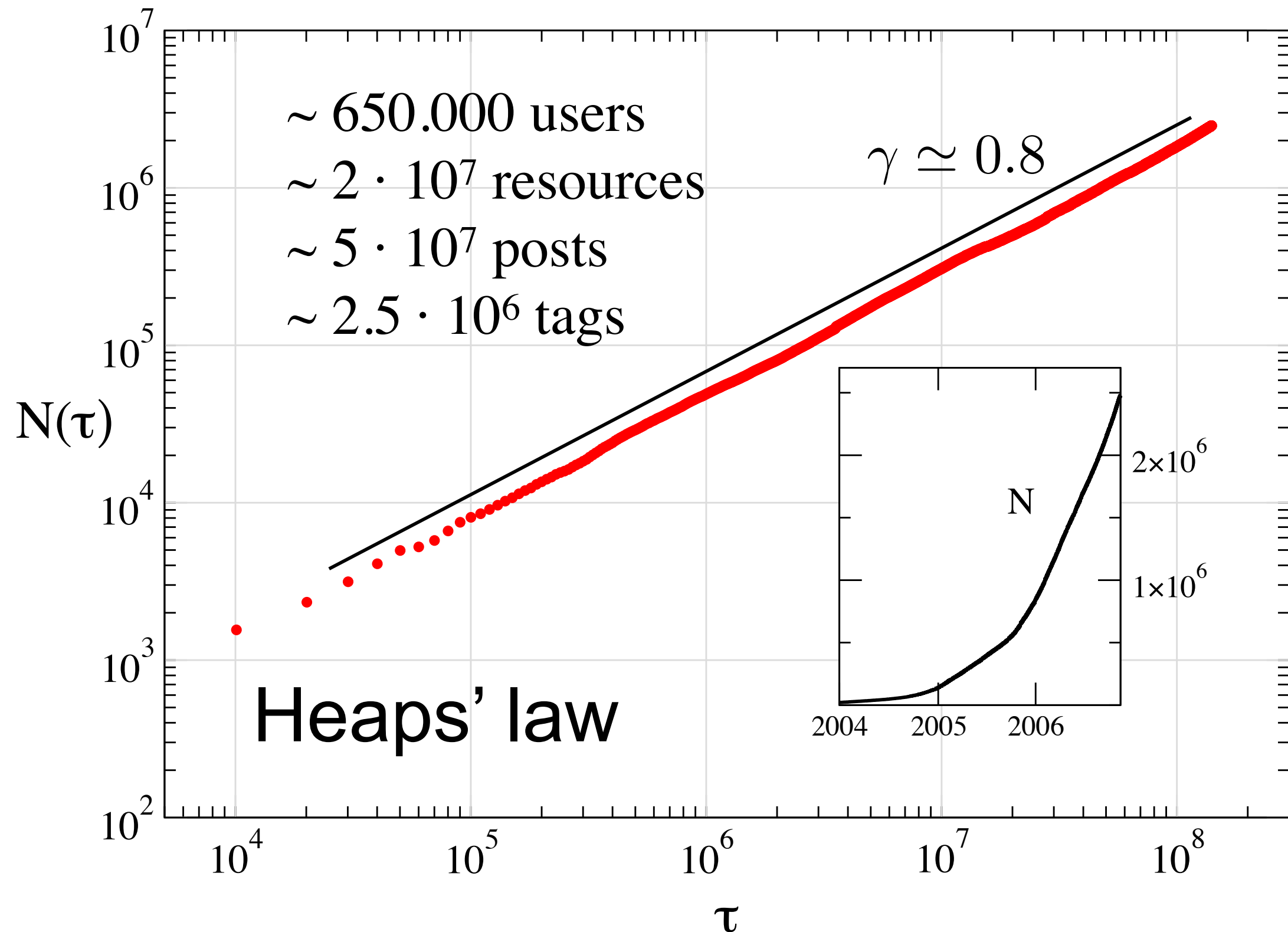
social adoption of a tag



article first introducing the term "ajax" gets published

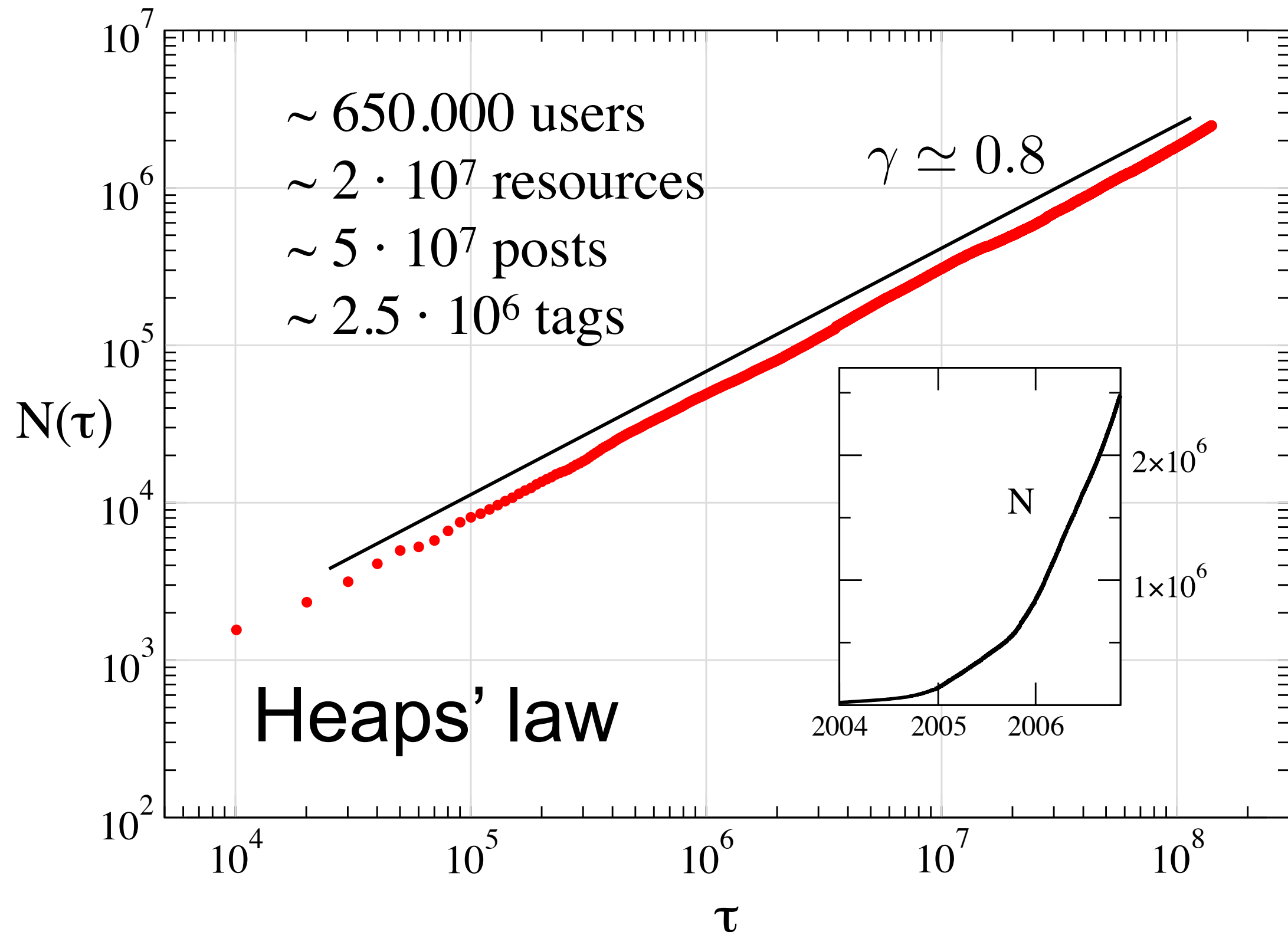
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global vocabulary growth

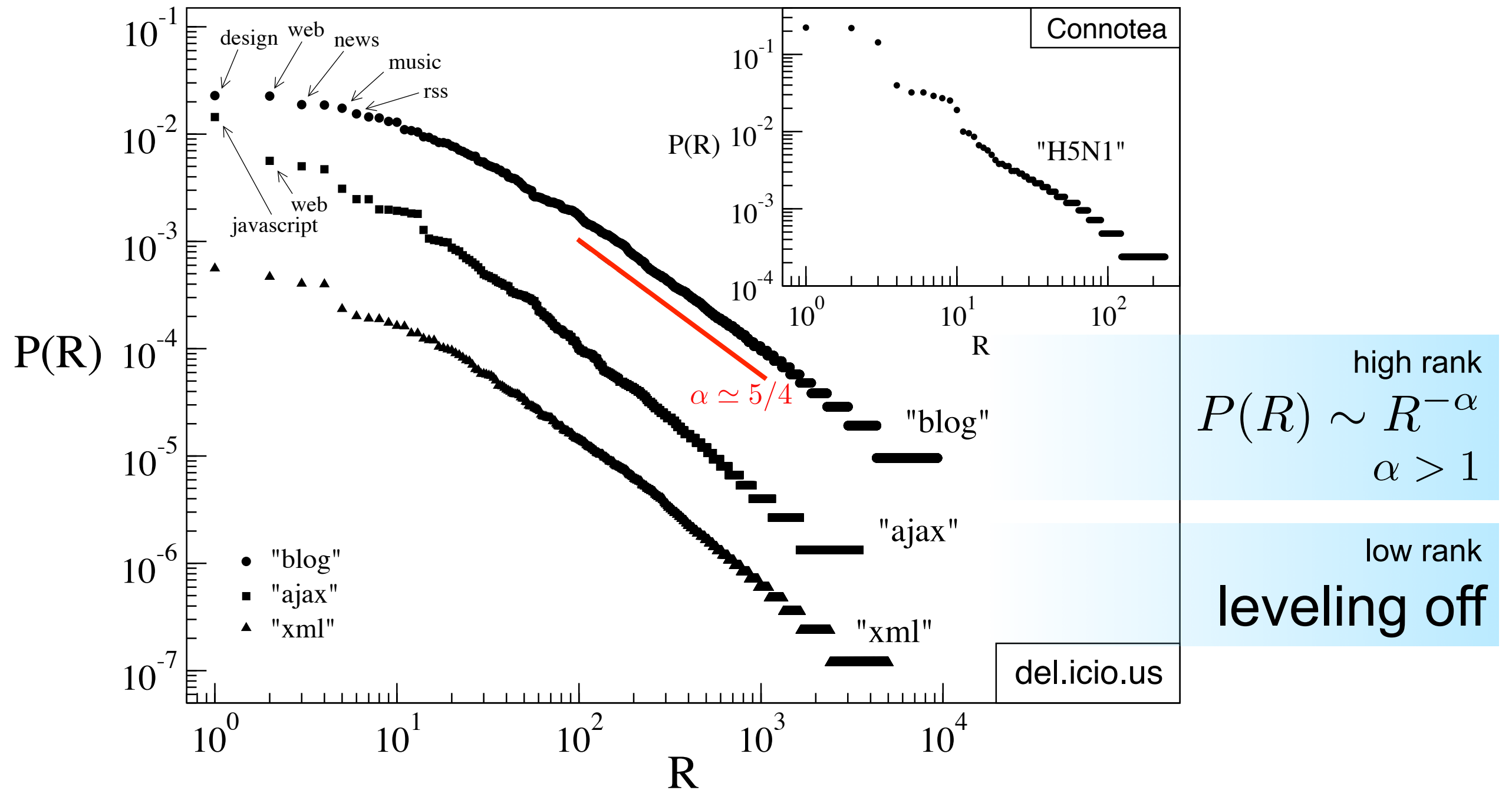


global vocabulary growth

~ natural language

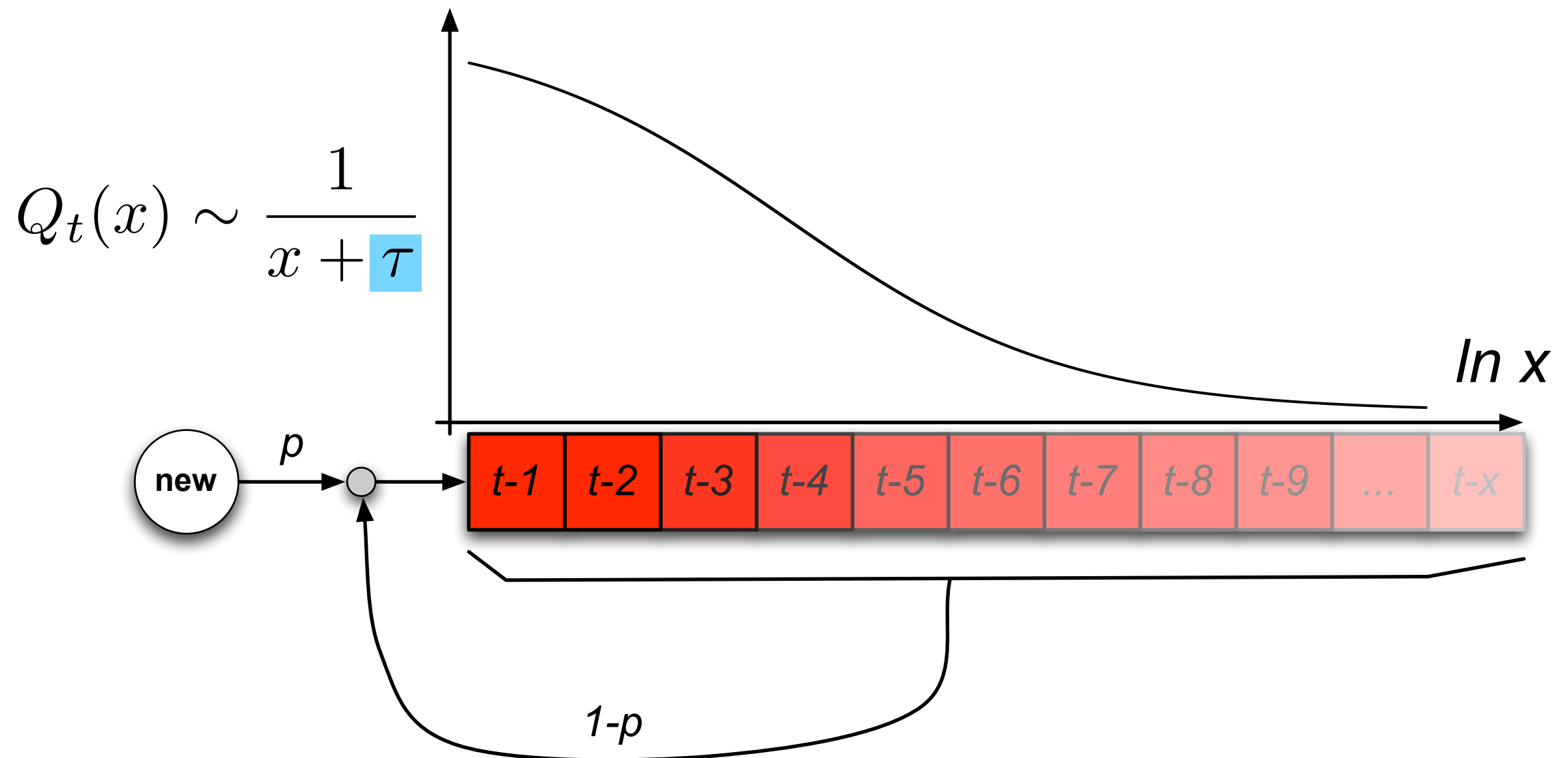


tag popularity: frequency-rank plot

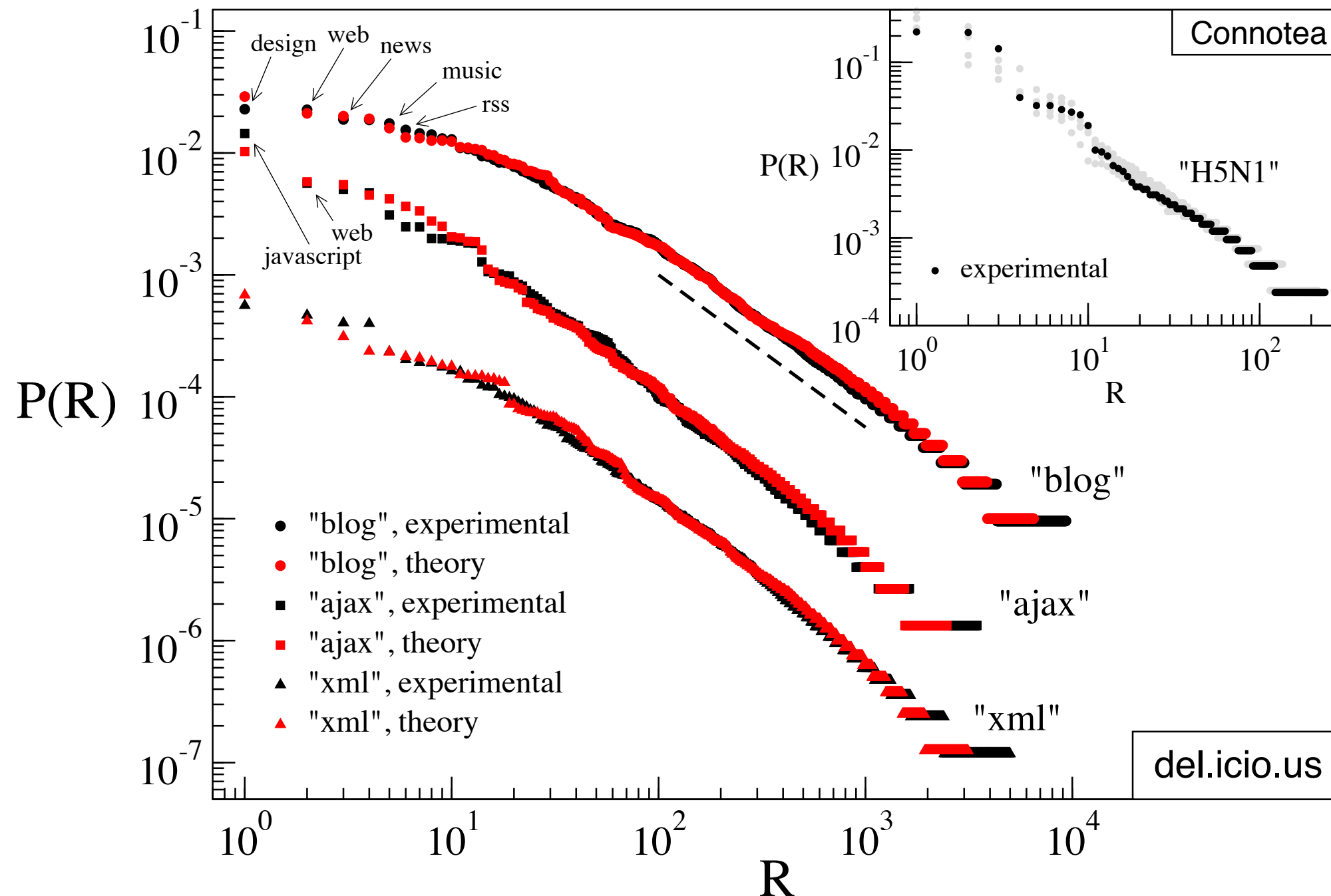


a Yule-Simon model with memory

- start with n_0 words
- at time t : with probability p , a new word is appended
- with probability $1-p$, a word is copied from position $t-x$
- x is distributed according to a fat-tailed memory kernel $Q(x)$



tag frequencies: data vs model



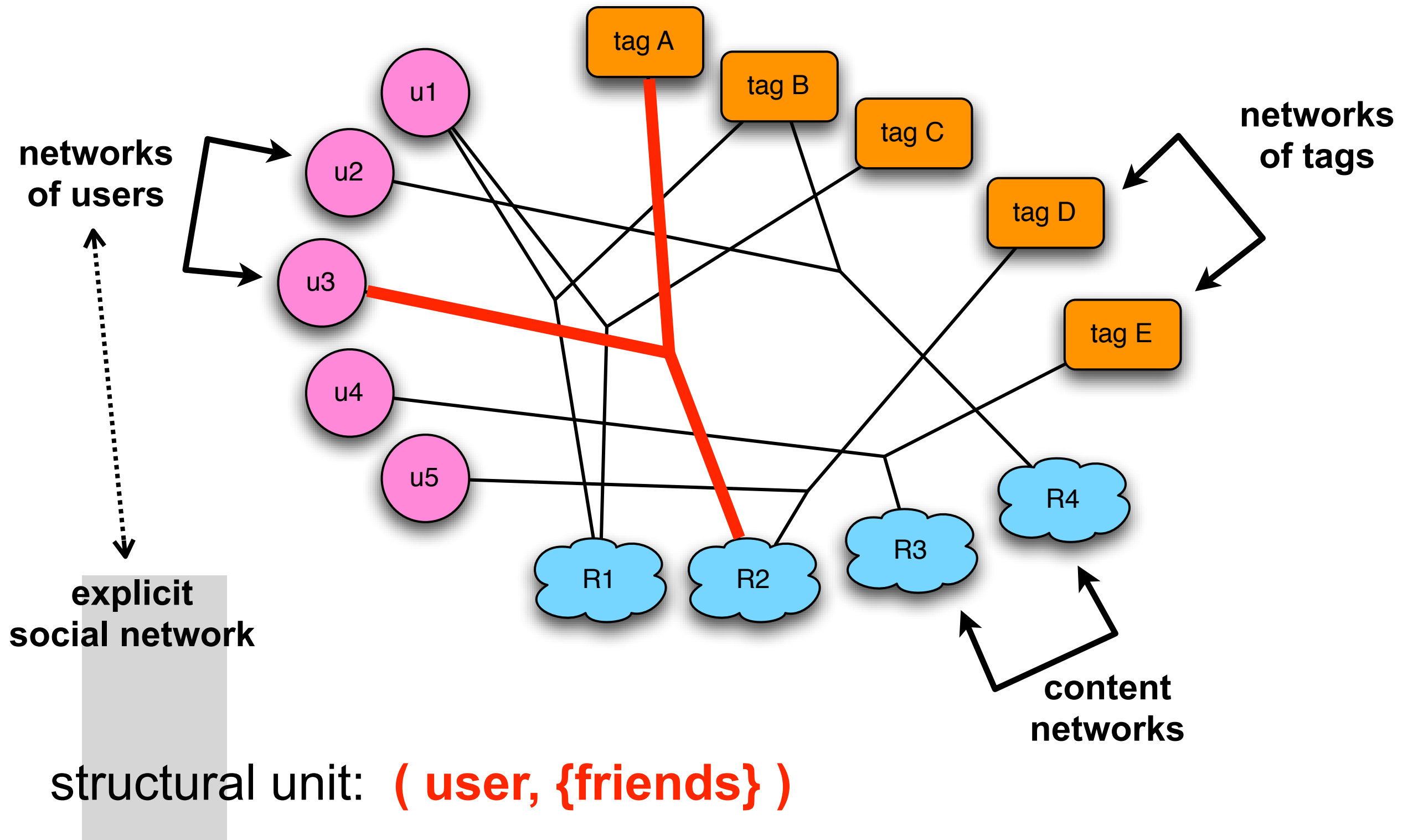
copying + skewed memory kernel + invention

➔ C. Cattuto, VL and L. Pietronero
"Semiotic dynamics and collaborative tagging"
PNAS 104, 1461 (2007)

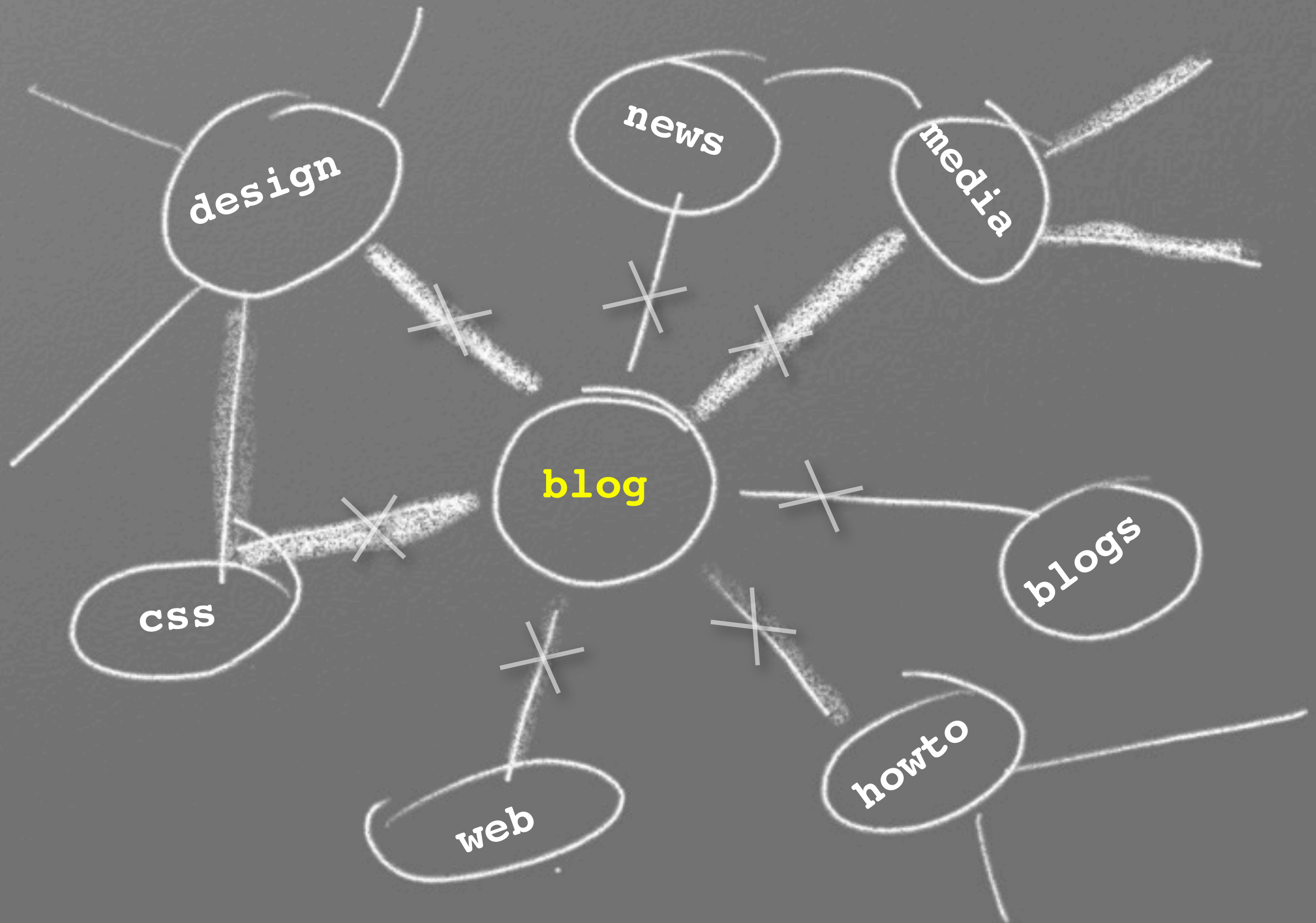
structural properties

social linking

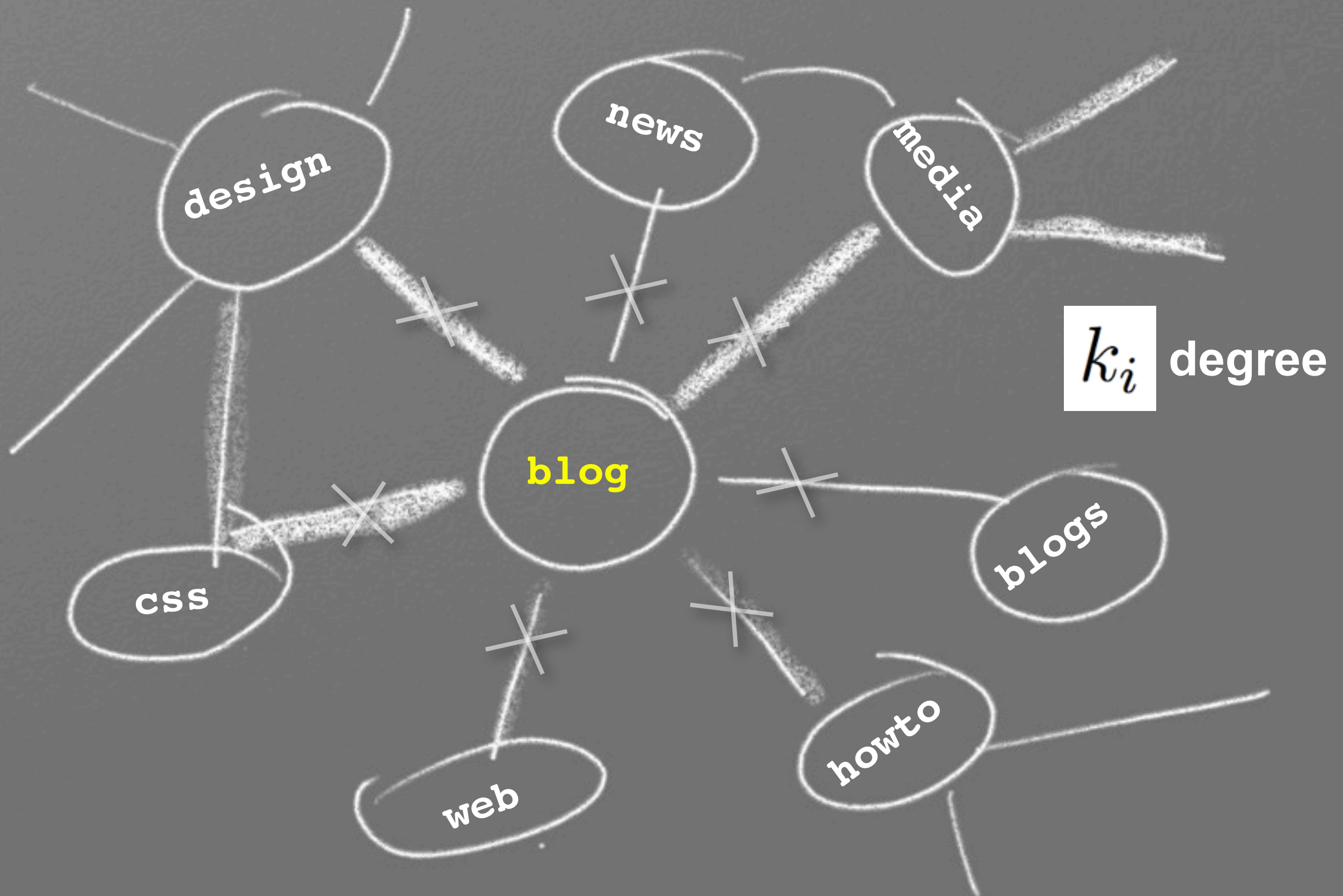
structural unit: (user, content, metadata)



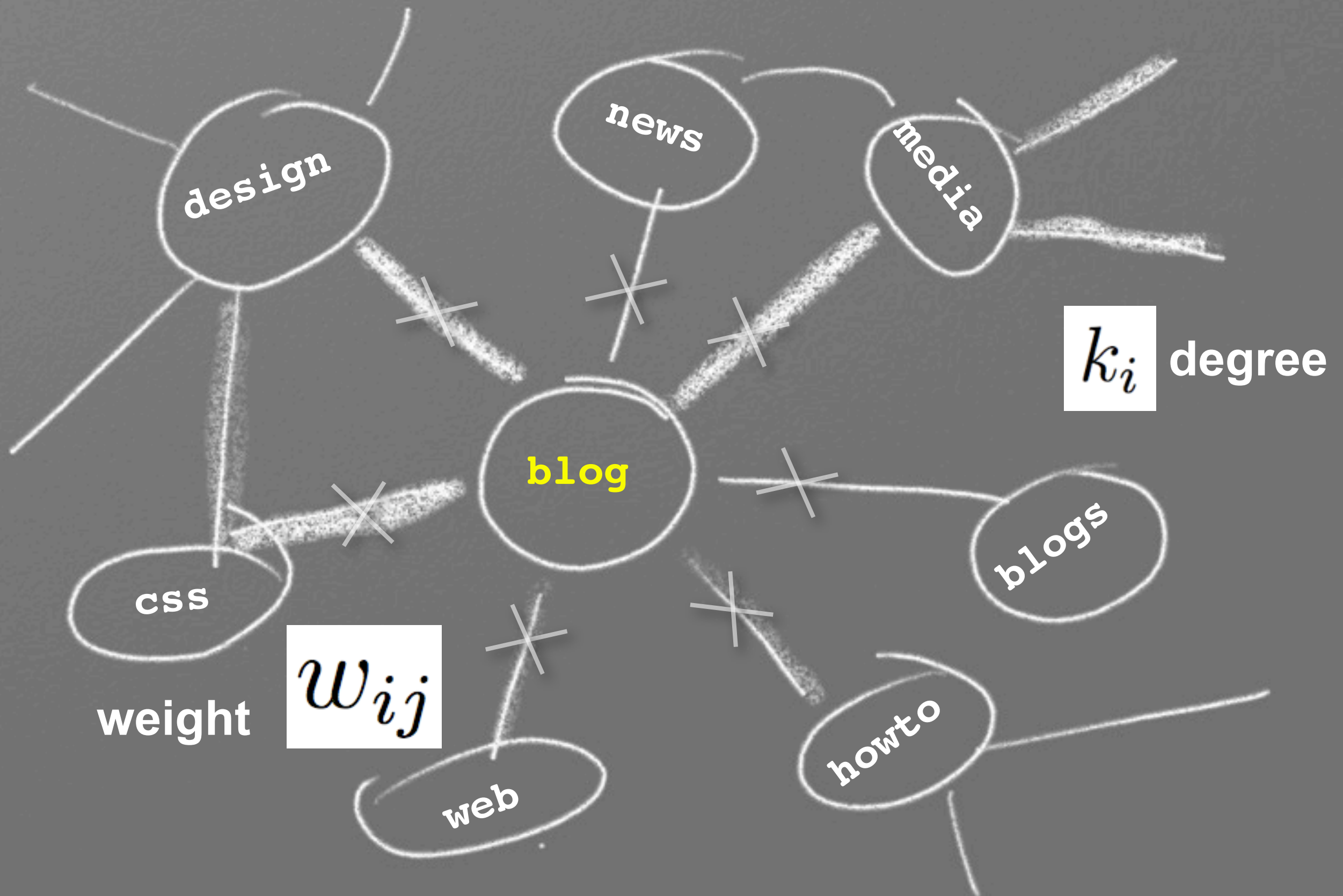
network of tag co-occurrence



network of tag co-occurrence



network of tag co-occurrence



network of tag co-occurrence

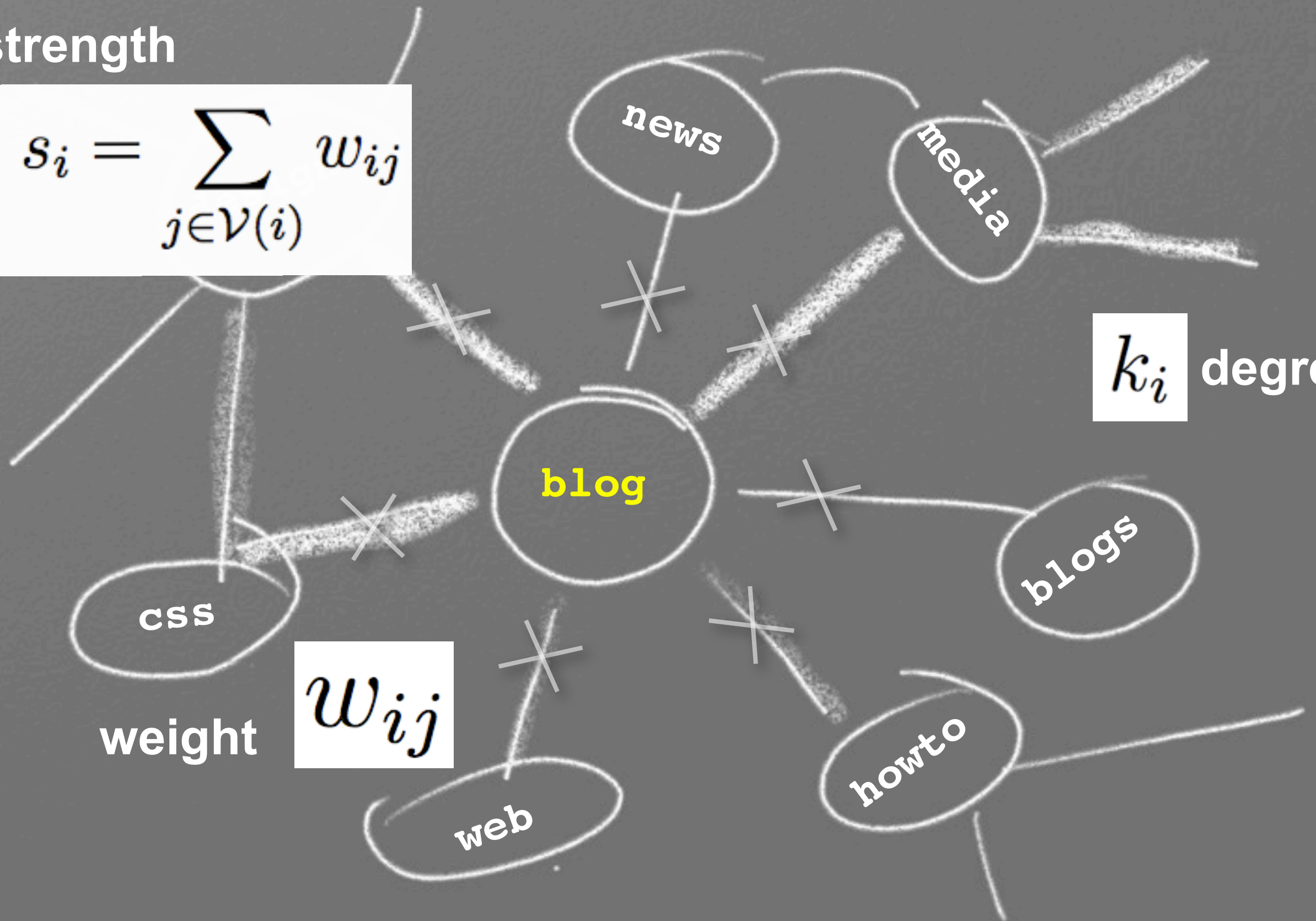
strength

$$s_i = \sum_{j \in \mathcal{V}(i)} w_{ij}$$

k_i degree

weight

w_{ij}



networks of tag co-occurrence

networks of tag co-occurrence

$$T_{tur} \quad \longrightarrow \quad C_{tt'} = \sum_{u,r} T_{tur} T_{t'ur}$$

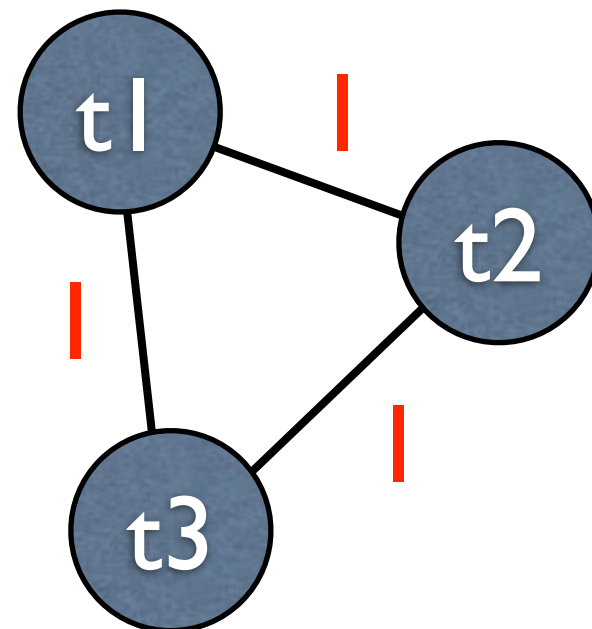
weighted

networks of tag co-occurrence

$$T_{tur} \longrightarrow C_{tt'} = \sum_{u,r} T_{tur} T_{t'ur}$$

weighted

(u1, r1, {t1, t2, t3})



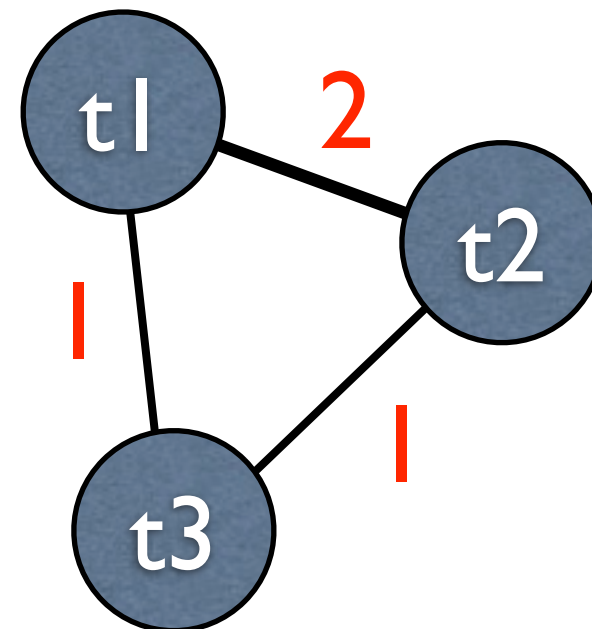
networks of tag co-occurrence

$$T_{tur} \longrightarrow C_{tt'} = \sum_{u,r} T_{tur} T_{t'ur}$$

weighted

(u1, r1, {t1, t2, t3})

(u2, r2, {t1, t2})



networks of tag co-occurrence

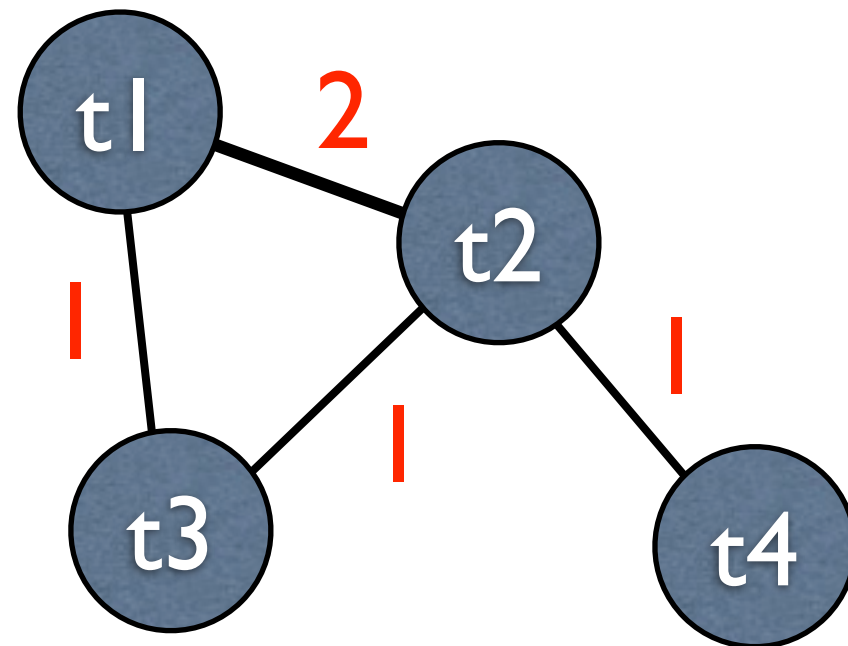
$$T_{tur} \longrightarrow C_{tt'} = \sum_{u,r} T_{tur} T_{t'ur}$$

weighted

(u1, r1, {t1, t2, t3})

(u2, r2, {t1, t2})

(u3, r3, {t2, t4})



networks of tag co-occurrence

$$T_{tur} \longrightarrow C_{tt'} = \sum_{u,r} T_{tur} T_{t'ur}$$

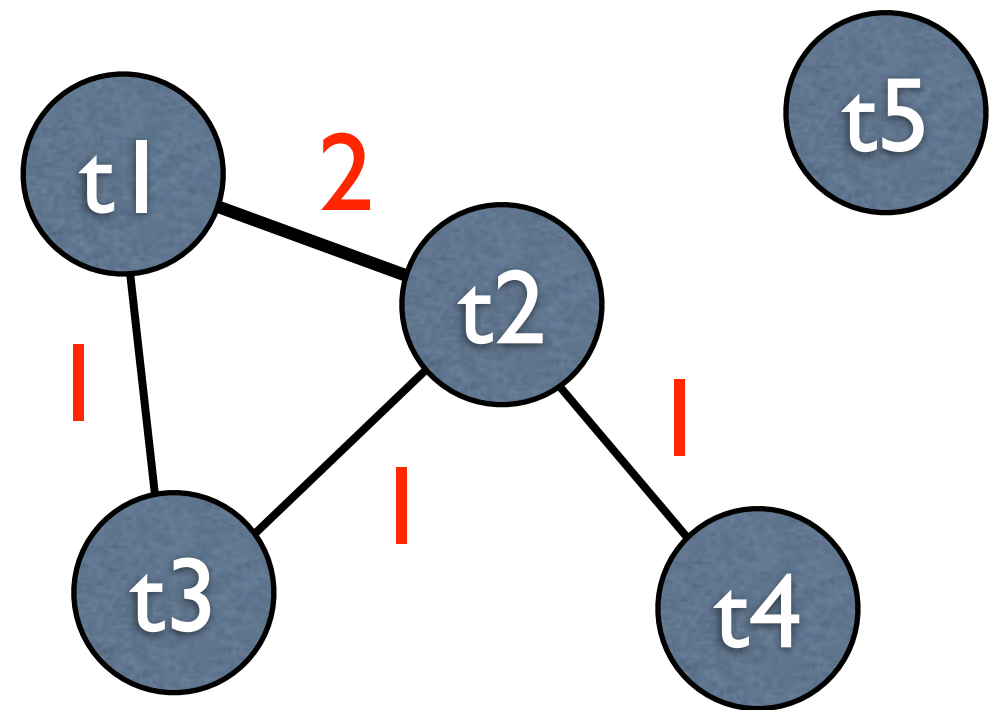
weighted

(u1, r1, {t1, t2, t3})

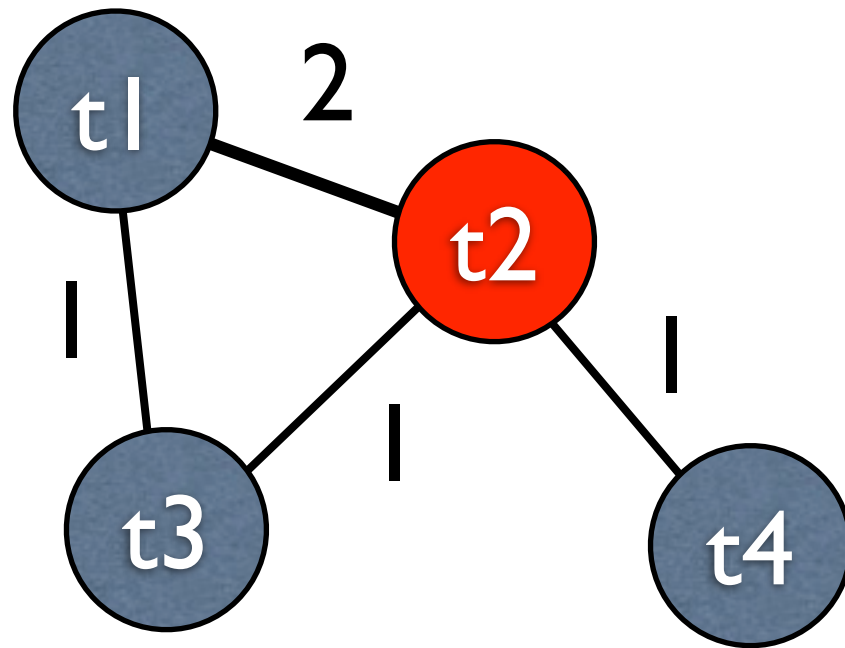
(u2, r2, {t1, t2})

(u3, r3, {t2, t4})

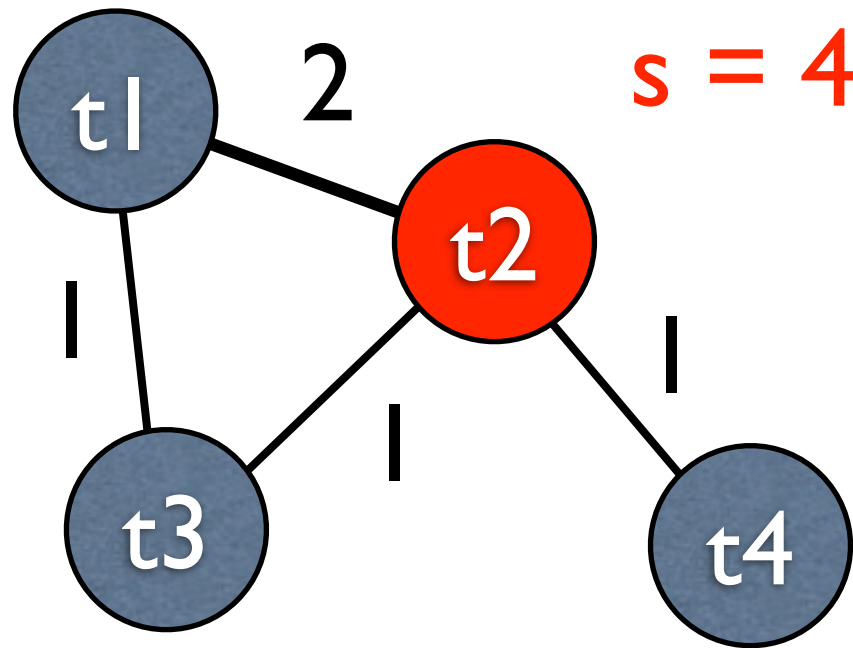
(u4, r4, {t5})



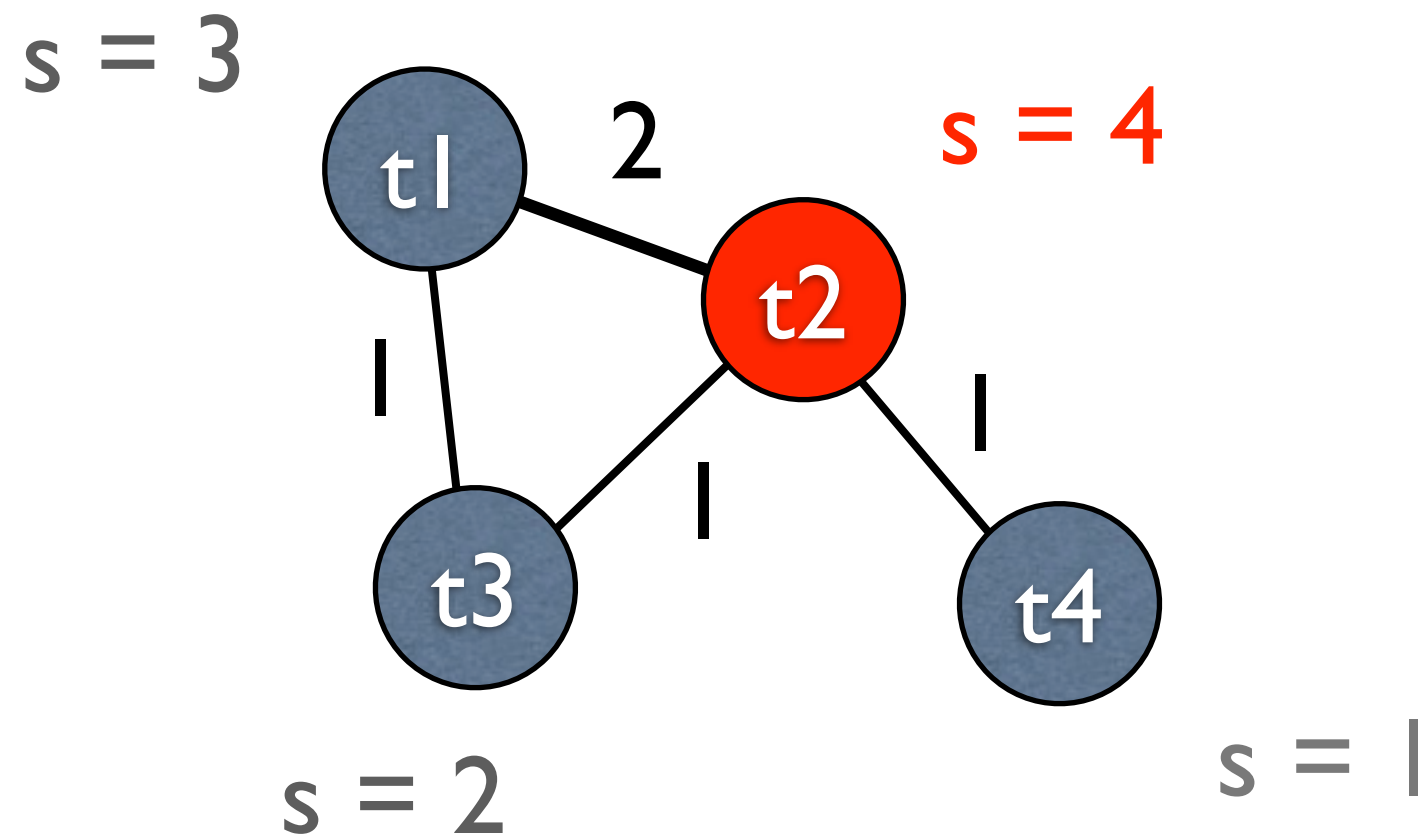
networks of tag co-occurrence: nearest-neighbor average strength



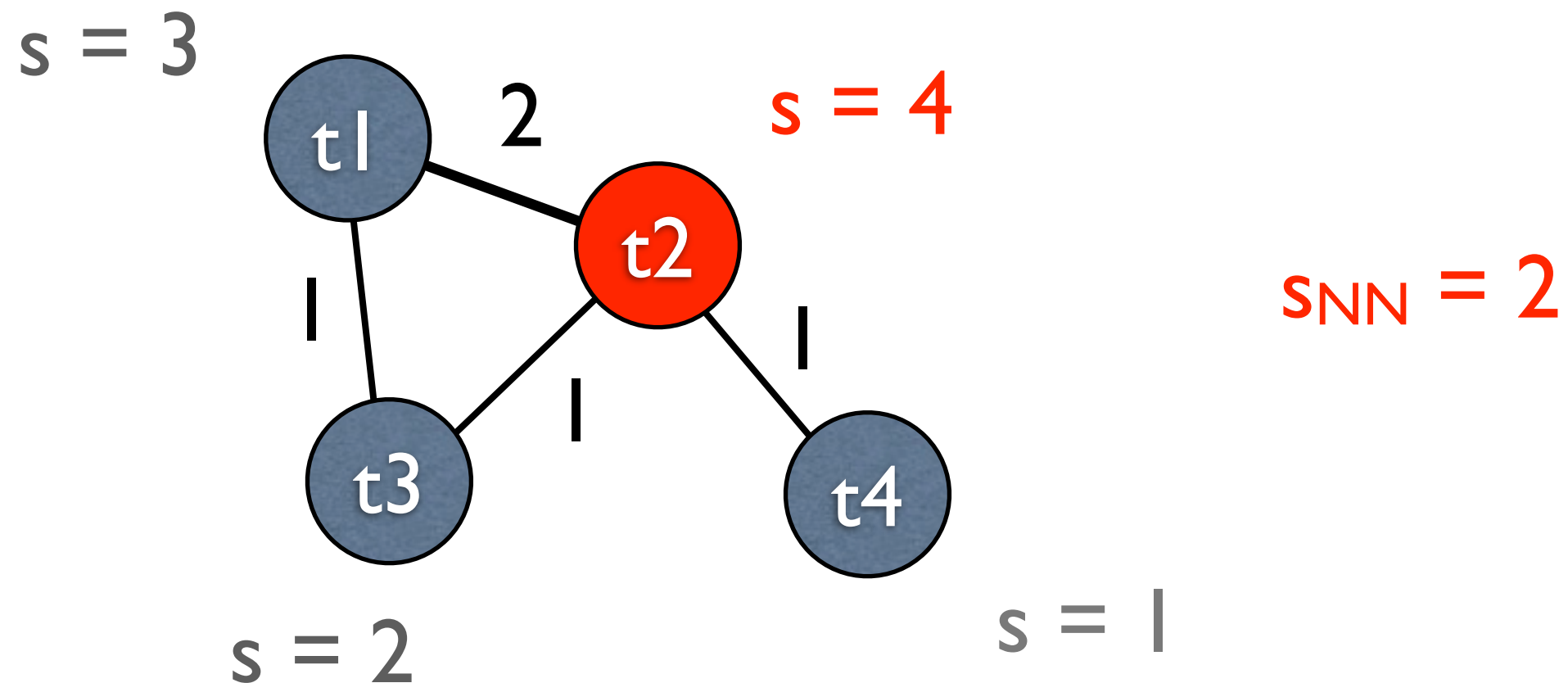
networks of tag co-occurrence: nearest-neighbor average strength



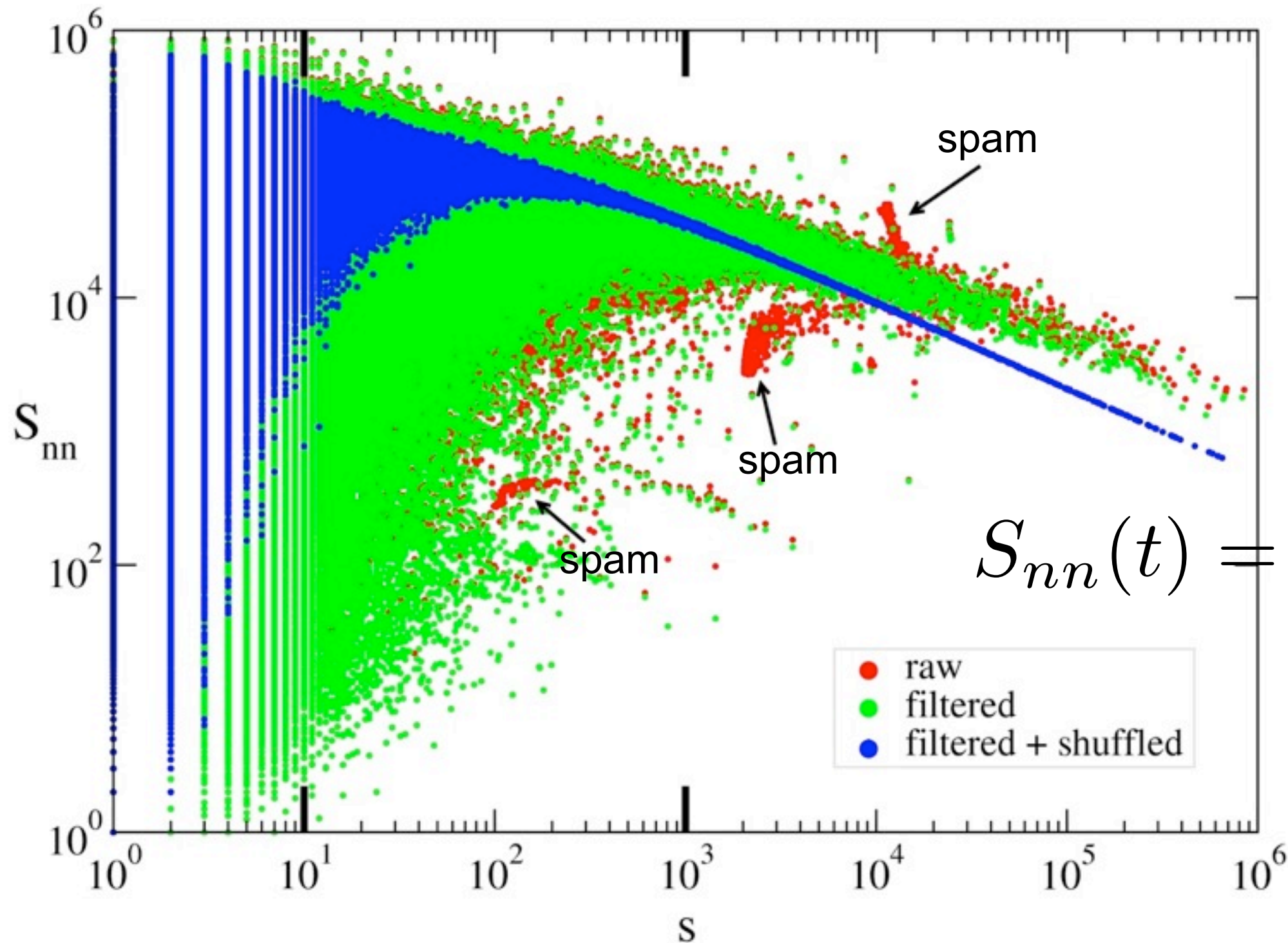
networks of tag co-occurrence: nearest-neighbor average strength



networks of tag co-occurrence: nearest-neighbor average strength



networks of tag co-occurrence



$$S_{nn}(t) = \frac{1}{k_i} \sum_{j=1}^{k_i} S_t$$


modelling structural properties

- ➔ C. Cattuto, A. Barrat, A. Baldassarri, G. Schehr and VL
“Collective dynamics of social annotation”
PNAS 106, 10511 (2009)



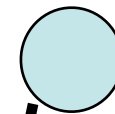


fruit

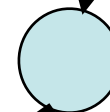
A diagram consisting of a light blue circle with a thin black outline. A solid black arrow originates from the bottom of the circle and points diagonally downwards and to the left.

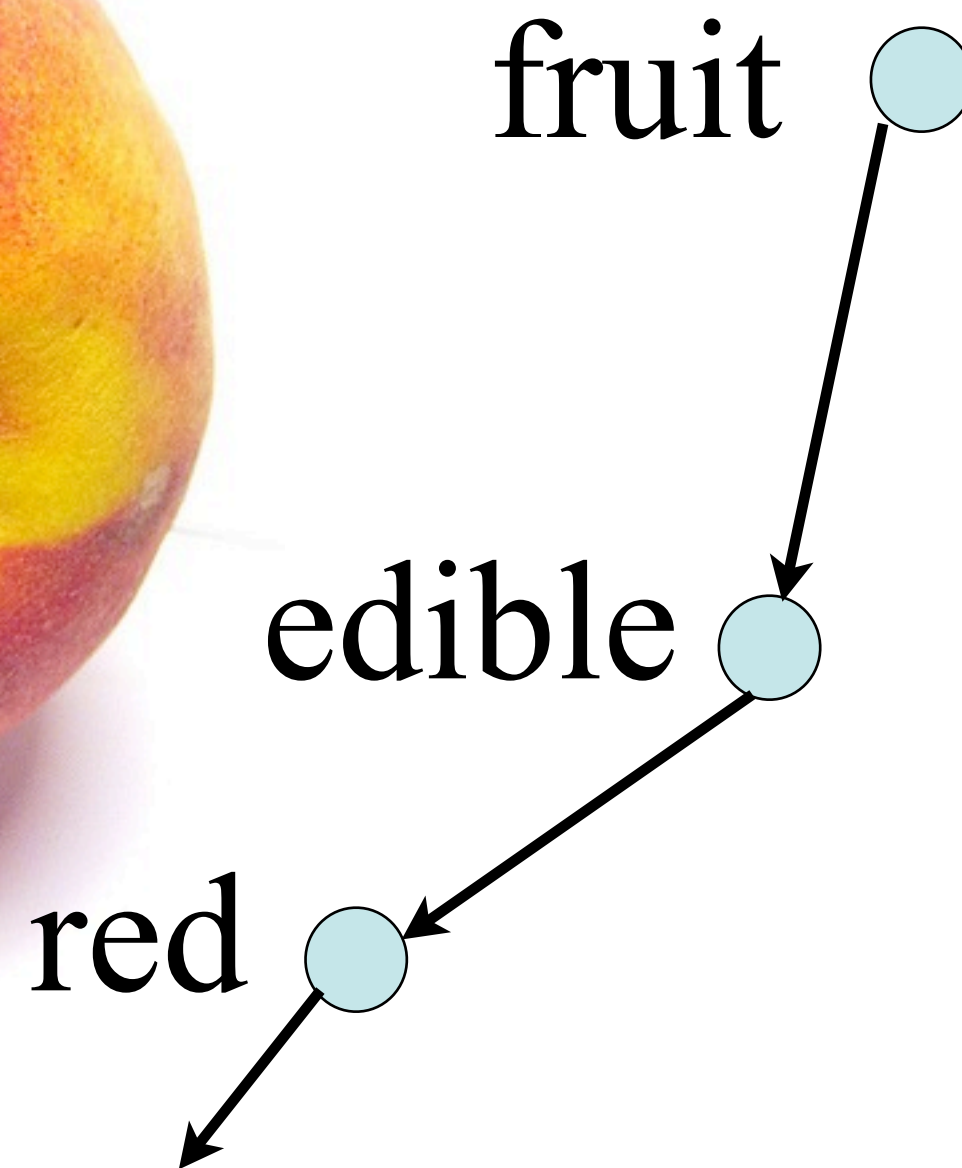


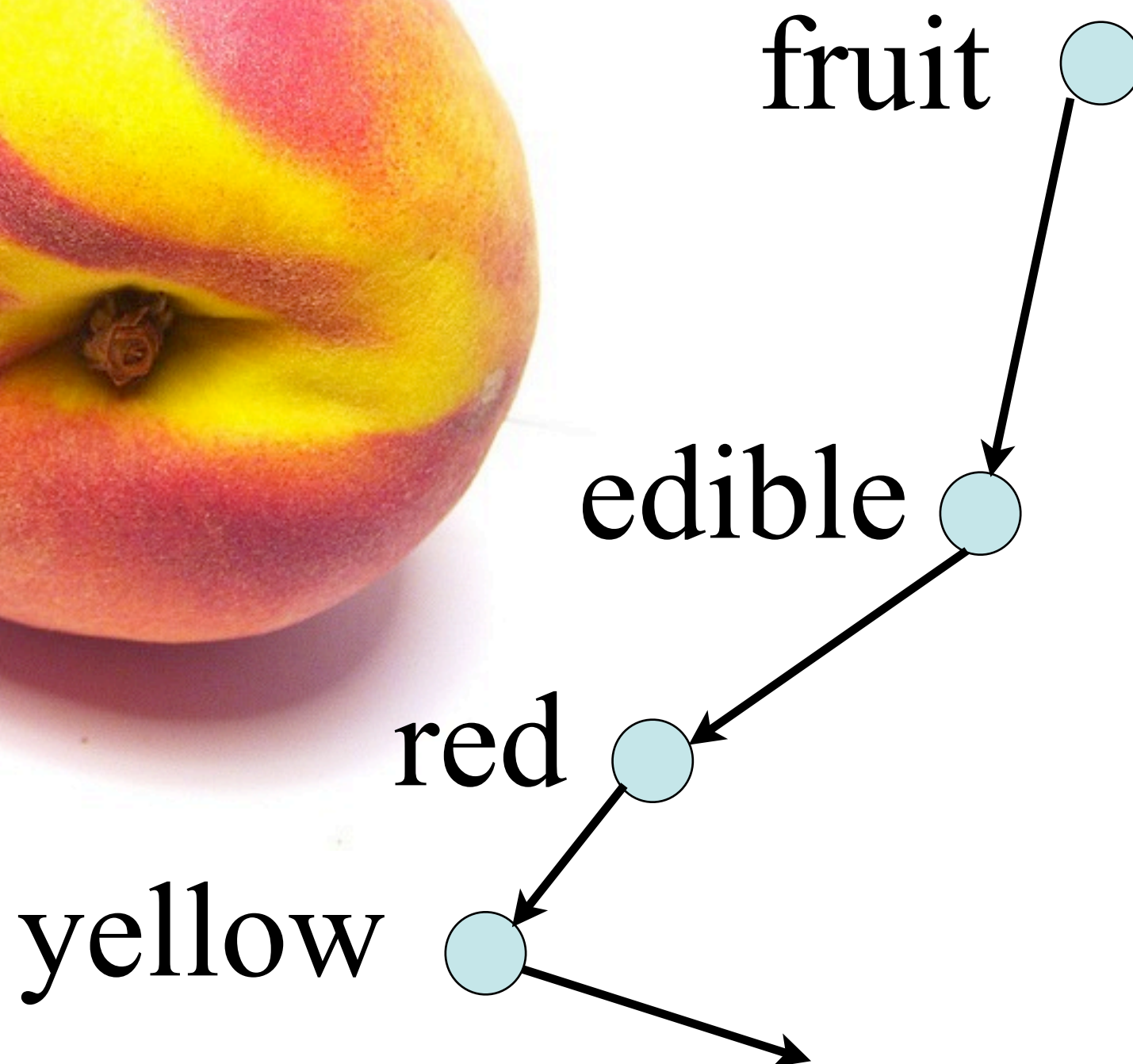
fruit

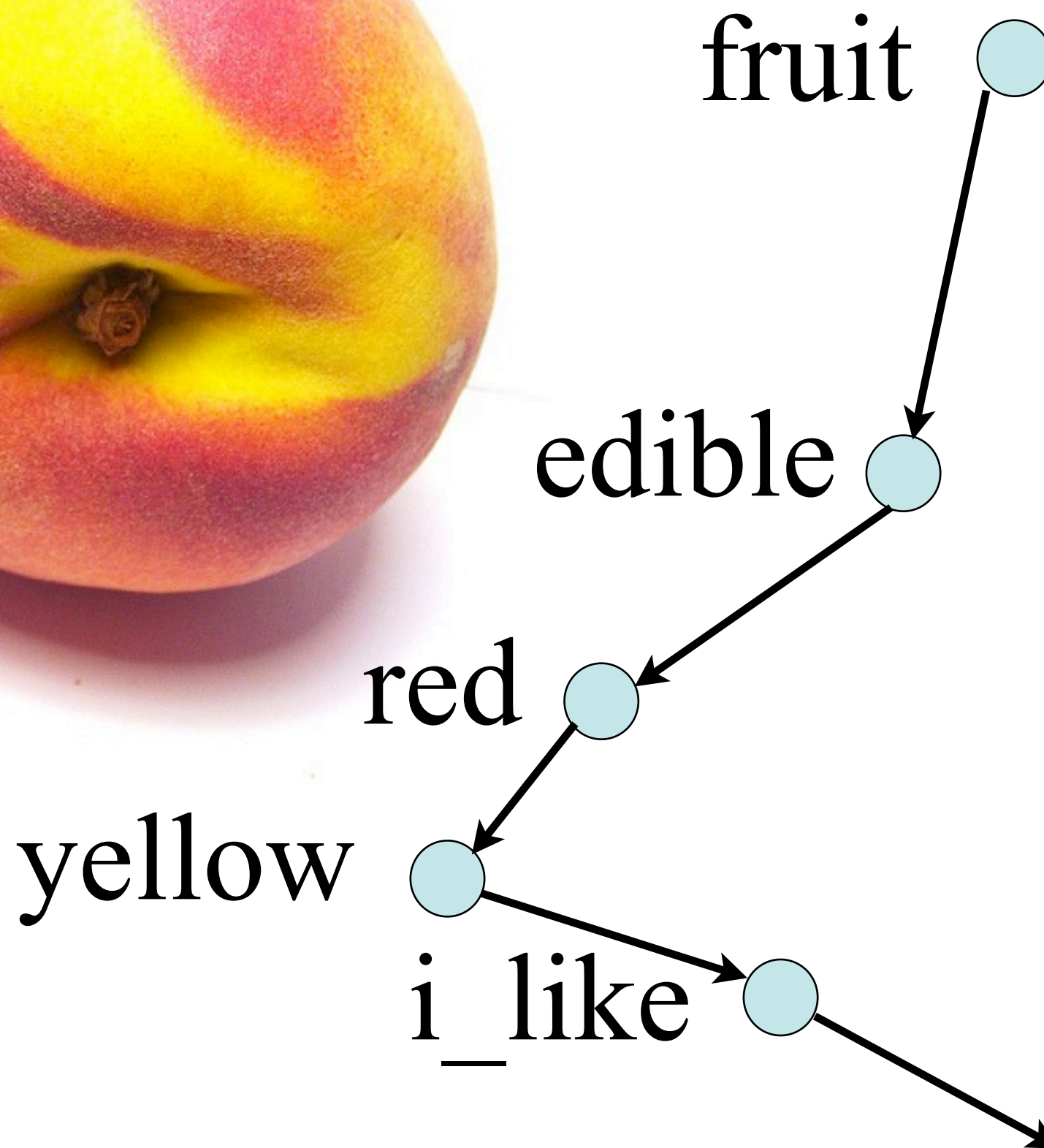


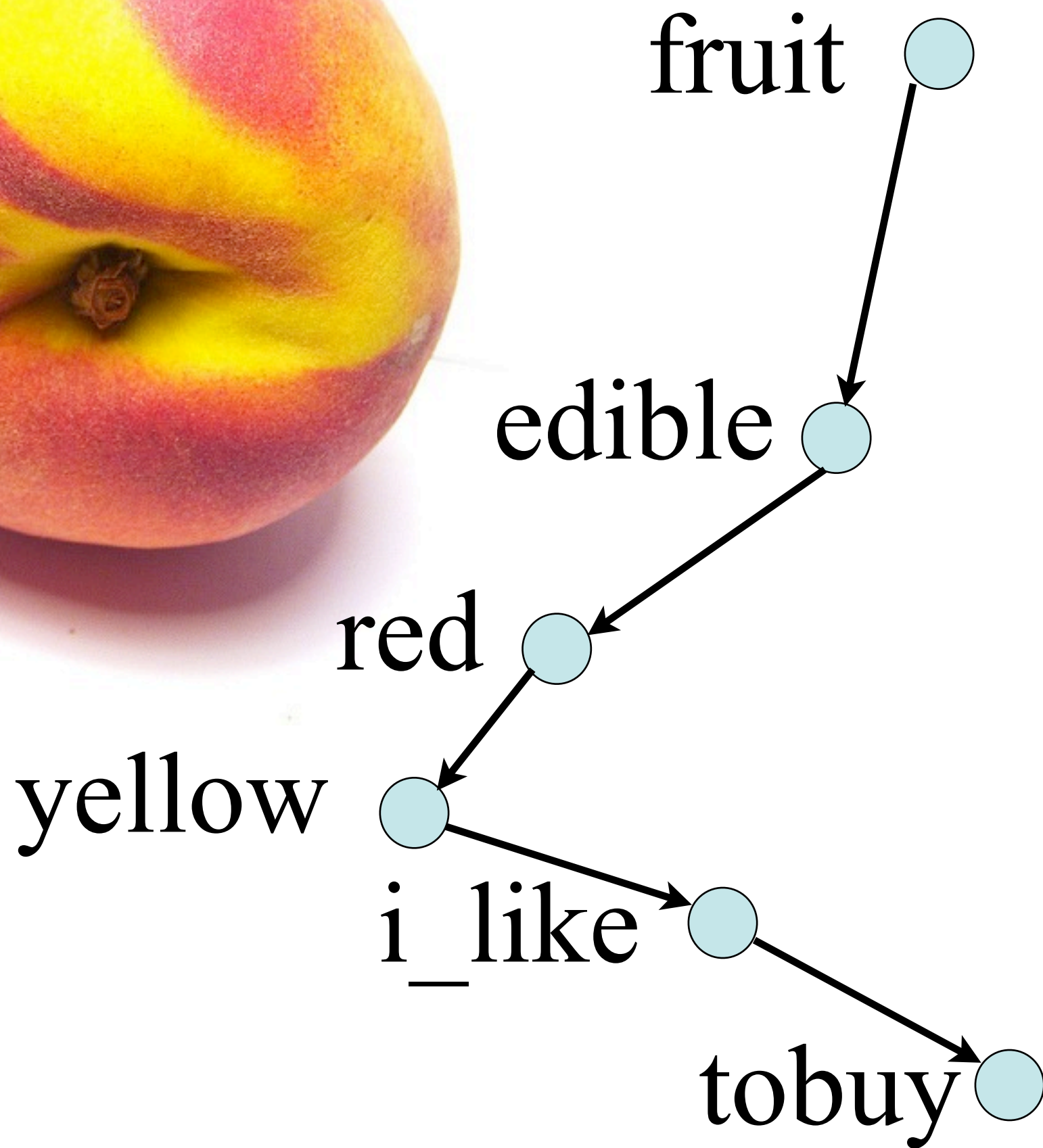
edible



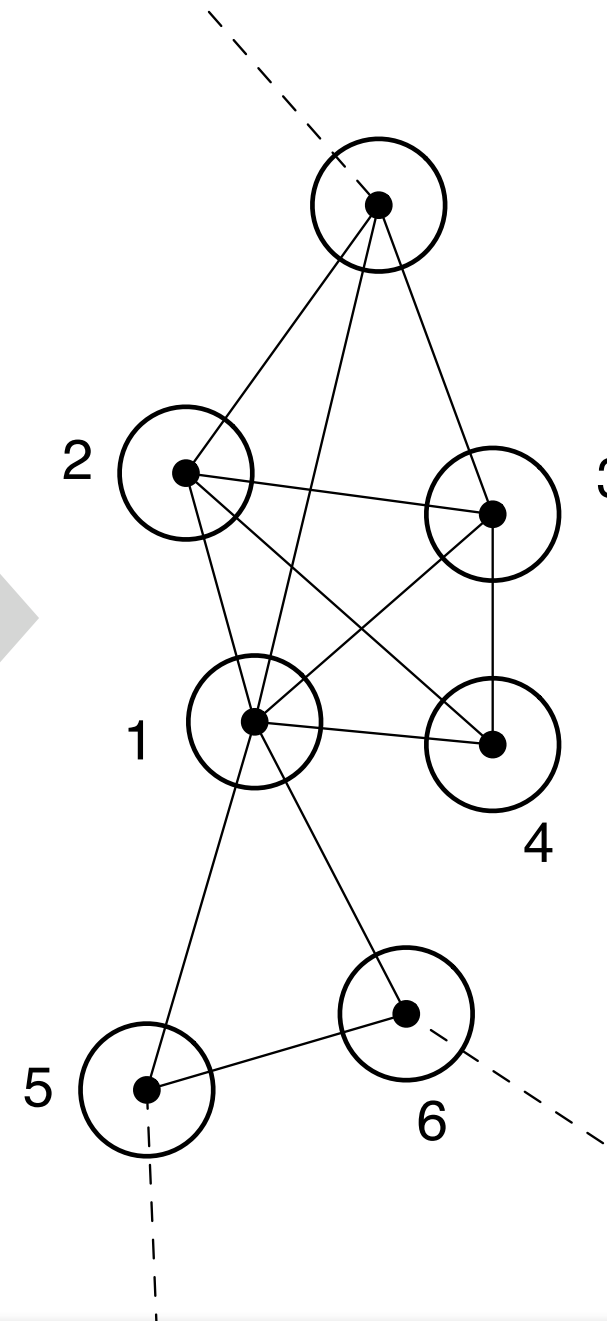
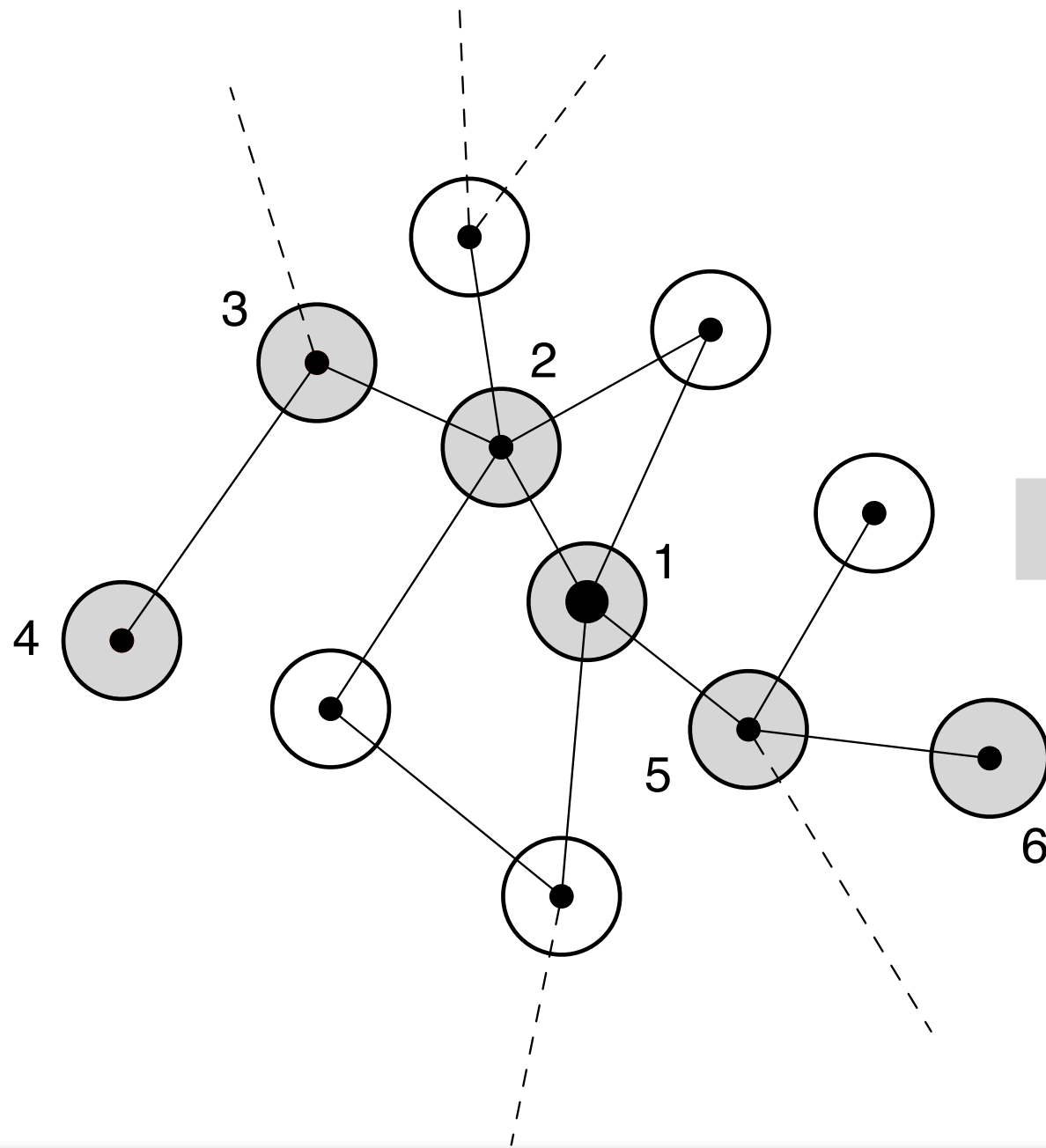








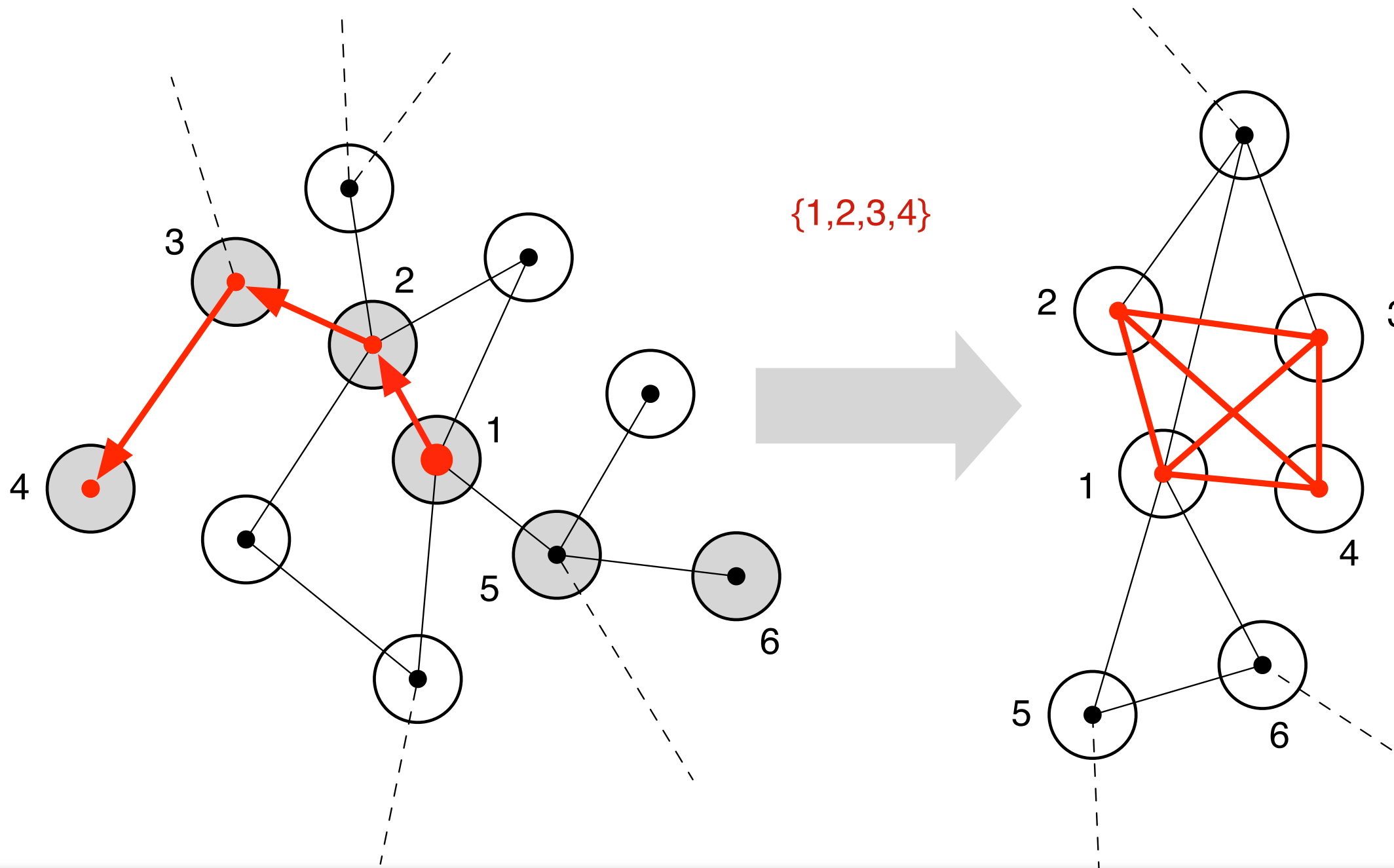
Basic idea



shared semantic
graph (latent)

tag co-occurrence
network

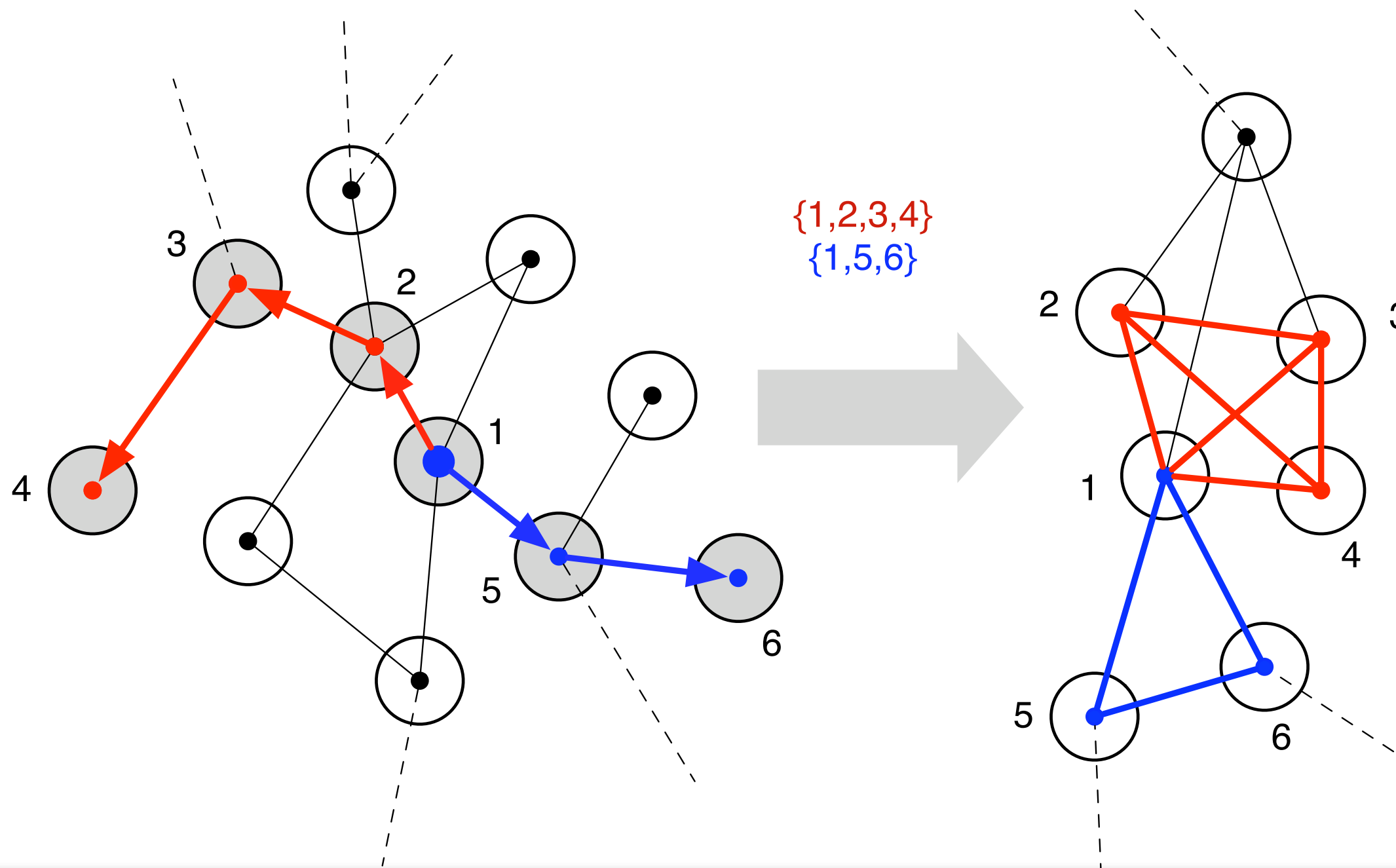
Basic idea



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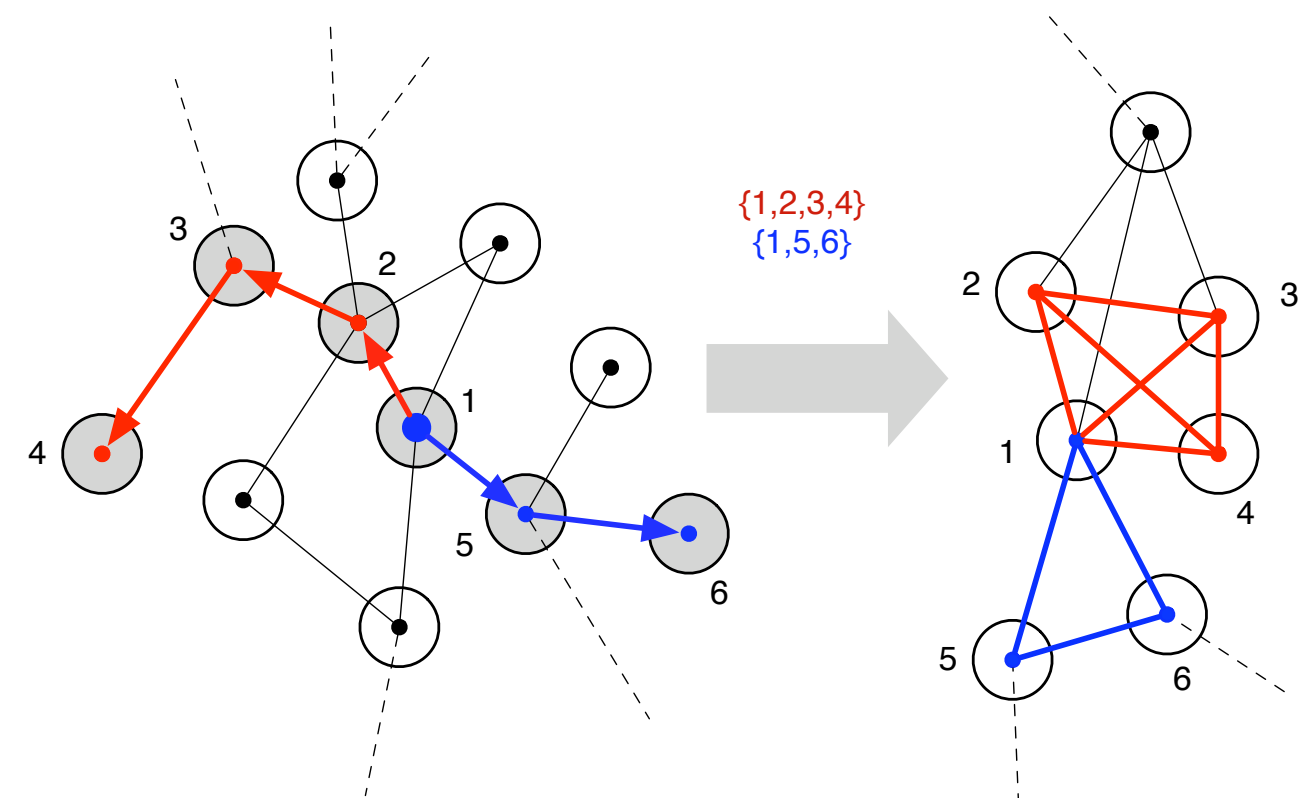
Basic idea



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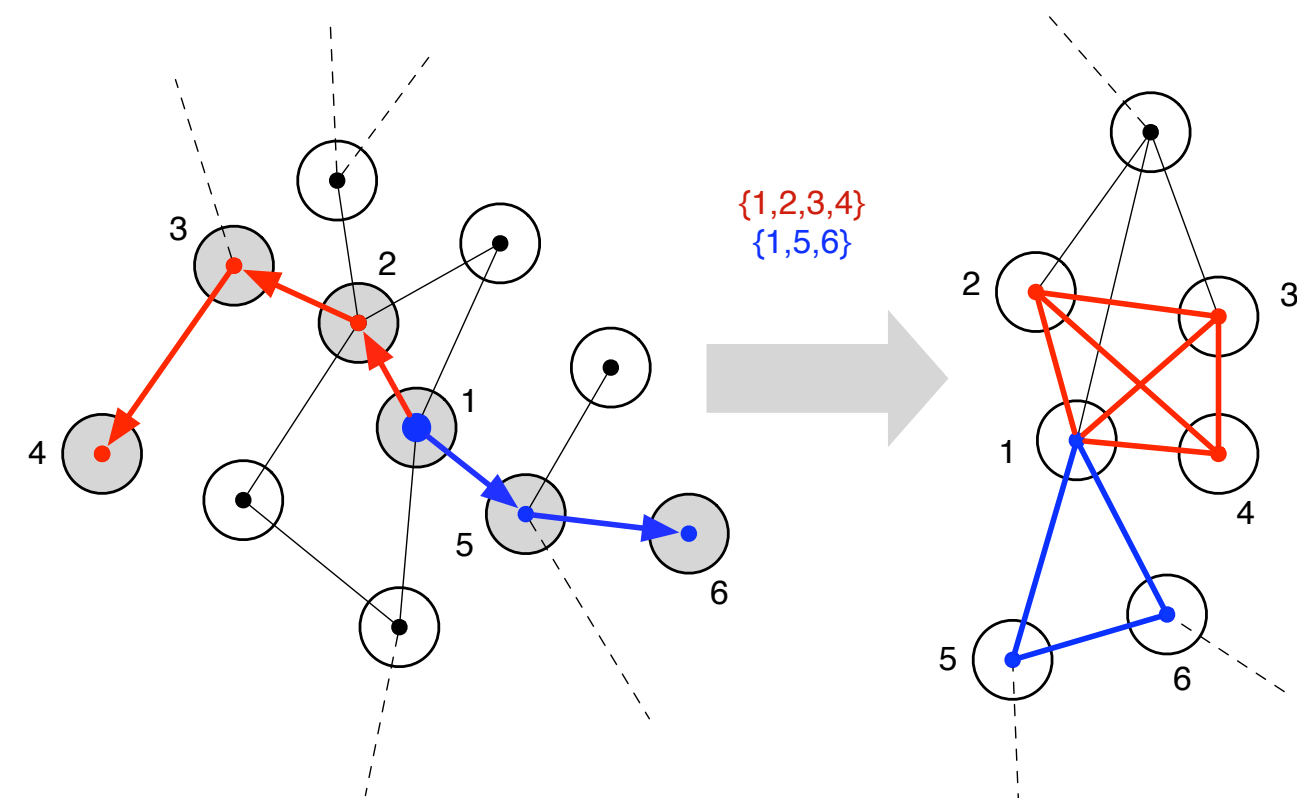
tag co-occurrence
network

Main ingredients



Main ingredients

semantic graph topology



Main ingredients

semantic graph topology

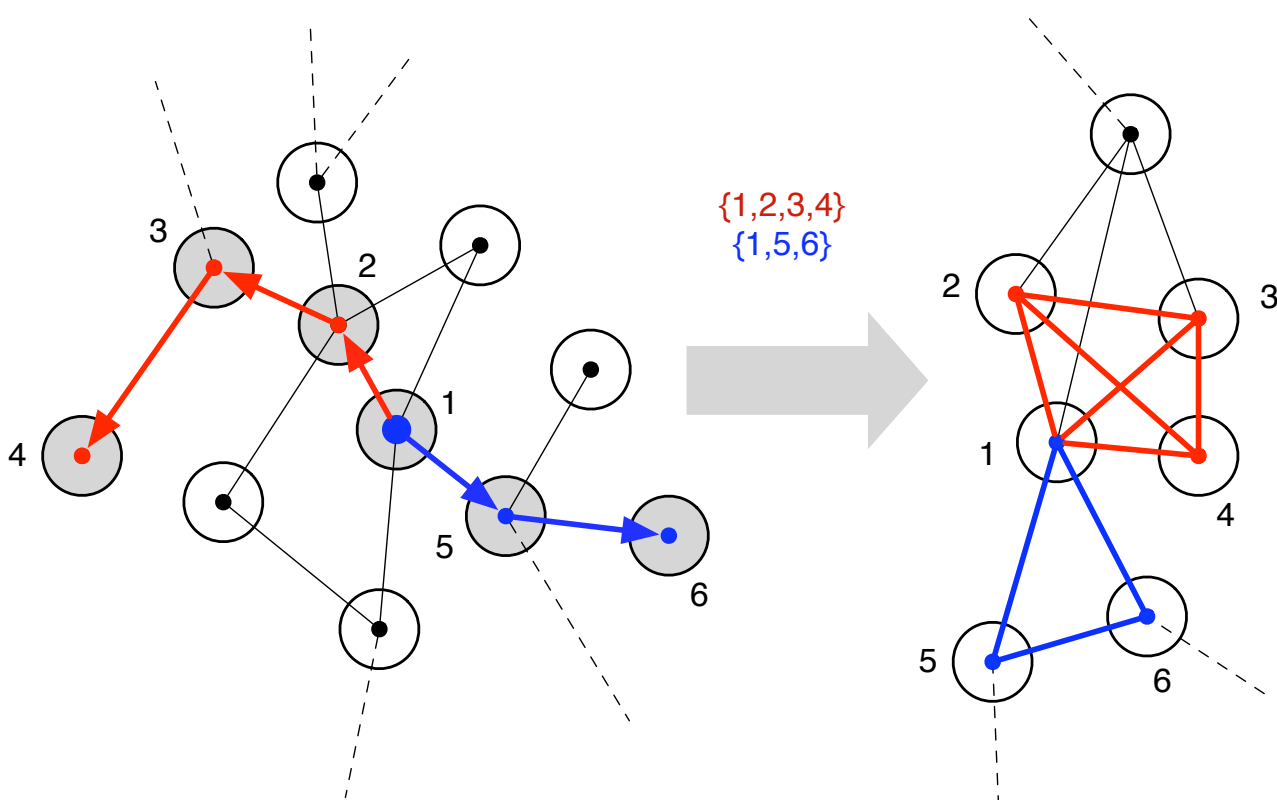
networks considered:

Watts and Strogatz (small world)

Random scale free (configuration model)

Erdos Renyi

...



Main ingredients

semantic graph topology

length of random walks

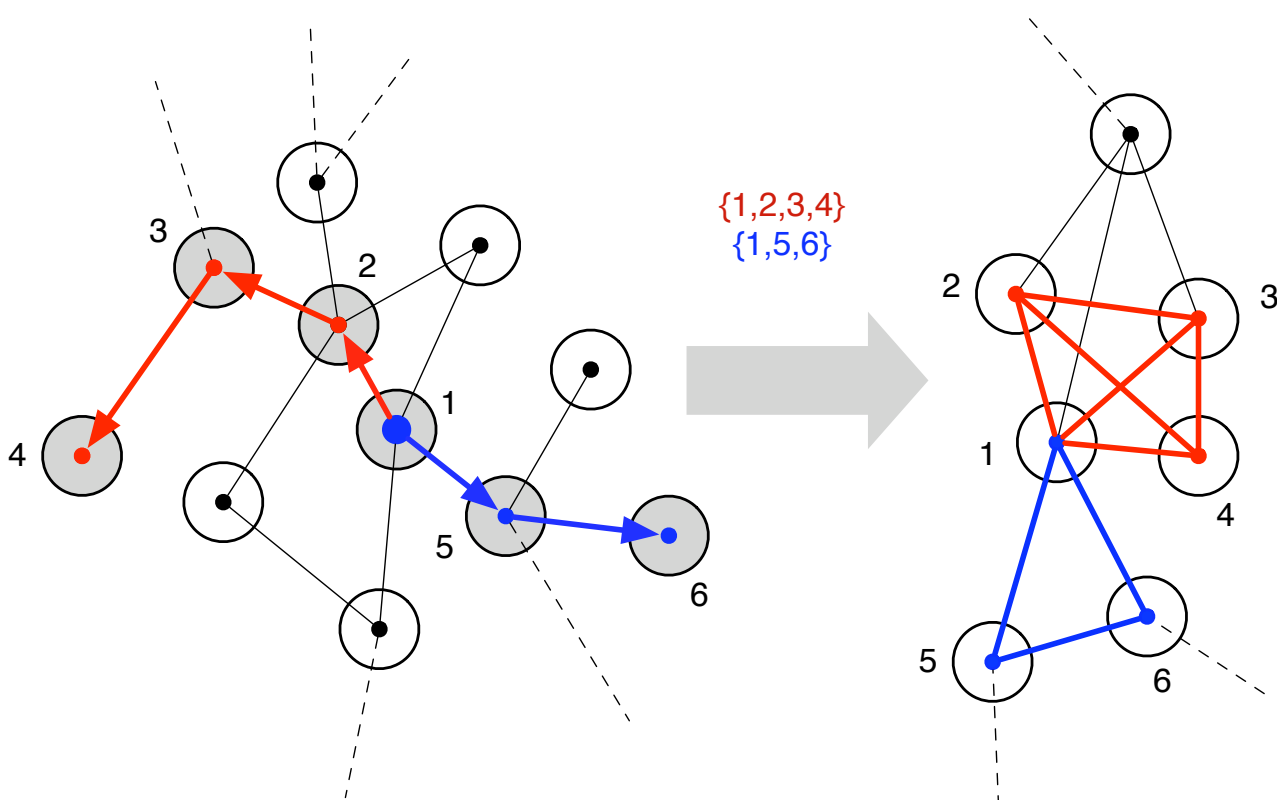
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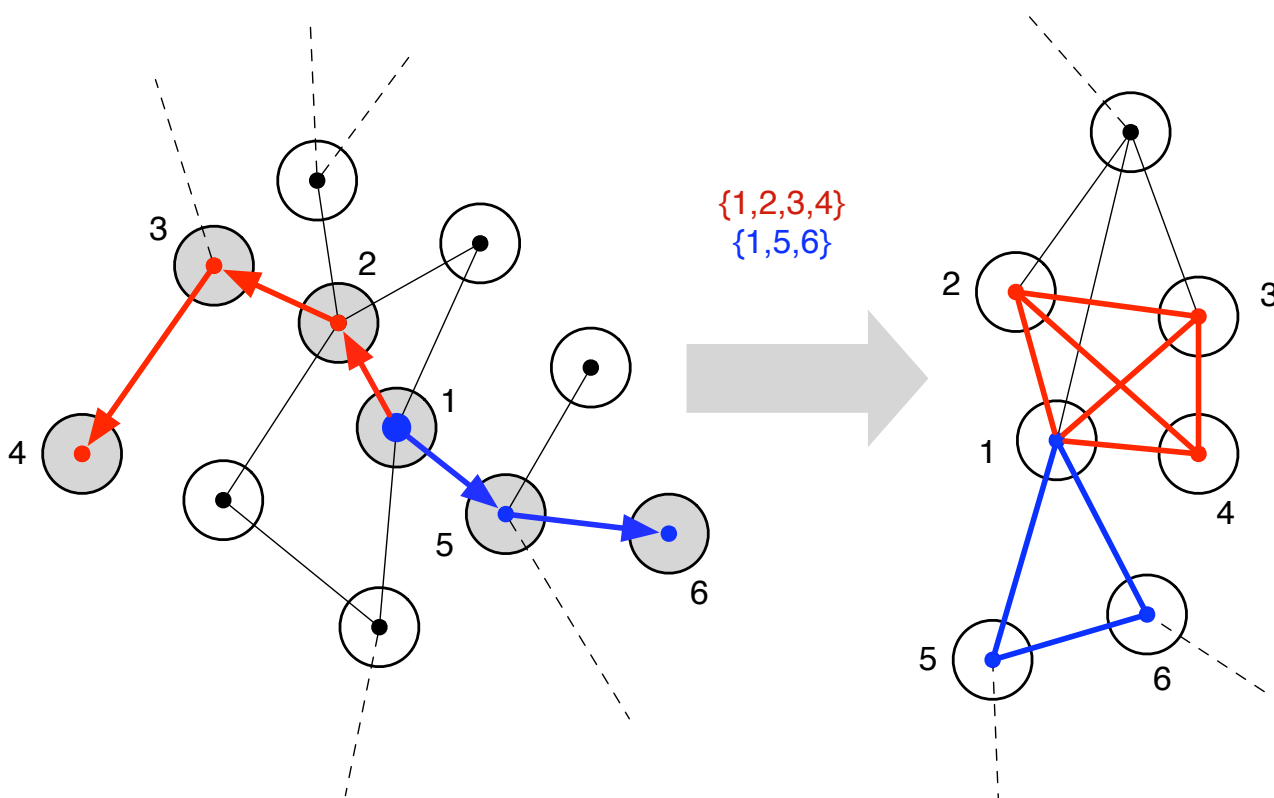
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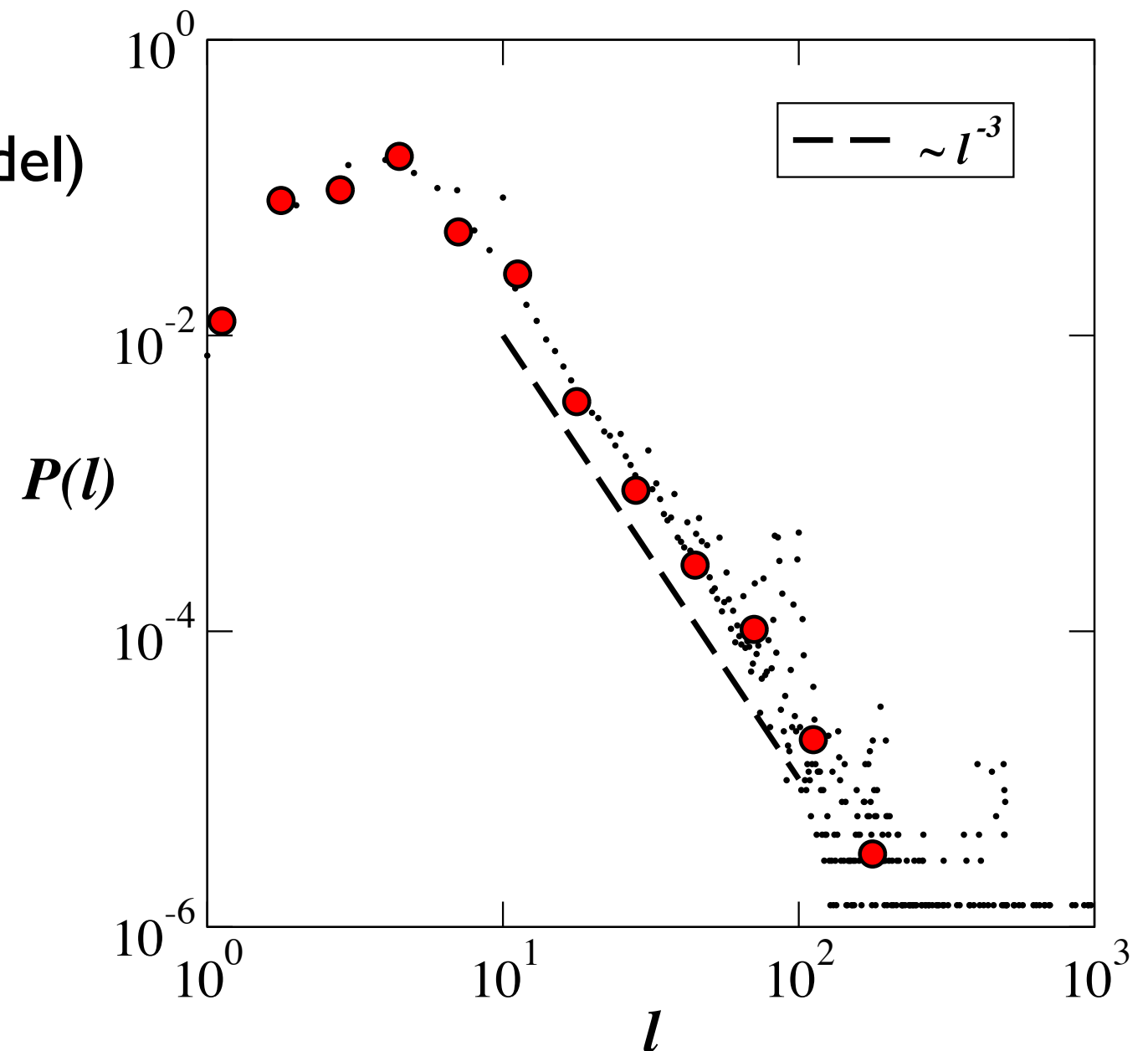
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Erdos Renyi

...

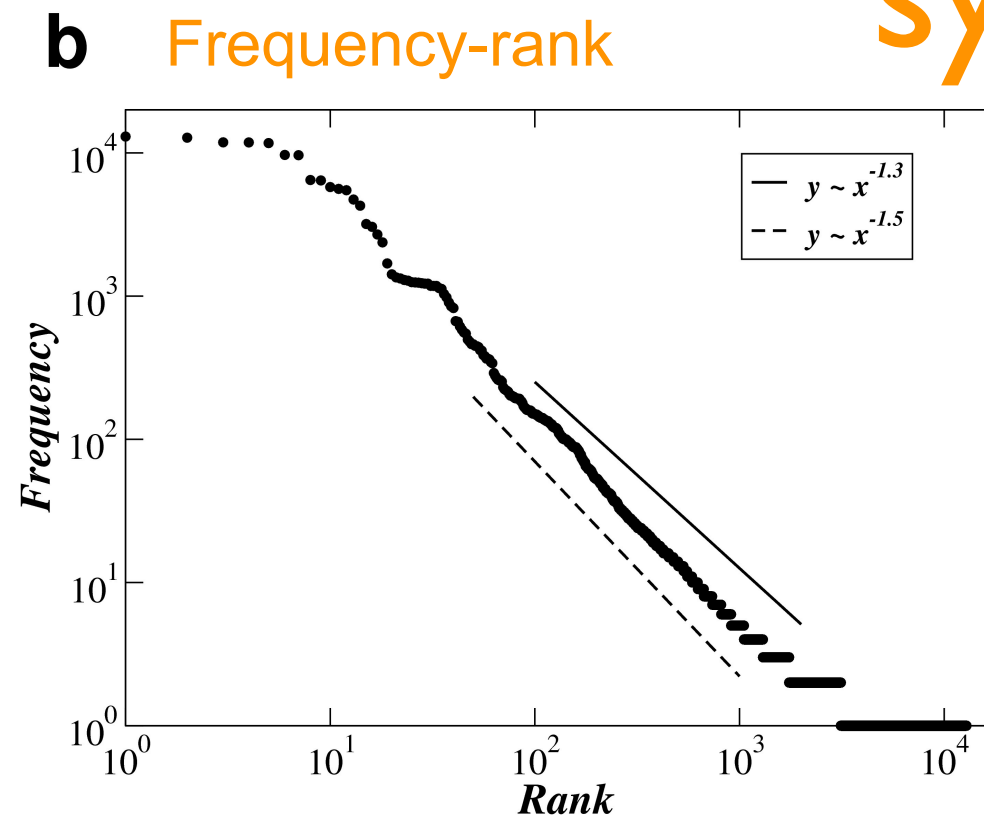
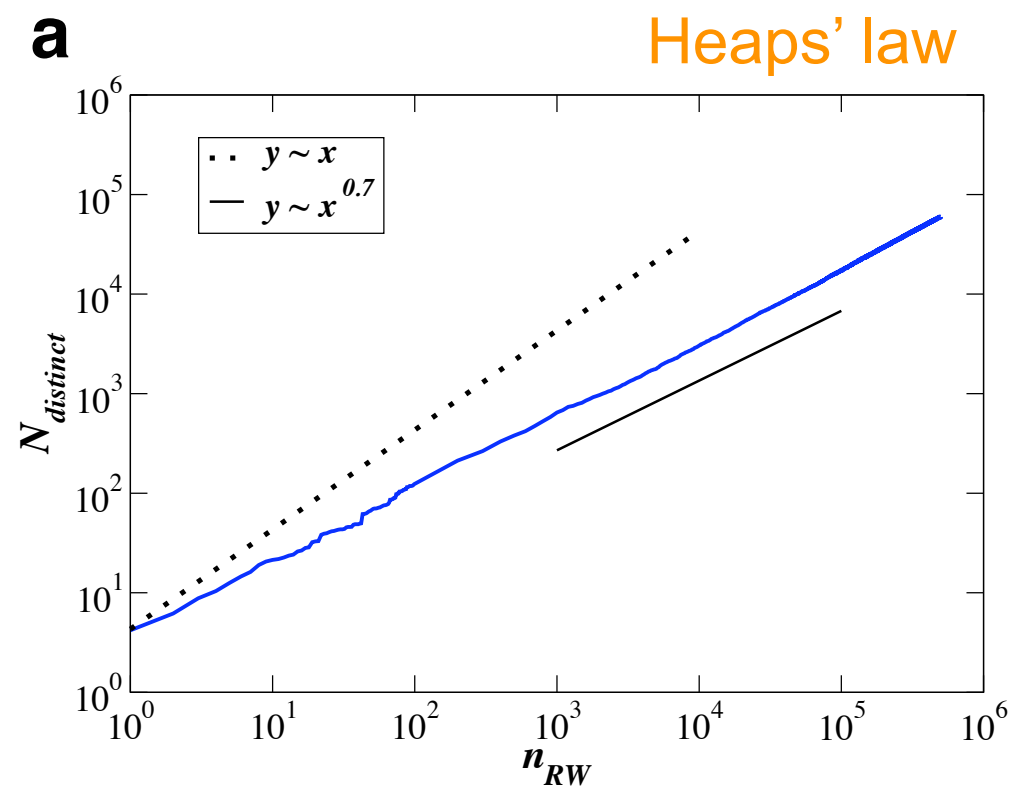
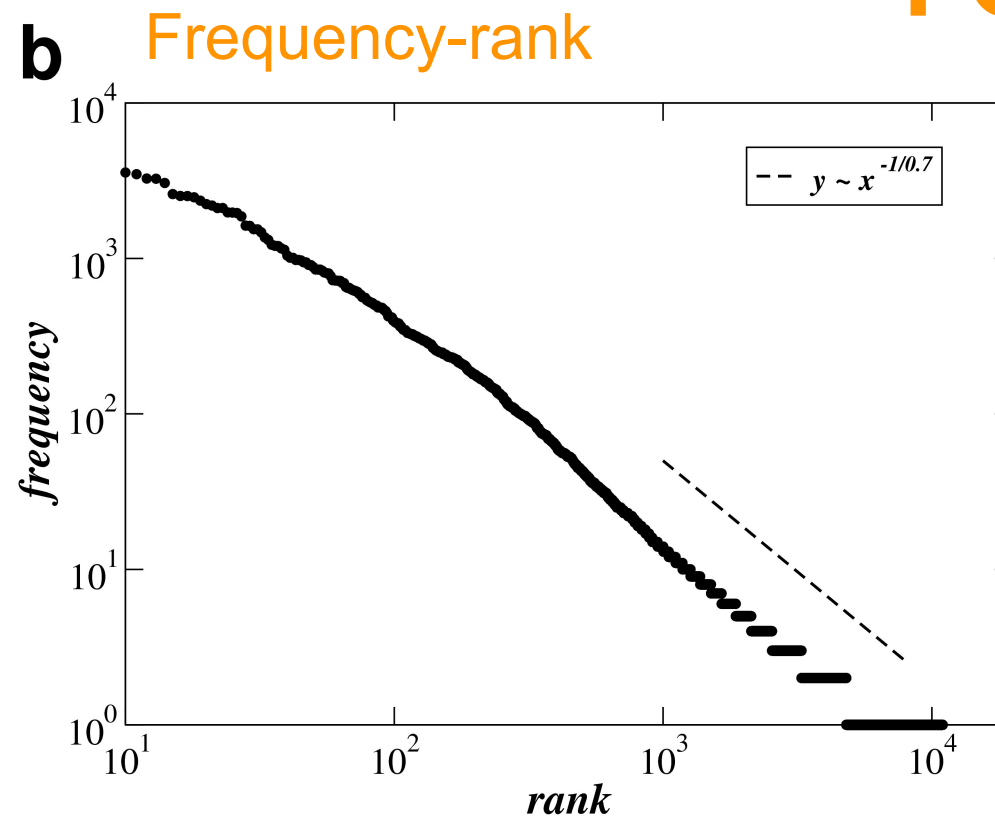
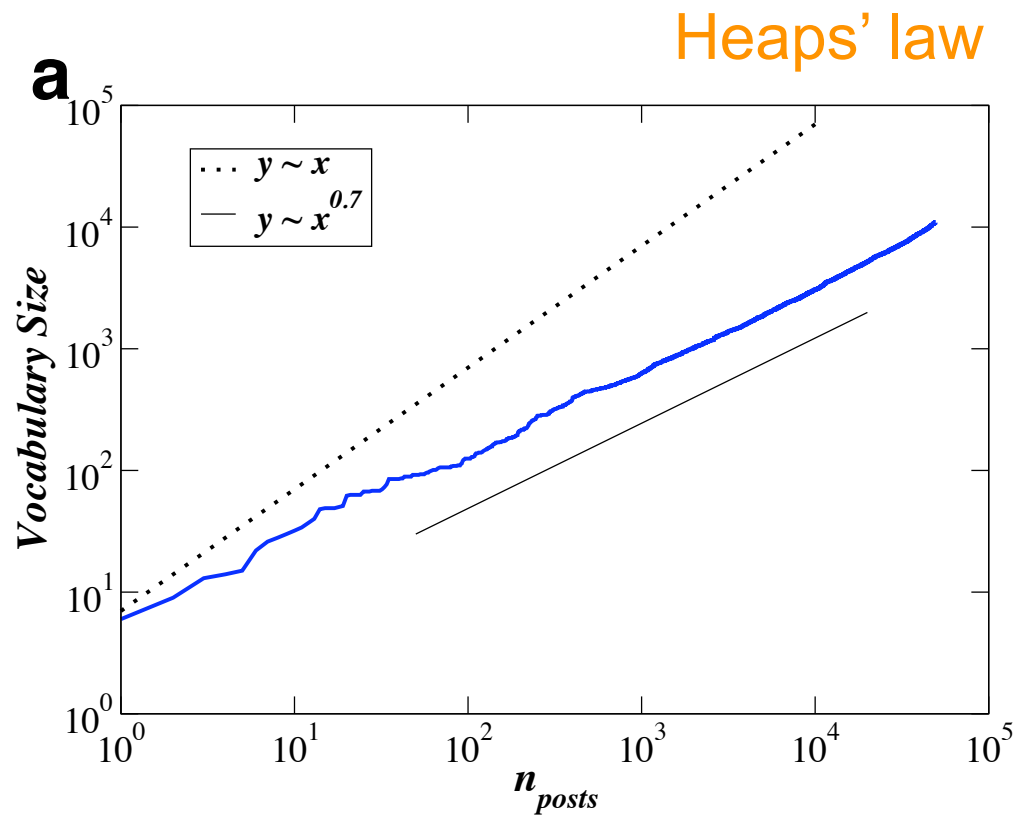


post length distribution in
del.icio.us



Comparison with real systems

real

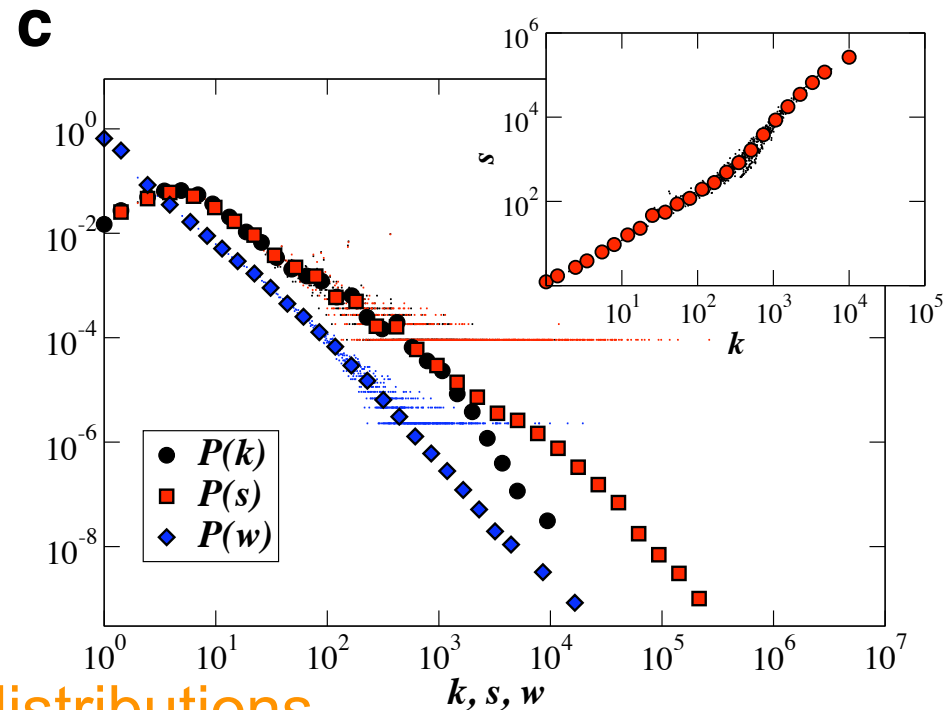


synthetic

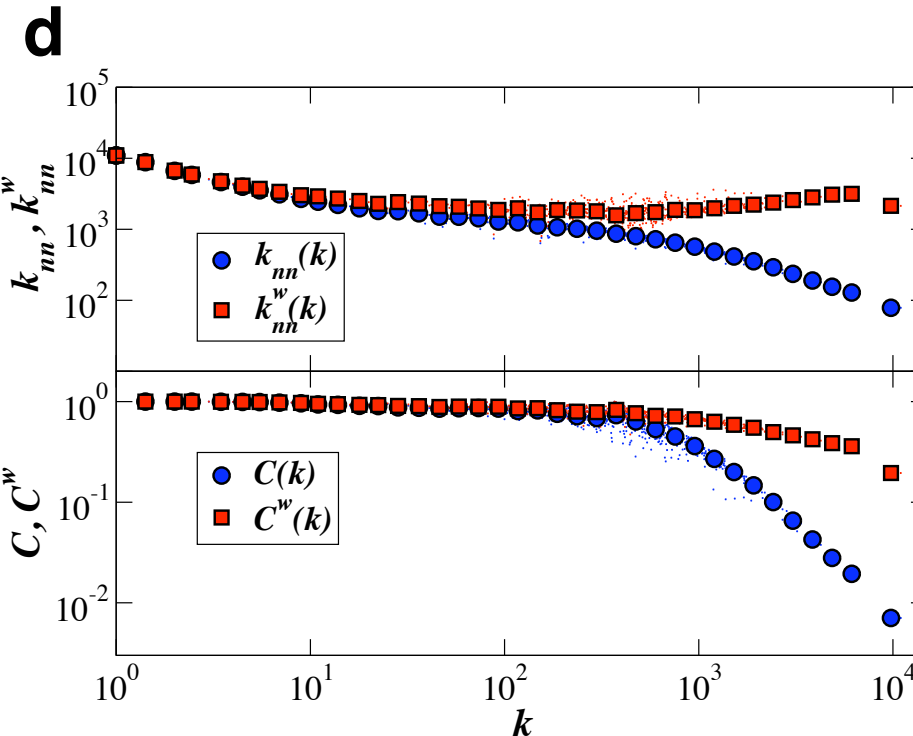
Comparison with real systems

real

strength vs. degree



distributions

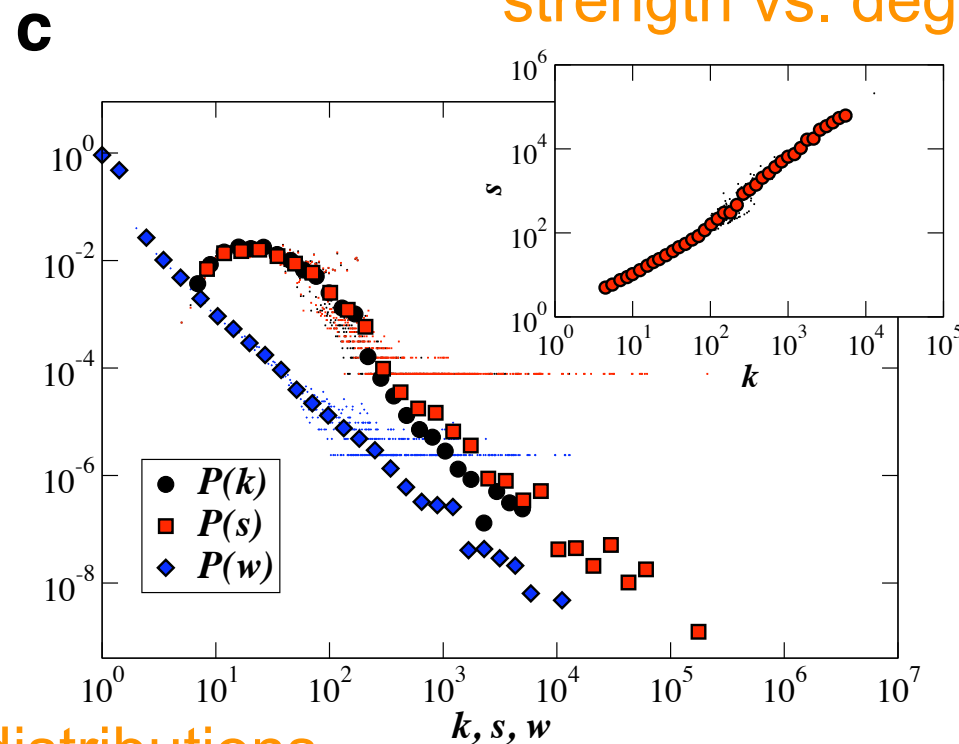


knn

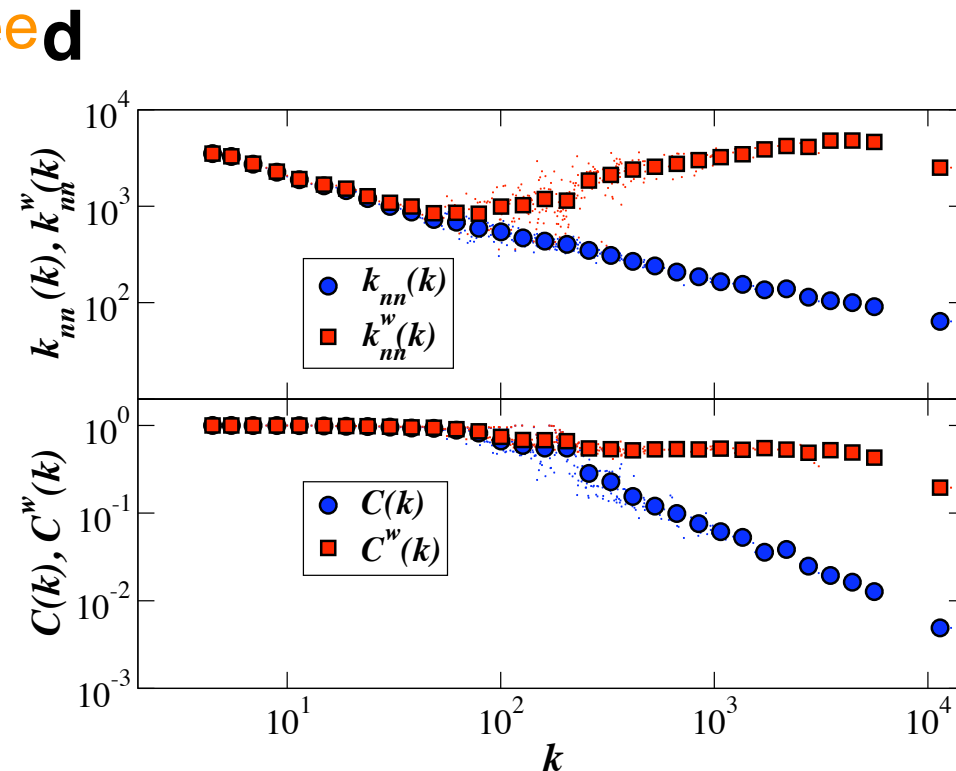
Clustering
coefficient

synthetic

strength vs. degree



distributions



knn

Clustering
coefficient

short summary

Social bookmarking systems are interesting because they encode, in an unpredictable way, traces of the cognitive abilities of human beings: emergent semantics

(just a few) open questions

short summary

Social bookmarking systems are interesting because they encode, in an unpredictable way, traces of the cognitive abilities of human beings: emergent semantics

(just a few) open questions

- understanding users' behaviour
- individual vs. collective (cooperative) features
- modeling tag invention rate
- structure/evolution of the co-occurrence networks
- latent hierarchies & semantics
- measures of node relatedness and similarity

Web as a laboratory for social sciences

- opinions formation
- consumers behaviors, marketing strategies
- cultural trends, globalization
- birth and evolution of communication systems
- language evolution
- ...

Social computation

Populations of users facing
collectively
difficult problems using a
small cognitive overhead

Social computation

Populations of users facing
collectively
difficult problems using a
small cognitive overhead

- collaborative tagging and folksonomies
- online collaborative games
- collaborative filtering
- recommendation/trust networks
- crowdsourcing



<http://www.espgame.org/>



The images shown during the game
may be subject to copyright.

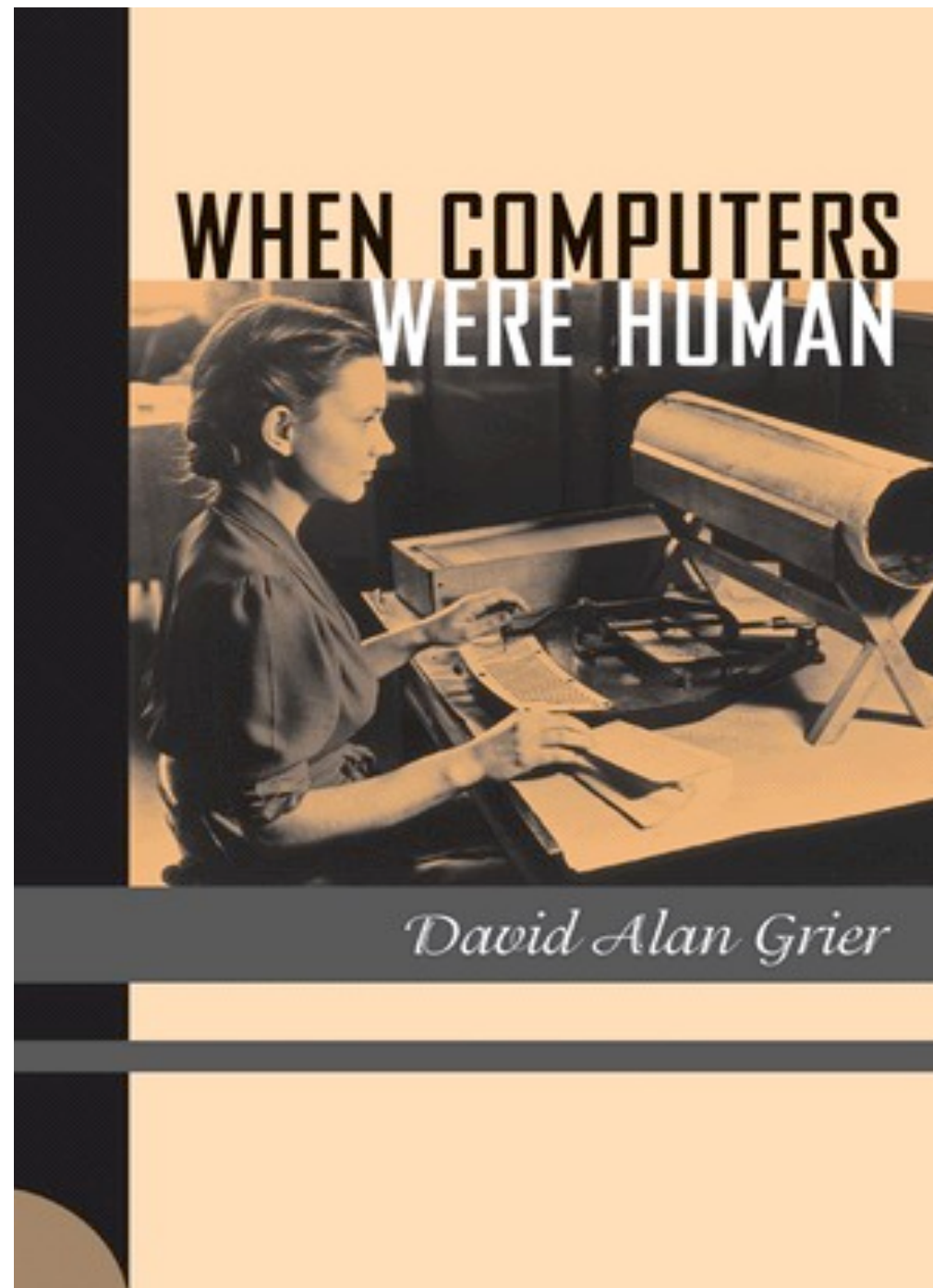
The ESP Game



Ready!

Click to start the game

The human computer



*“Before the computers
were machines they
were persons”*

D.A. Grier

Experimental Turk

A blog on social science experiments on Amazon Mechanical Turk

[About](#)[How to collaborate](#)[People](#)[Resources and Links](#)[What is AMT](#)

Altruism

Posted by: [Gabriele Paolacci](#) | February 11, 2010

David Rand posted on [Crowdfunder](#) about a great AMT study he recently conducted along with John Horton on altruism (as measured by cooperative behavior on a Prisoner's Dilemma), that also used religious priming. The authors found that *(reproduced from the original post)*:

Mechanical Turk is a marketplace for work.

We give businesses and developers access to an on-demand, scalable workforce. Workers select from thousands of tasks and work whenever it's convenient.

174,064 HITs available. [View them now.](#)

Make Money by working on HITs

HITs - Human Intelligence Tasks - are individual tasks that you work on. [Find HITs now.](#)

As a Mechanical Turk Worker you:

- Can work from home
- Choose your own work hours
- Get paid for doing good work



[Find HITs Now](#)

or [learn more about being a Worker](#)

Get Results from Mechanical Turk Workers

Ask workers to complete HITs - Human Intelligence Tasks - and get results using Mechanical Turk. [Register Now](#)

As a Mechanical Turk Requester you:

- Have access to a global, on-demand, 24 x 7 workforce
- Get thousands of HITs completed in minutes
- Pay only when you're satisfied with the results



[Get Started](#)

EXPERIMENTAL TURK

- [About](#)
- [How to collaborate](#)
- [People](#)
- [Resources and Links](#)
- [What is AMT](#)

CATEGORIES

- [games](#)
- [heuristics and biases](#)
- [information processing](#)

RECENT POSTS

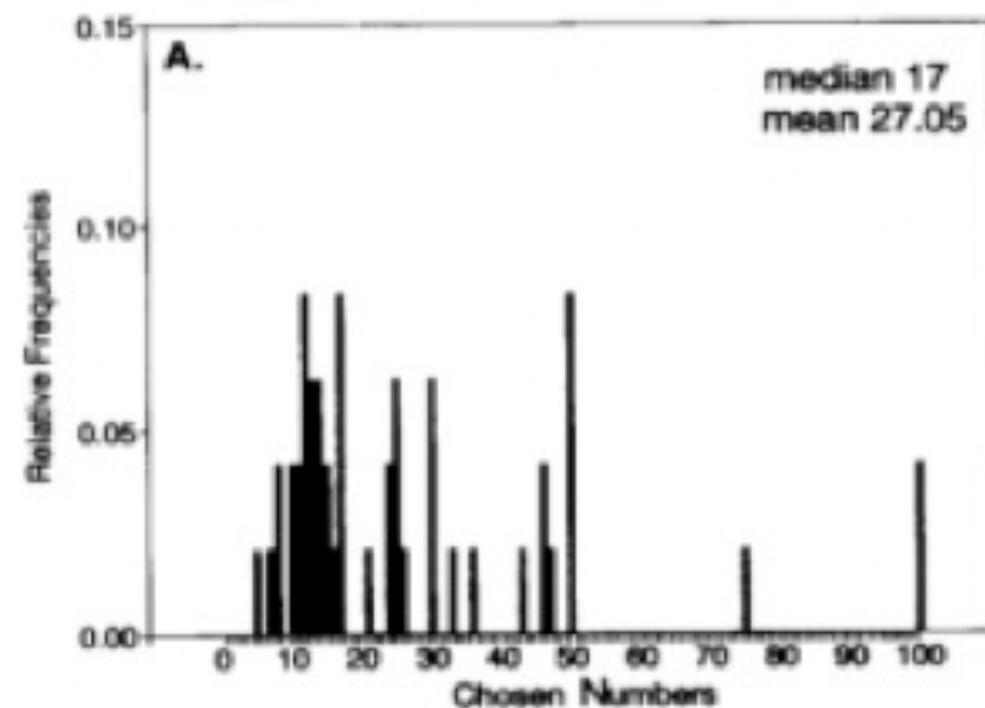
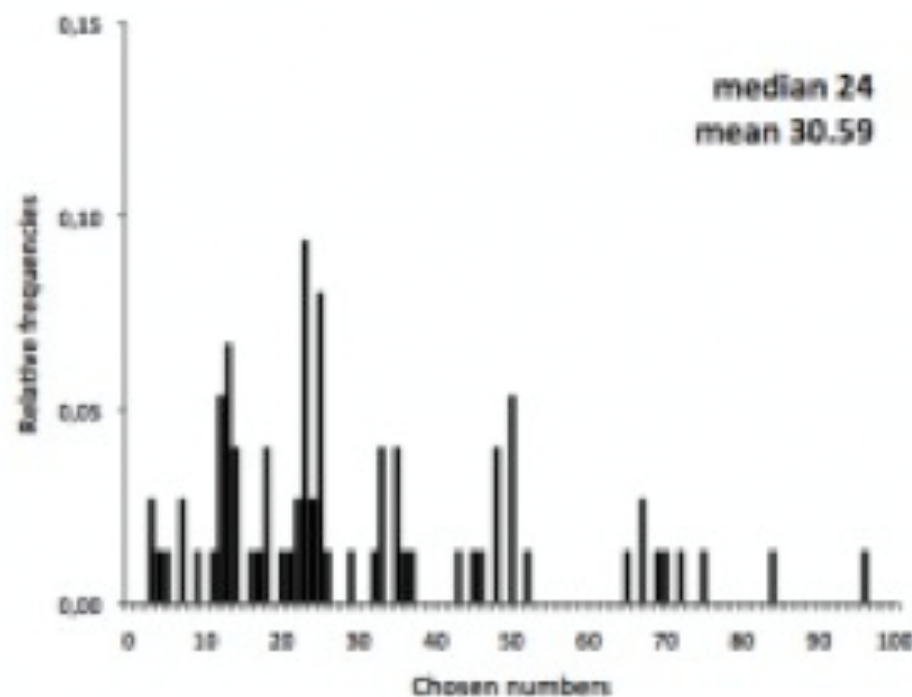
- [Altruism](#)
- [Intertemporal Choice](#)
- [Sunk-cost fallacy](#)
- [Framing](#)
- [Anchoring](#)
- [Base rate fallacy](#)
- [p-beauty contest](#)
- [Outcome bias](#)

[Leave a Comment](#)

p-beauty contest

Task: select a number in $[0:100]$


Winner: player closest to $p * AVERAGE$



$$p = 1/2$$

A new platform for web-based experiments

A new platform for web-based experiments



experimental tribe

is a web platform for gaming and social computation. It helps researchers to realize web games/experiments and it let people join, while enjoying, the scientific research.

[Log out vittorio](#) [My account](#)

[Home](#) [Experiments](#) [Development](#) [About](#) [Credits](#)

X-Tribe launch at the 2nd London Citizen Cyberscience Summit

Submitted by admin on Mon, 2012-02-13 17:49



**citizen
cyberscience
centre**

Finally, the beginning. The X-Tribe platform will be presented at the [2nd London Citizen Cyberscience Summit](#) by the [Citizen Cyberscience Center](#).

After the success of the first edition, the summit will take again place in London from 16 to 18 February 2012, with a very rich [programme](#) that will touch many different aspects of the citizen science: people engagement, pollution monitoring, case studies and many others.

And we will be there too, for the first official presentation of the X-Tribe project.

[Read more](#)

<http://www.xtribe.eu/>

Experimental Tribe (ET) is general purpose platform for
social computation and web-based experiments

Experimental Tribe (ET) is general purpose platform for social computation and web-based experiments

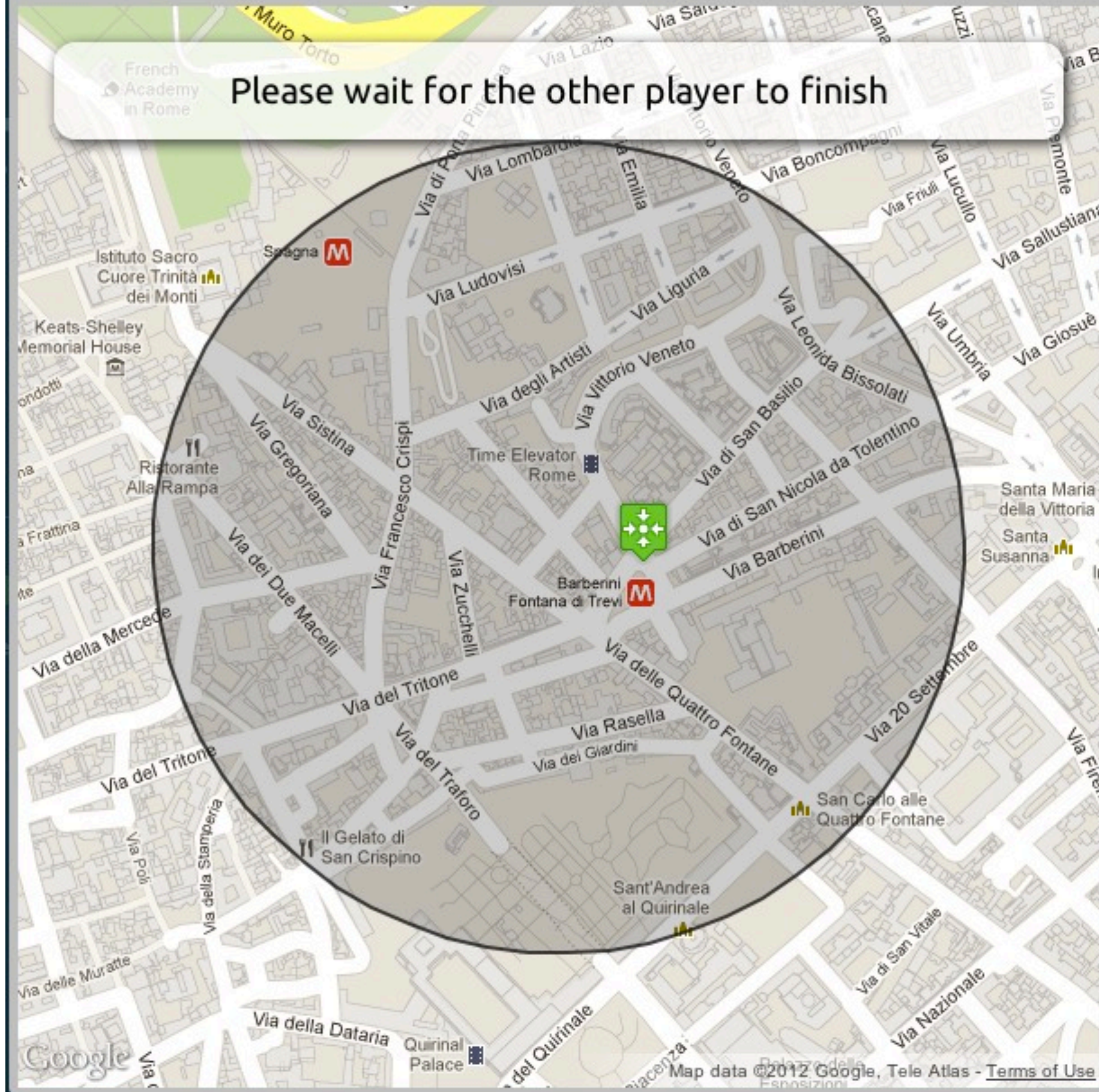
- it will allow virtually any researcher to realize his own experiment with minimal effort, paving the way of the use of the web as a standard “laboratory” for social sciences.

Experimental Tribe (ET) is general purpose platform for social computation and web-based experiments

- it will allow virtually any researcher to realize his own experiment with minimal effort, paving the way of the use of the web as a standard “laboratory” for social sciences.
- it can be a strong “basin of attraction” for people willing to participate to experiments, making in this way recruitment much easier than for single-experiment platforms.

Experimental Tribe (ET) is general purpose platform for **social computation and web-based experiments**

- it will allow virtually any researcher to realize his own experiment with minimal effort, paving the way of the use of the web as a standard “**laboratory**” for social sciences.
- it can be a strong “**basin of attraction**” for people willing to participate to experiments, making in this way **recruitment** much easier than for single-experiment platforms.
- **research areas**: opinion and language dynamics, decision making, game-theory, human mobility, economics, psychology, etc...

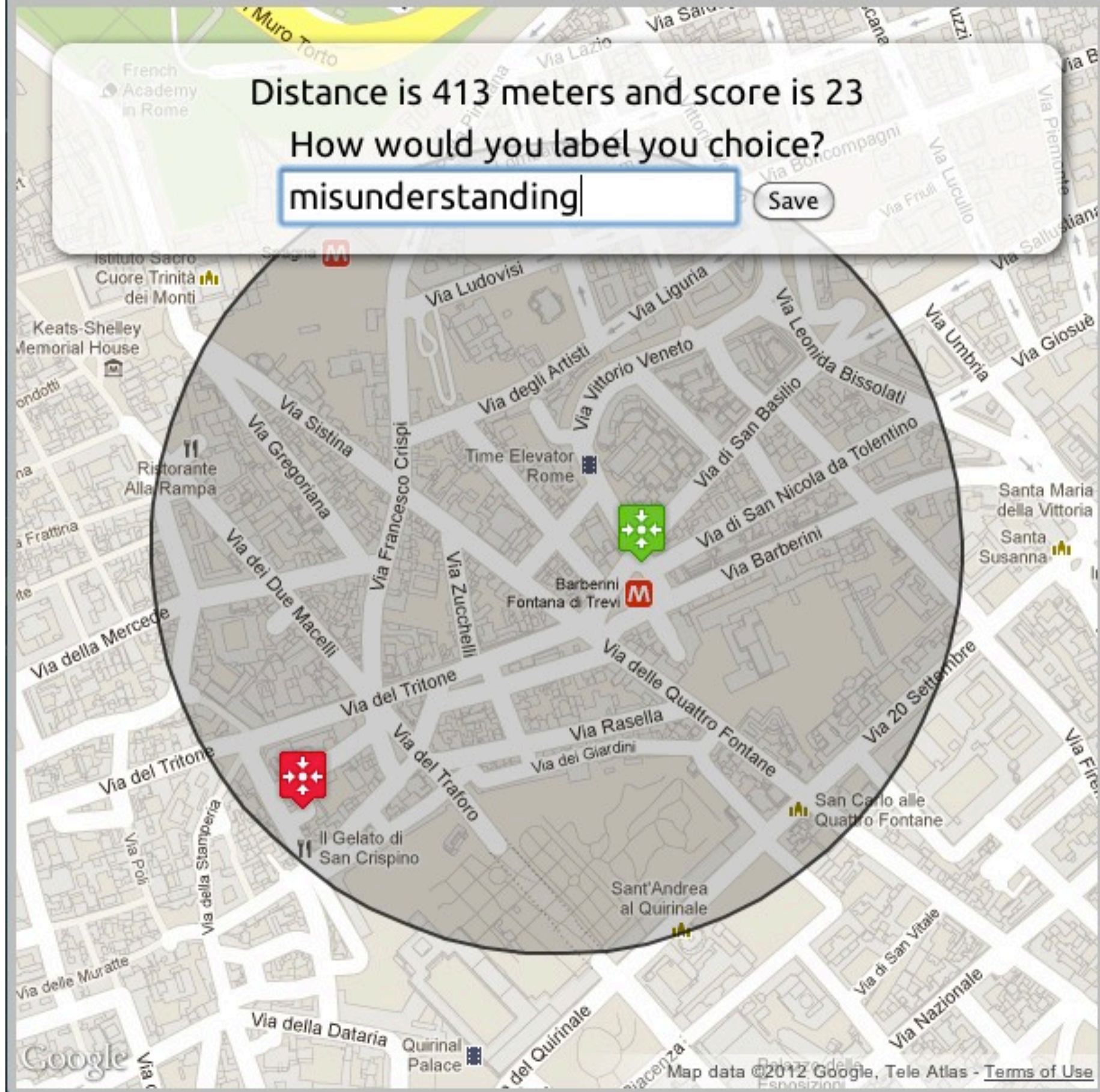


Distance is 413 meters and score is 23

How would you label your choice?

misunderstanding

Save



Guess Where

Exit

Which place is this?

Enter key to submit

Google

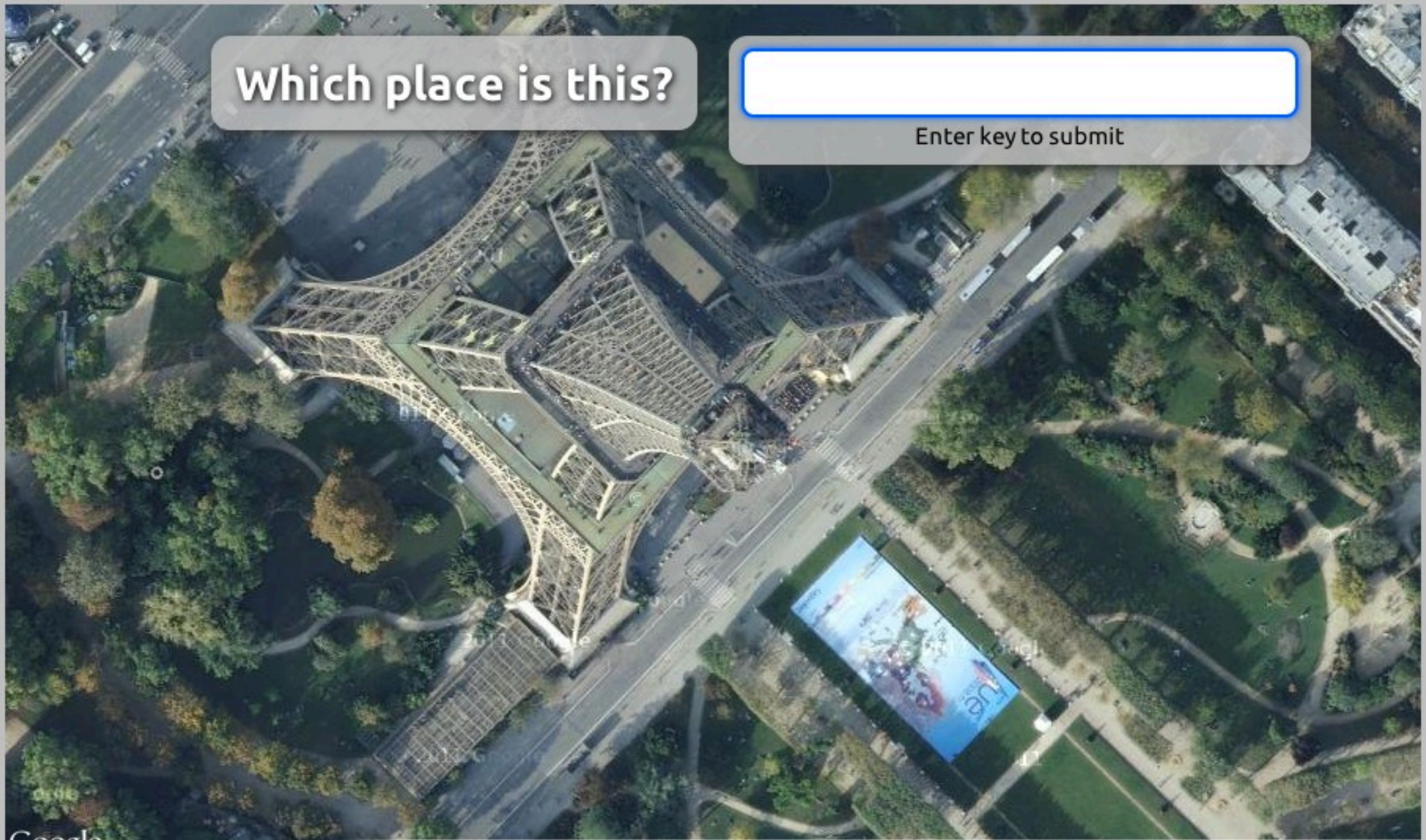
Imagery ©2012 Aerodata International Surveys, GeoEye, IGN-France, The GeoInformation Group | InterAtlas - [Terms of Use](#)

Guess Where

Exit

Which place is this?

Enter key to submit



Google

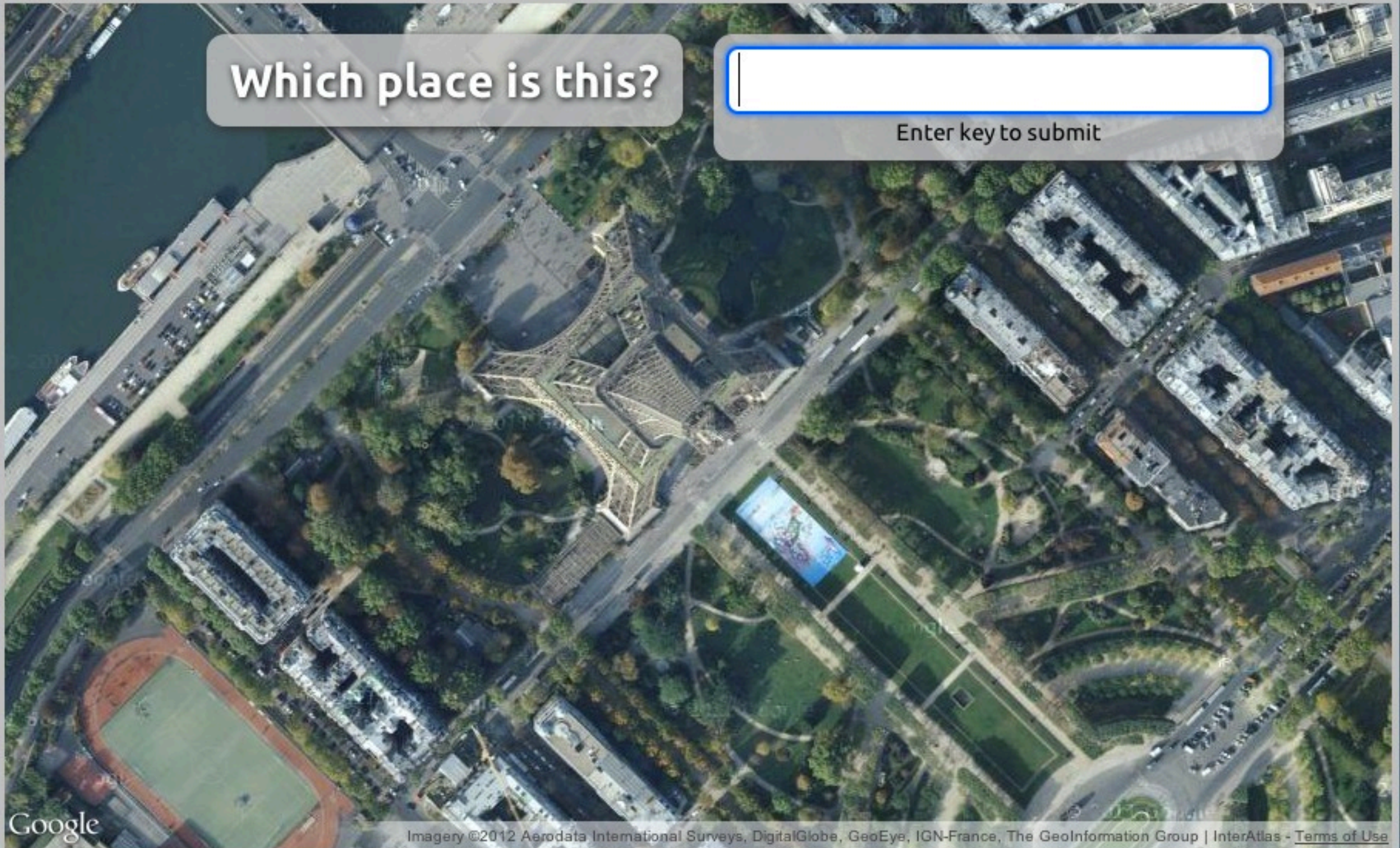
Imagery ©2012 Aerodata International Surveys, DigitalGlobe, GeoEye, IGN-France, The GeoInformation Group | InterAtlas - [Terms of Use](#)

Guess Where

Exit

Which place is this?

Enter key to submit



Google

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Guess Where

Exit

Which place is this?

Enter key to submit

Google

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Guess Where

Exit

Which place is this?

paris

Enter key to submit

Google

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Guess Where

Exit

Which place is this?

paris **Yes**

Great you recognized the place!

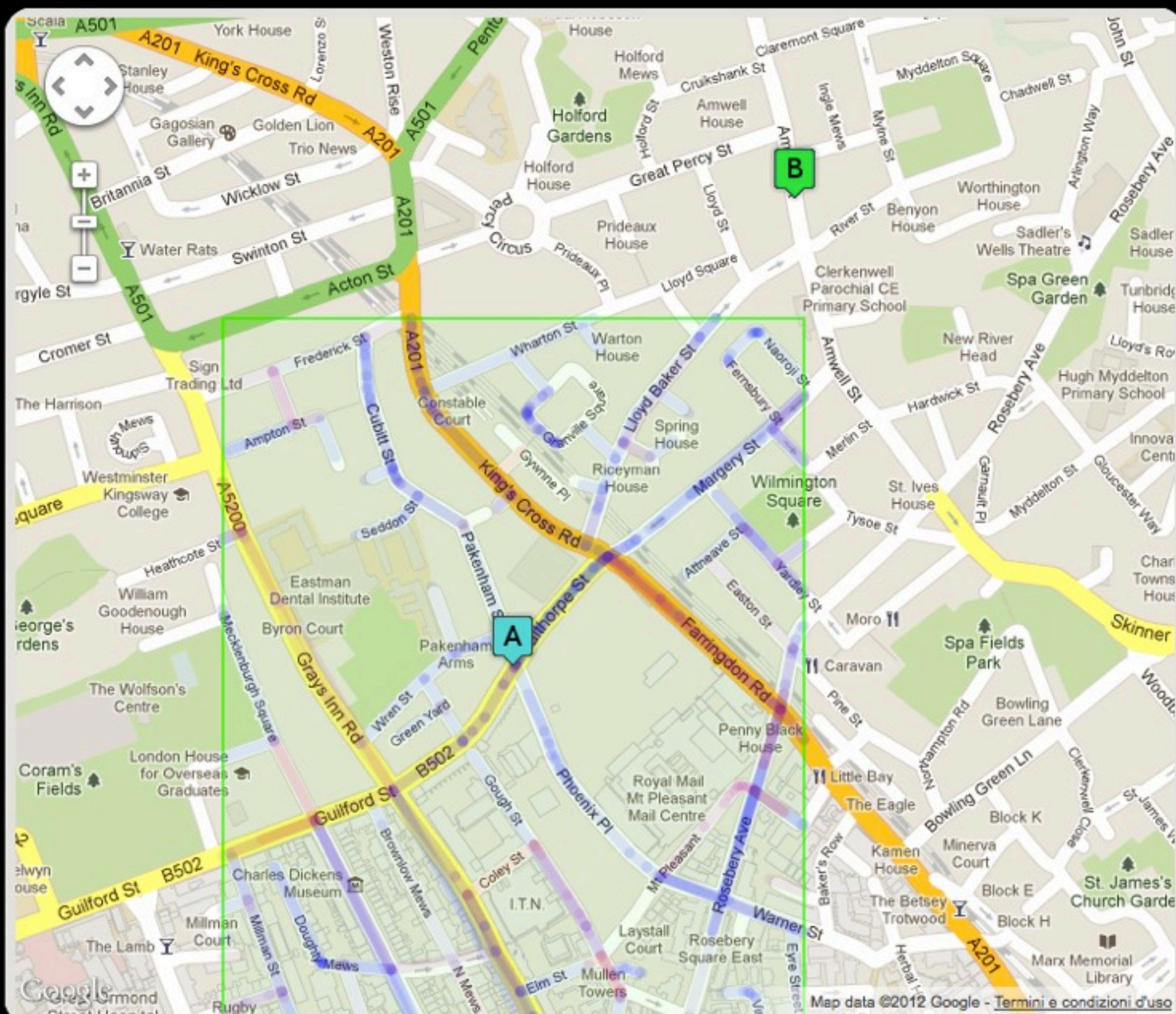
Your accuracy level: 14. Map zoom level: 13. Score: 500/1000.

Great, play again!

Nope, stop it!

Google

Imagery ©2012 Aerodata International Surveys, Cnes/Spot Image, DigitalGlobe, GeoEye, IGN-France, The GeoInformation Group | InterAtlas - [Terms of Use](#)



City Race

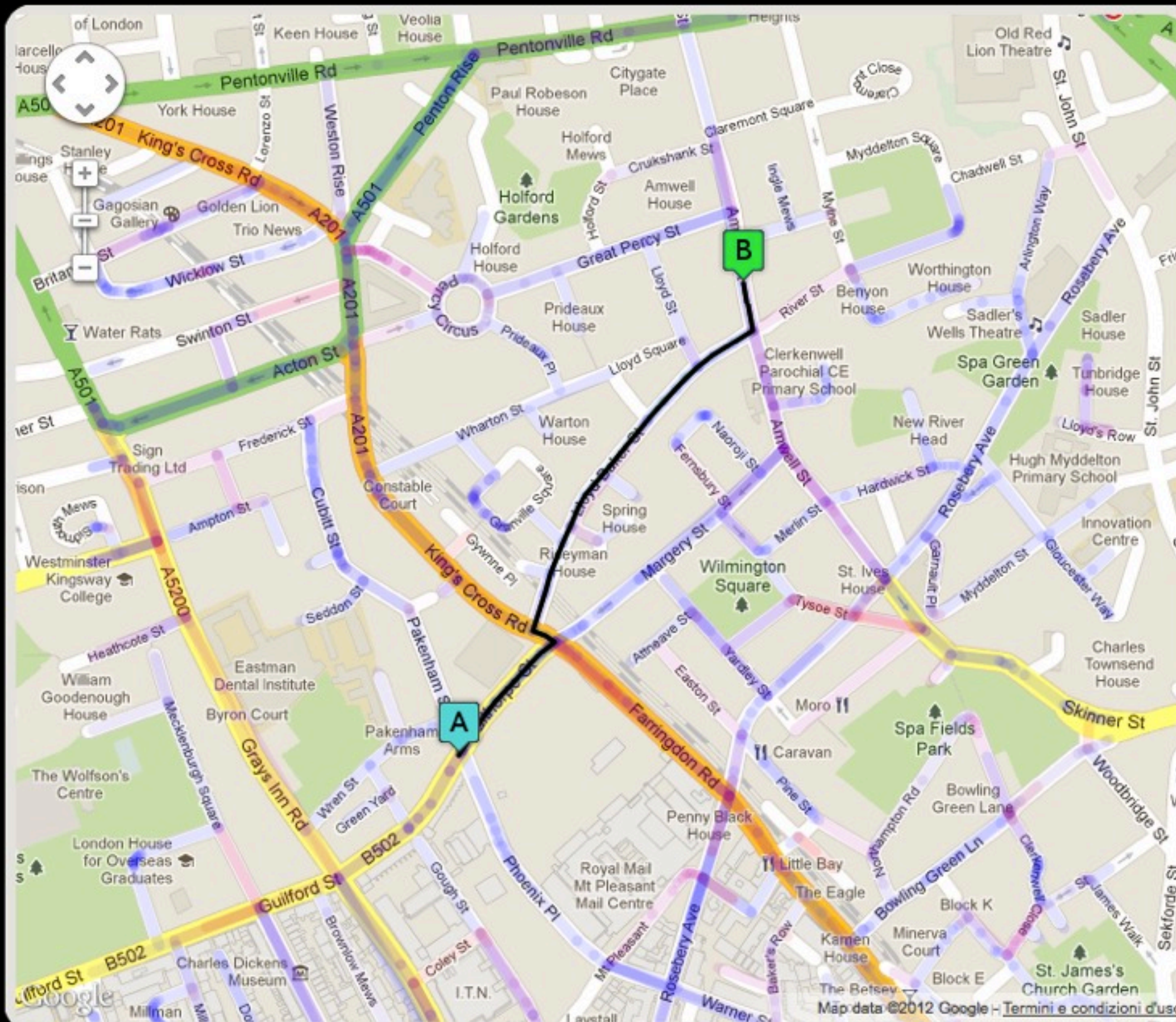
Drawing a route from A to B...

Select, by clicking on the map (green area), the next point to move to.

To finish, click on B.

Tips

- * The colours on the street express how busy that street is (red - very busy - to blue - very low traffic).
- * Make sure you pay attention to one-way streets and the lane you start from.
- * Take small steps in order to control exactly the route, otherwise the shortest path by Google Maps will be used.
- * You can revert only one move per game.
- * You can finish, by clicking on B, only after B is within the green area.



Score: good!



Exact score is 1.00

	You	Google
Distance (m)	570	571
Time (s)	1min 15s	1min 15s
Speed (km/h)	27.35	27.40

Play Again

Without traffic information:
1.00.

	You	Google
Time (s)	2min 6s	2min 6s
Speed (km/h)	16.29	16.31

Nexicon

Exit

00:04

TIME

2/3

*keep writing things
related to this word
until you guess what
the other player wrote*

FAST

type a word and hit Enter key

CLOCK, DATE

think words
association
idea
social
speak
language

Human Brain Cloud

massively multiplayer word association "game"

[play](#)[view the cloud](#)[leaderboard](#)[what is it?](#)

bus

submit

instructions:

Look at the word. **Type the first word or phrase that comes to mind.** This will gradually help build a giant network of associated words you can [view](#).

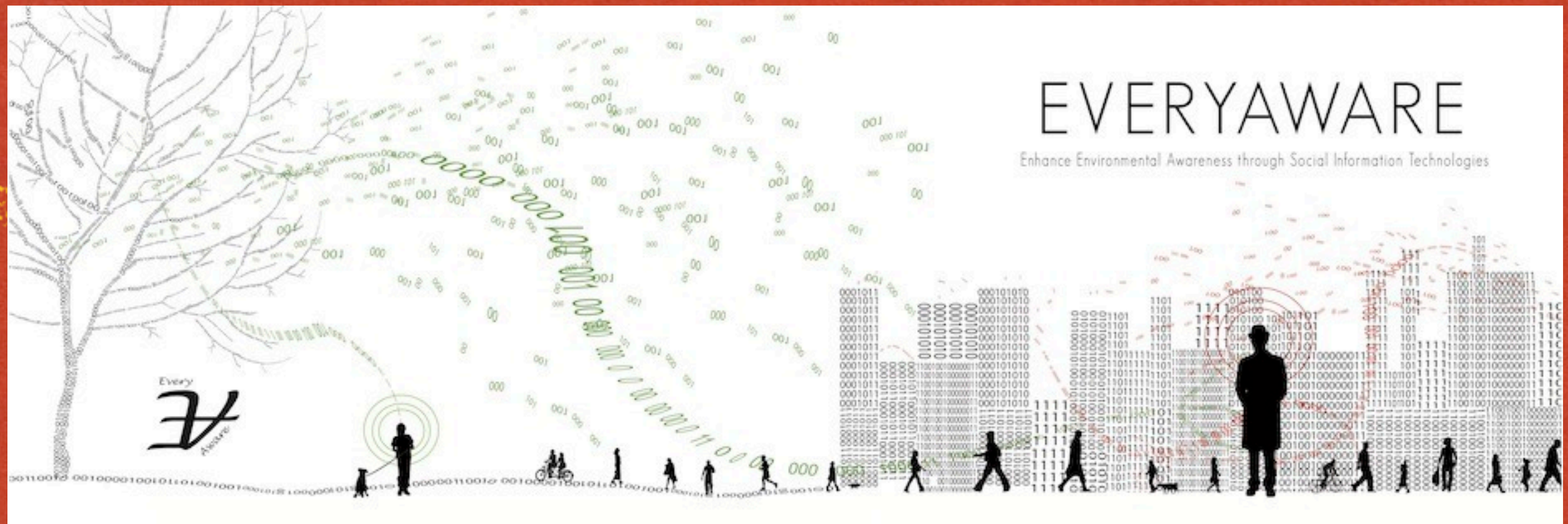
- To [skip](#) a word, just press "enter".
- Flag this word as [junk](#) or [not a word](#)
- Flag this word as [misspelling](#)

updates:

- note: occasionally the site gets very busy and goes down for a few minutes. (If you are playing the game and you start getting strange message boxes, that's why..) I'm trying to fix it, but until then, just wait a couple minutes, and refresh. Sorry about that!
- some [interesting stats](#)

Raise awareness and participation

- Monitoring of common resources and environment
- Monitoring of societies
- Feedback to policy makers
- Sustainable development
- ...



Enhance environmental awareness
through social information technologies

<http://www.everyaware.eu/>



EveryAware concept

objective/subjective monitoring

pressure on policy
making

enhanced awareness

change of individual behaviours

development of new ICT tools

*"Tell me, I forget.
Show me, I remember.
Involve me, I understand."*

Chinese proverb

Citizen Science

...individual volunteers or networks of volunteers, many of whom may have no specific scientific training, perform or manage research-related tasks such as observation, measurement or computation.

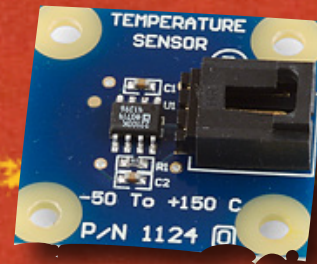
GPS helps Pygmies defend forest

J. Lewis (UCL)



Lewis, J. From abundance to scarcity. indigenous resource management and the industrial extraction of forest resources. some issues for conservation. African Studies Seminar, Edinburgh. (2004).

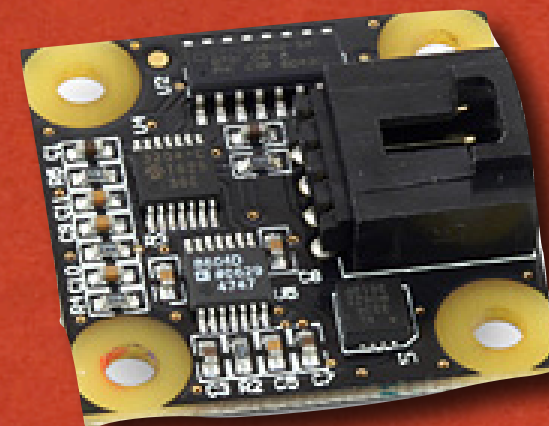
Tel: +91 80 6720 1000



Temperature/humidity



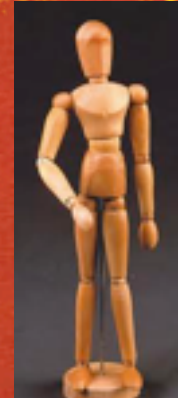
Movement



Magnetic

Objective vs. Subjective monitoring

Measured
Quantities



*participatory
sensing*

Opinions
Perceptions
Impressions
Personal Experiences

Main themes

*social
computation*

*participatory
sensing*

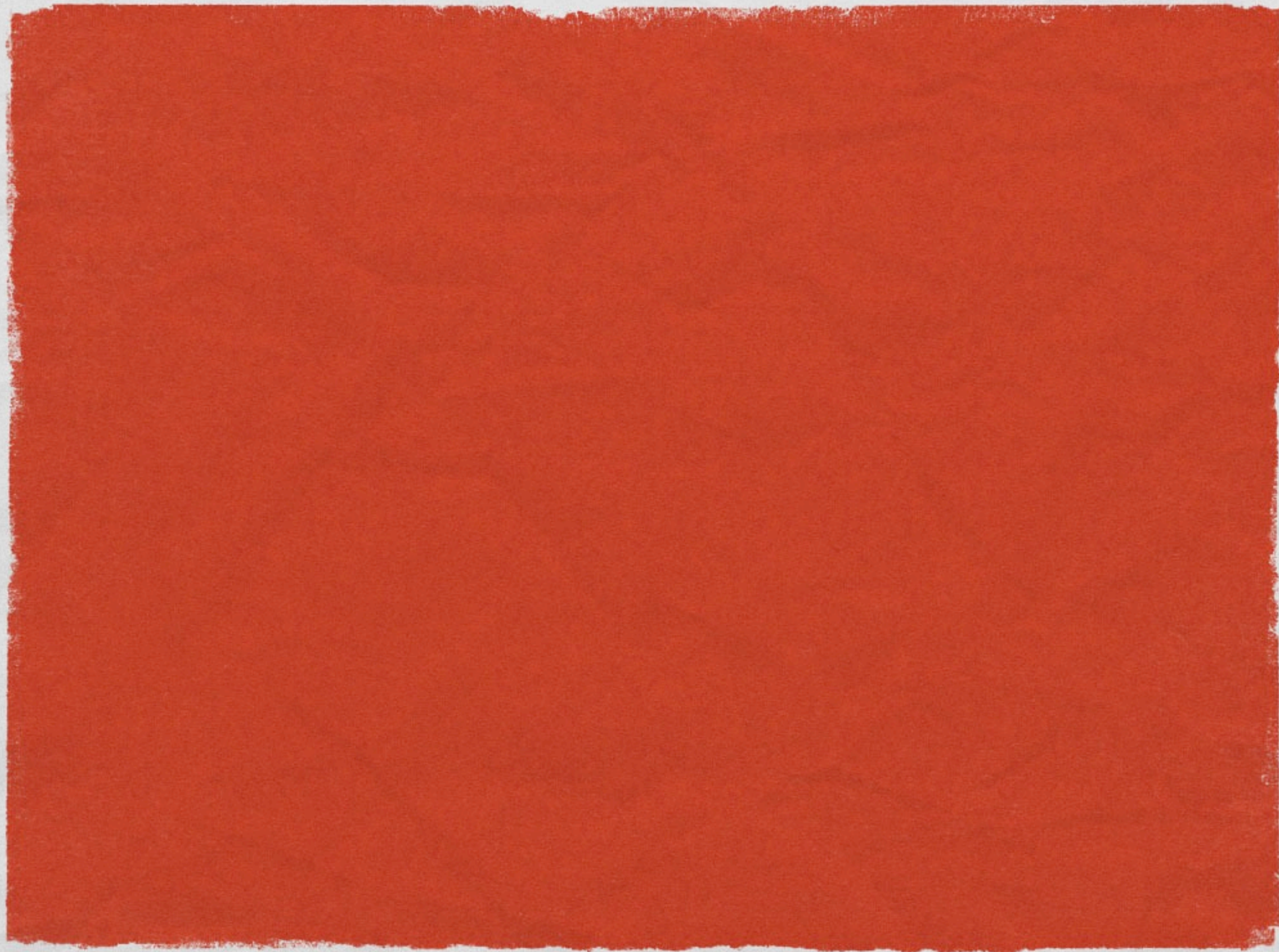
*geolocation
and
geographic
mapping*

*opinion
dynamics
///
decision
making*

*data
management*

*complex
systems
modeling*

The EveryAware platform





Sensor
box



Objective data

Sensor
box

GPS, accelerometers

Temperature, humidity

Noise

Air quality (NOx, Ozone, CO, ...)

e.m sensors, geiger



Objective data

Subjective data

Tags

Annotation

Votes

Comments

Sensor
box

GPS, accelerometers

Temperature, humidity

Noise

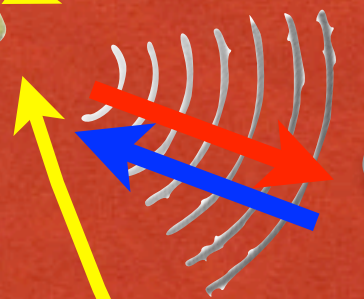
Air quality (NOx, Ozone, CO, ...)

e.m sensors, geiger



Objective data

Subjective data



Sensor
box



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Objective data

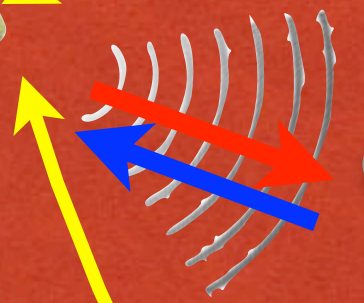
Subjective data

Tags

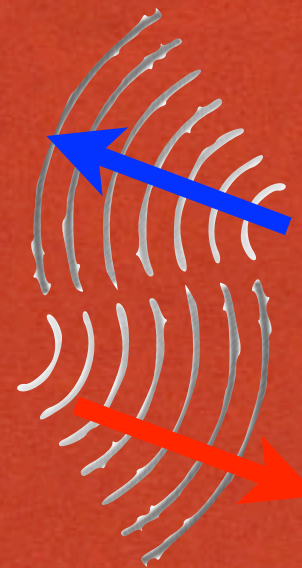
Annotation

Votes

Comments



Sensor
box



Server



GPS, accelerometers

Temperature, humidity

Noise

Air quality (NOx, Ozone, CO, ...)

e.m sensors, geiger



Objective data

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Sensor
box



Server



GPS, accelerometers

Temperature, humidity

Noise

Air quality (NOx, Ozone, CO, ...)

e.m sensors, geiger



Different scales



Users with
sensor box
(air quality)
~200-300



Users with
smartphones
(noise pollution)
~1000-10000



Web users
Web games
Opinions

Case studies

London

Bruxelles
Antwerp

Turín

Rome





WideNoise, the iPhone & Android app that helps you understand the soundscape around you.

There are various kind of pollution that get often on the first page of newspapers. Noise pollution instead is rarely cited, but it's something that constantly surrounds us even if we are not aware of. WideNoise will help you to better understand the soundscape around you & live a healthier life.



Get WideNoise
for iPhone

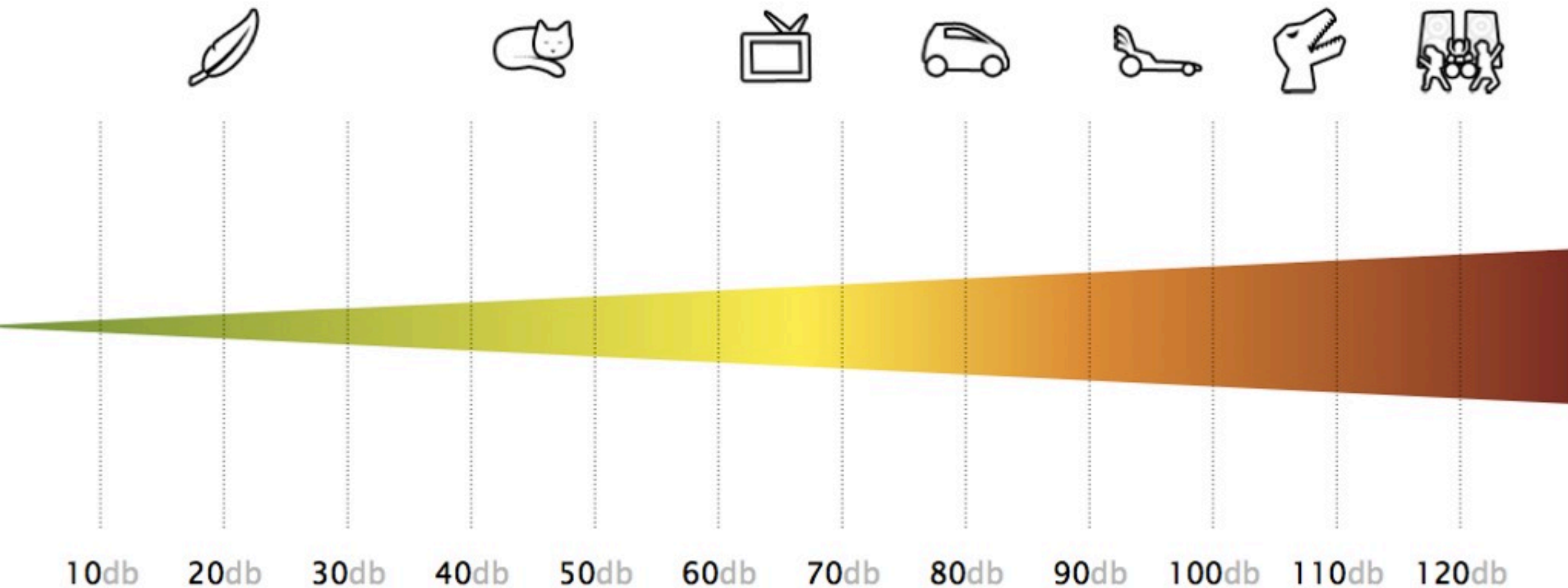


Get WideNoise
for Android



<http://cs.everyaware.eu/event/widenoise>

Each sound level is represented
as a symbolic noise emitter:



*Nobody knows how much noise is "65db",
but everyone knows the noise level of a TV!*

Objective monitoring



Objective monitoring



Objective monitoring



Objective monitoring

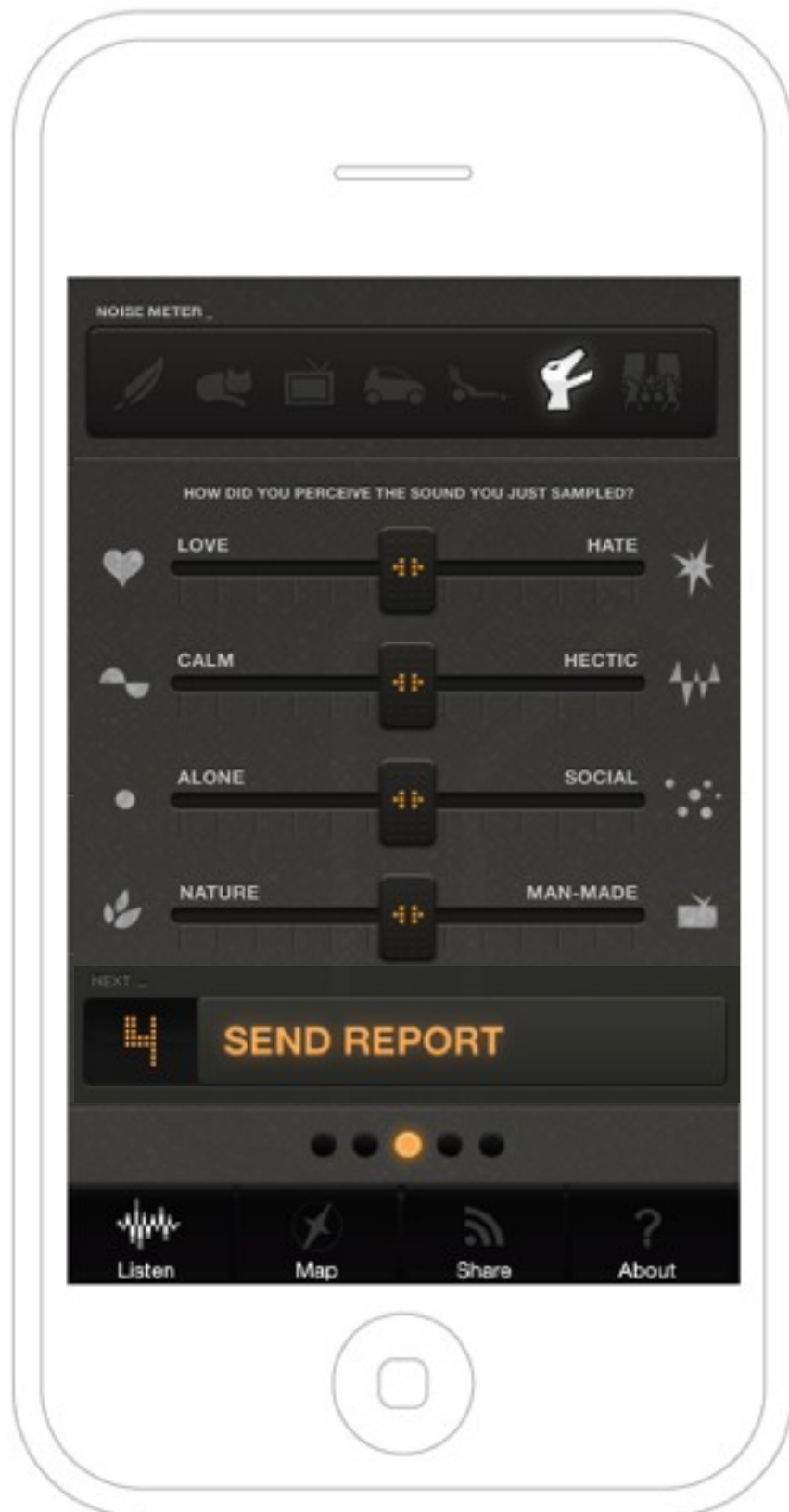


Objective monitoring



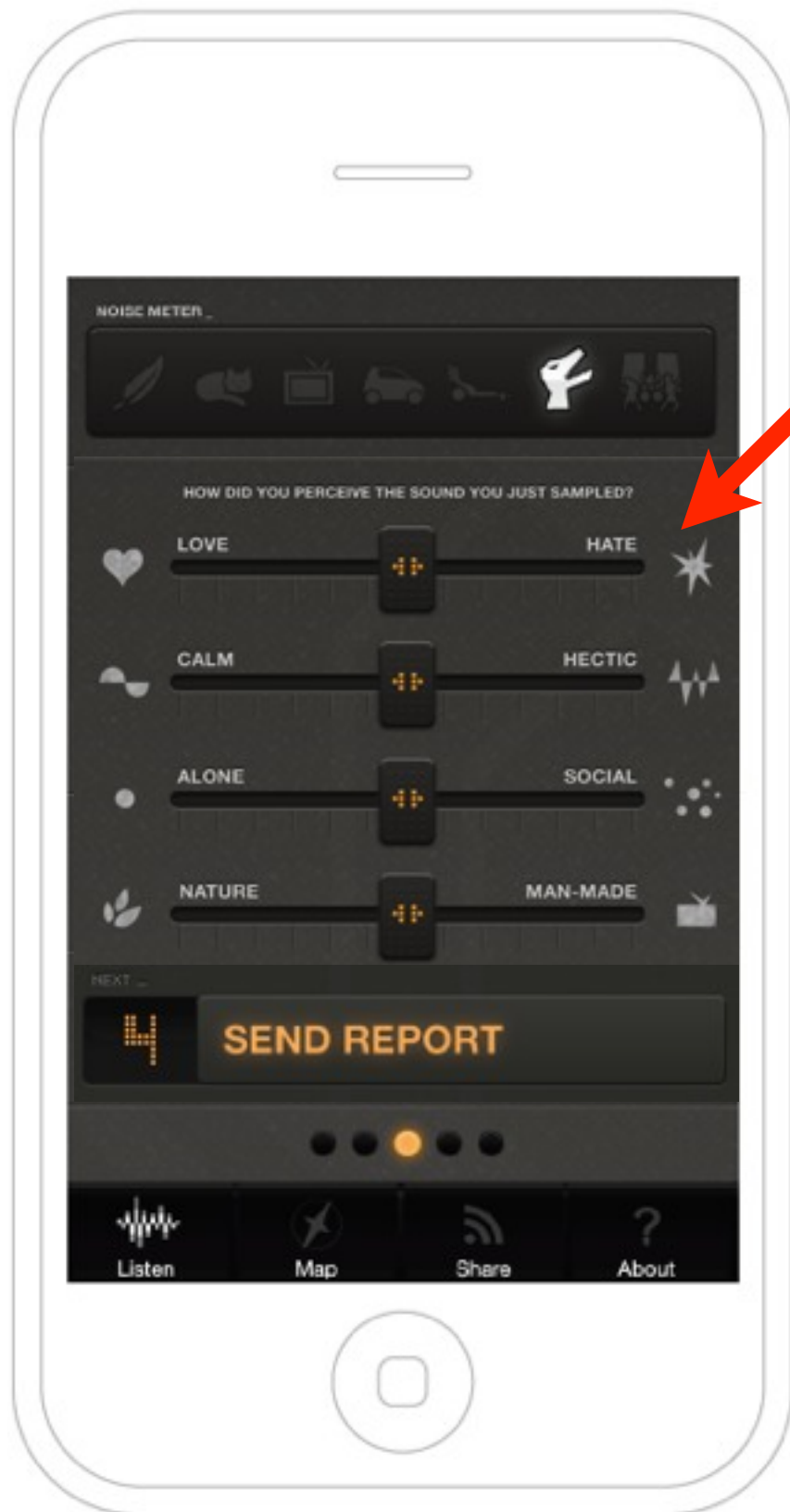
Subjective monitoring

Subjective monitoring



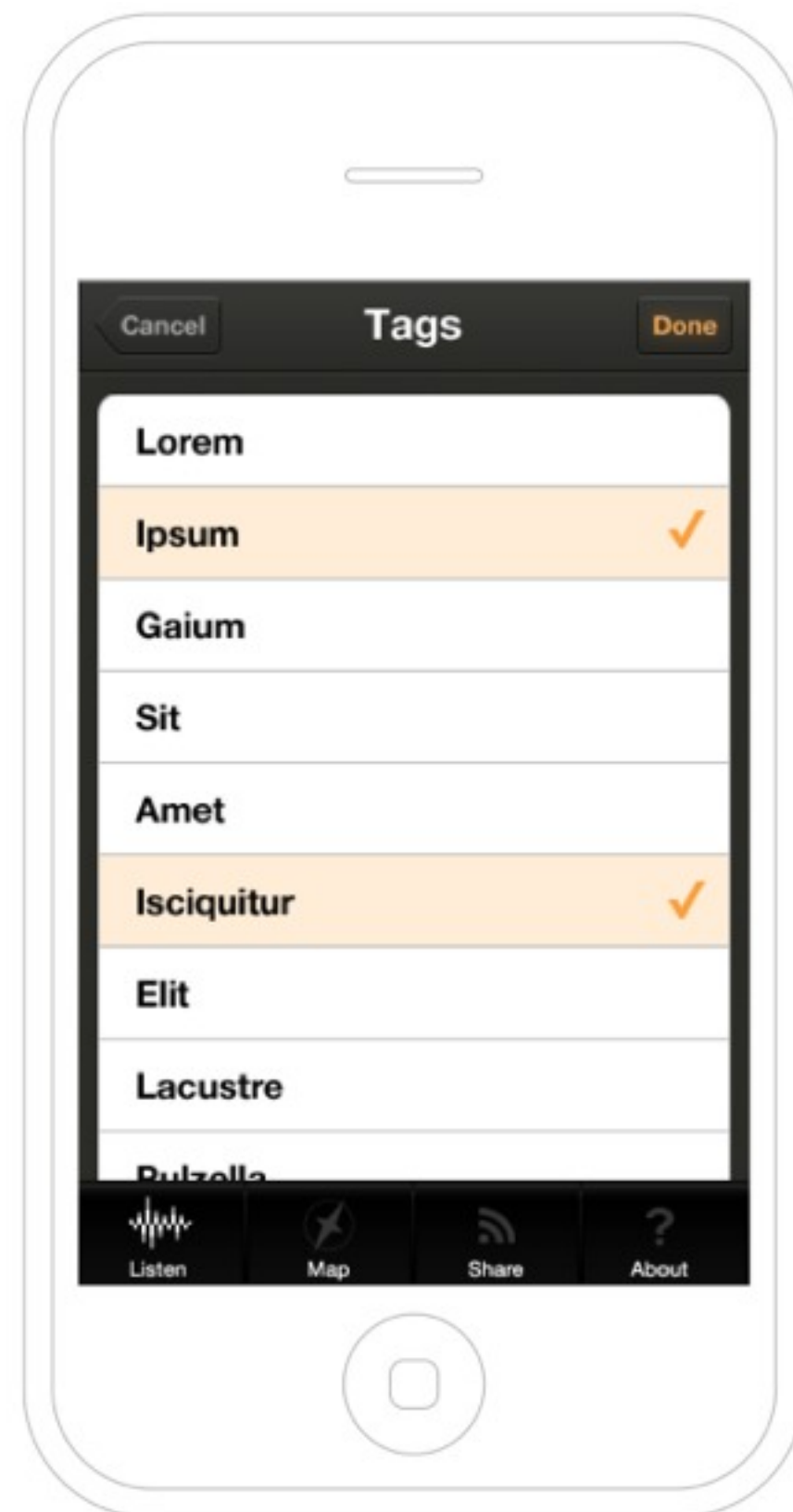
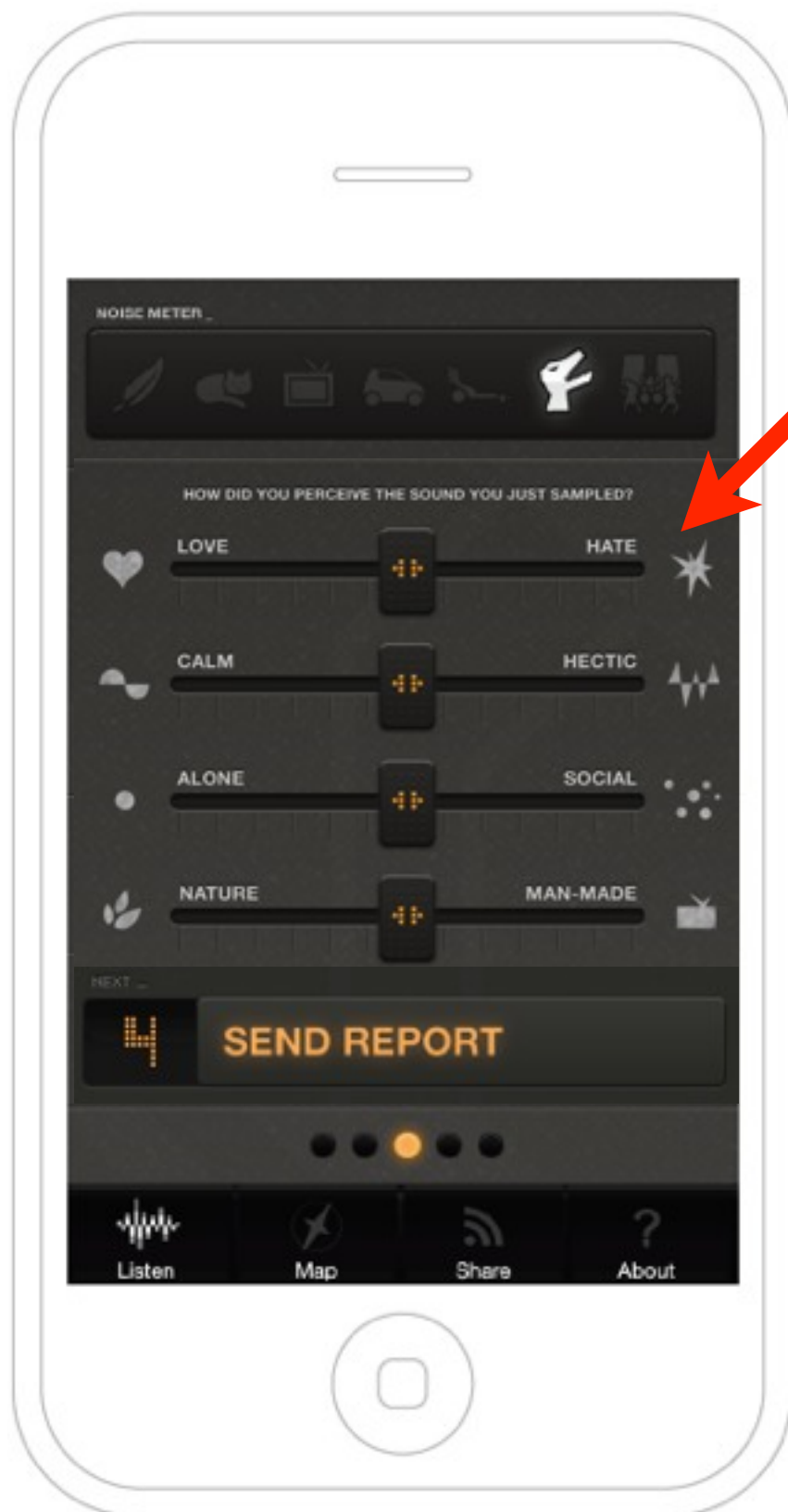
Subjective monitoring

Sliders

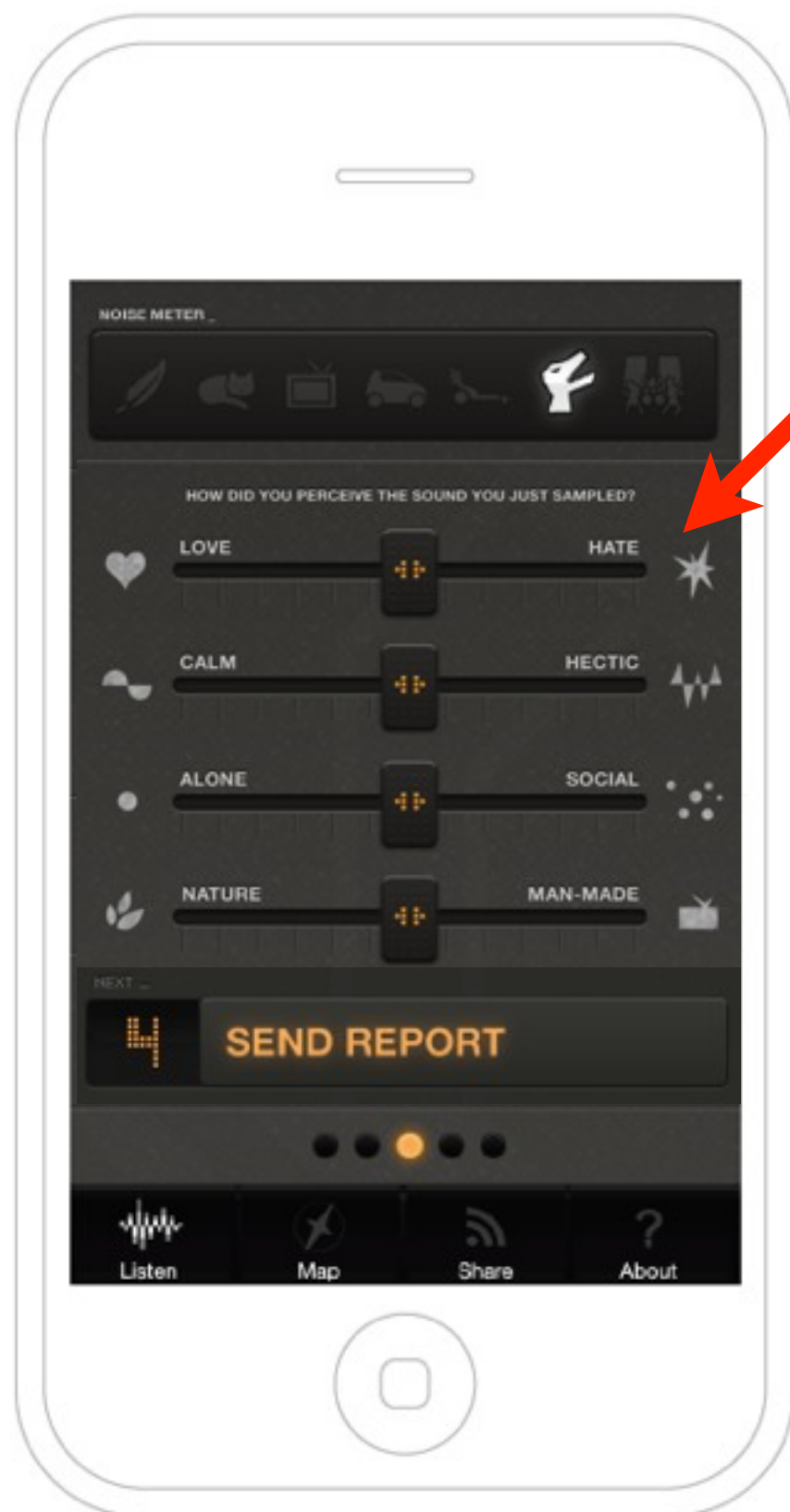


Subjective monitoring

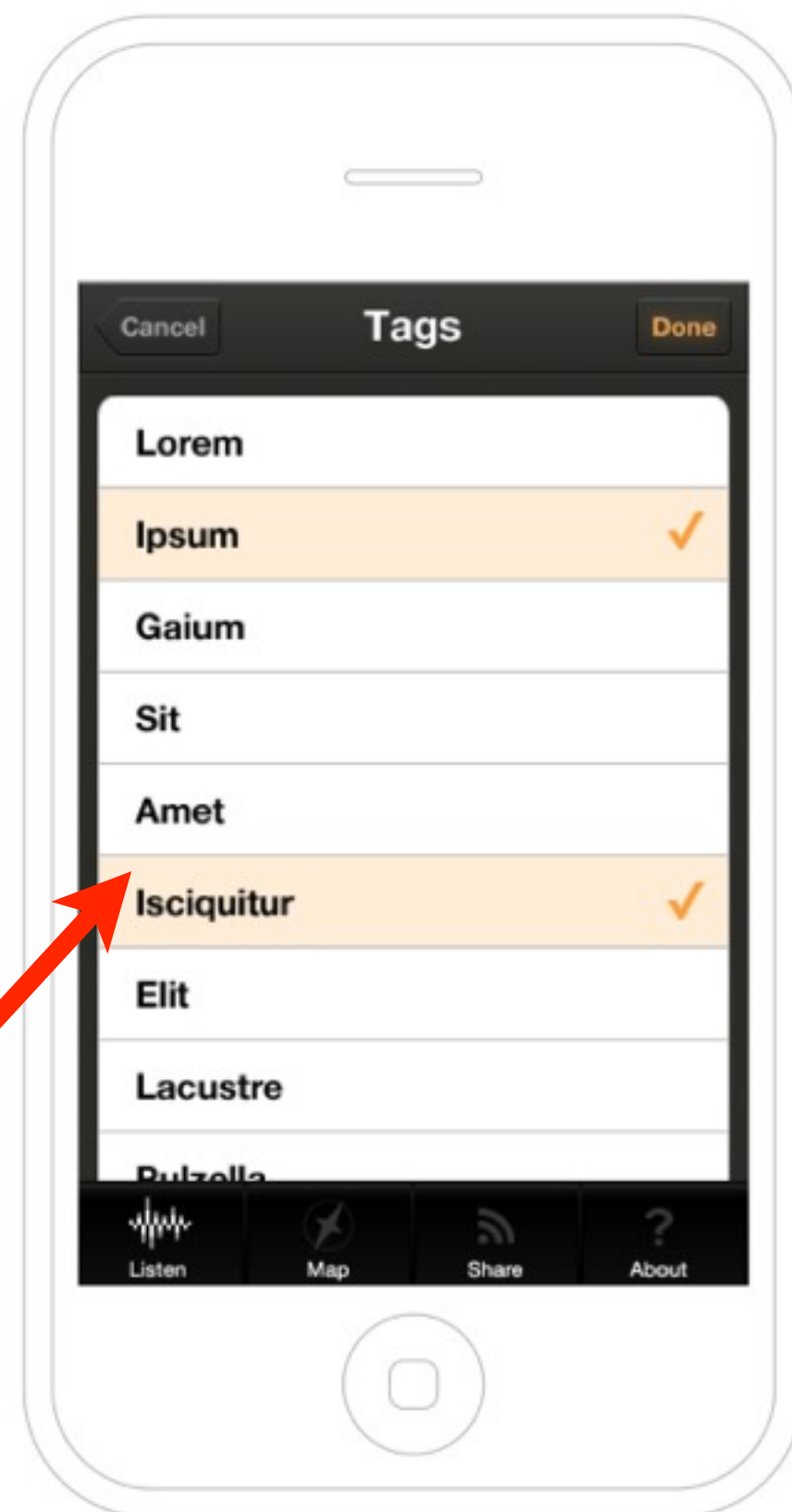
Sliders



Subjective monitoring

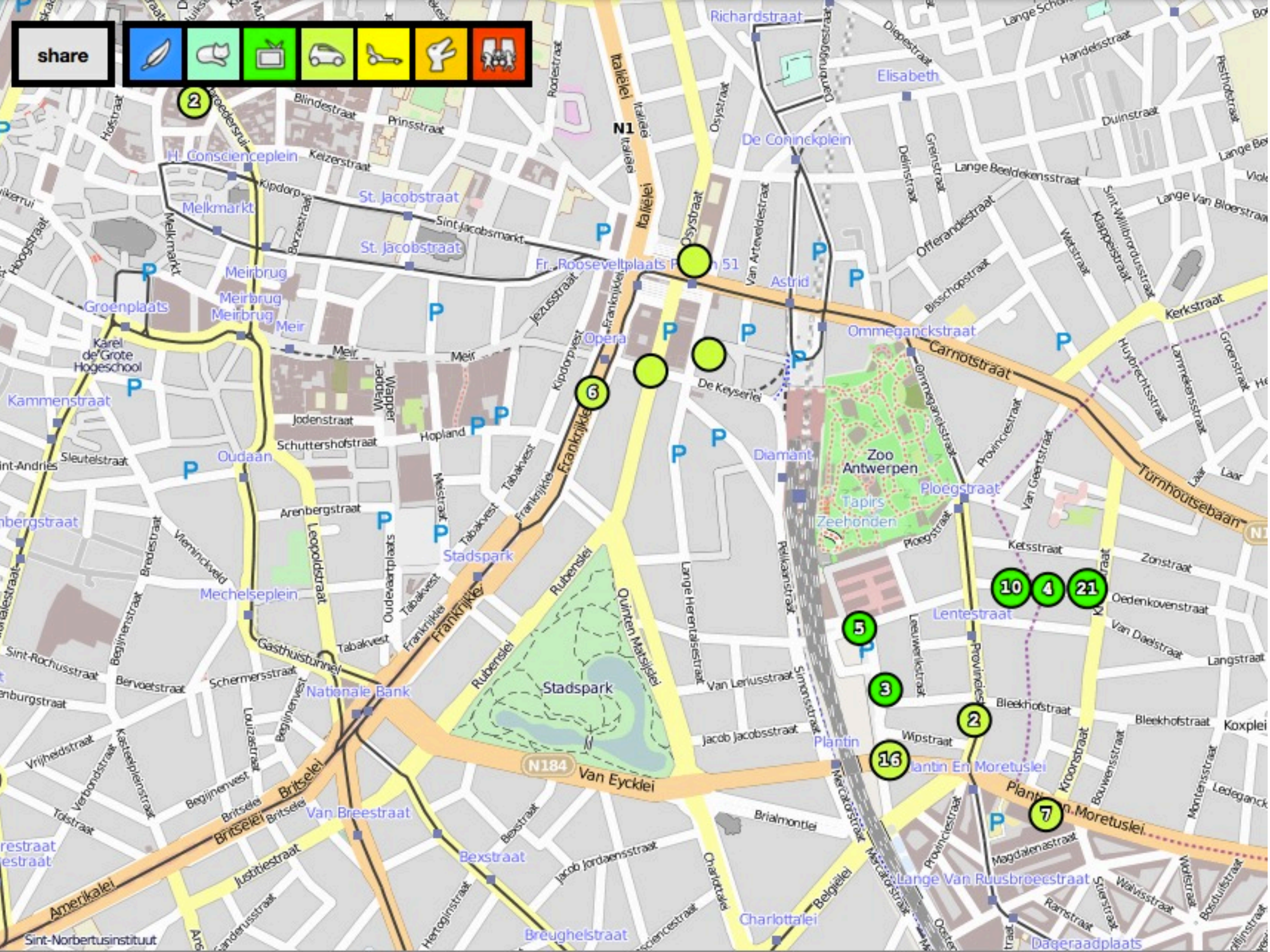


Sliders



Tags

share



share



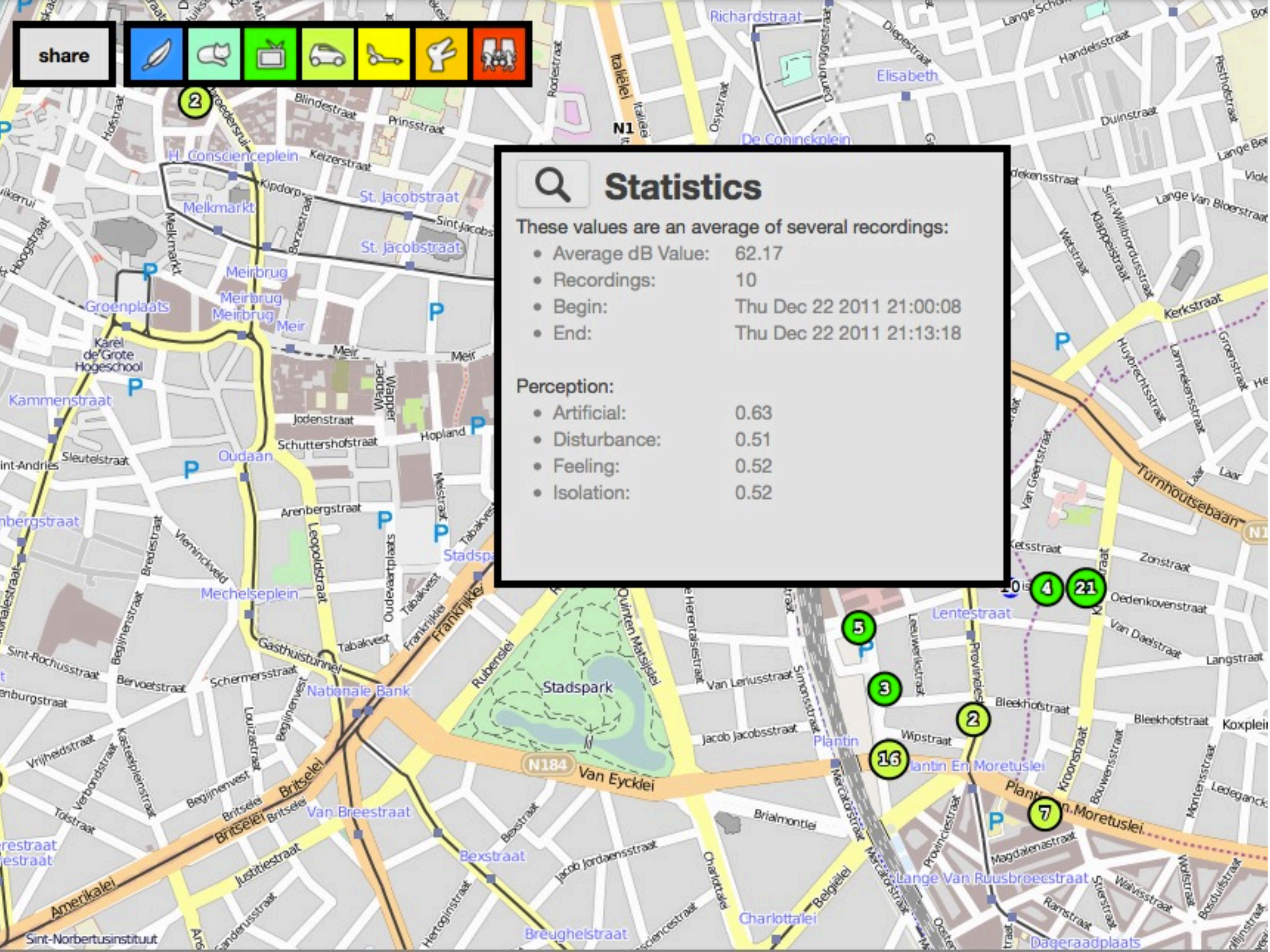
Statistics

These values are an average of several recordings:

- Average dB Value: 62.17
- Recordings: 10
- Begin: Thu Dec 22 2011 21:00:08
- End: Thu Dec 22 2011 21:13:18

Perception:

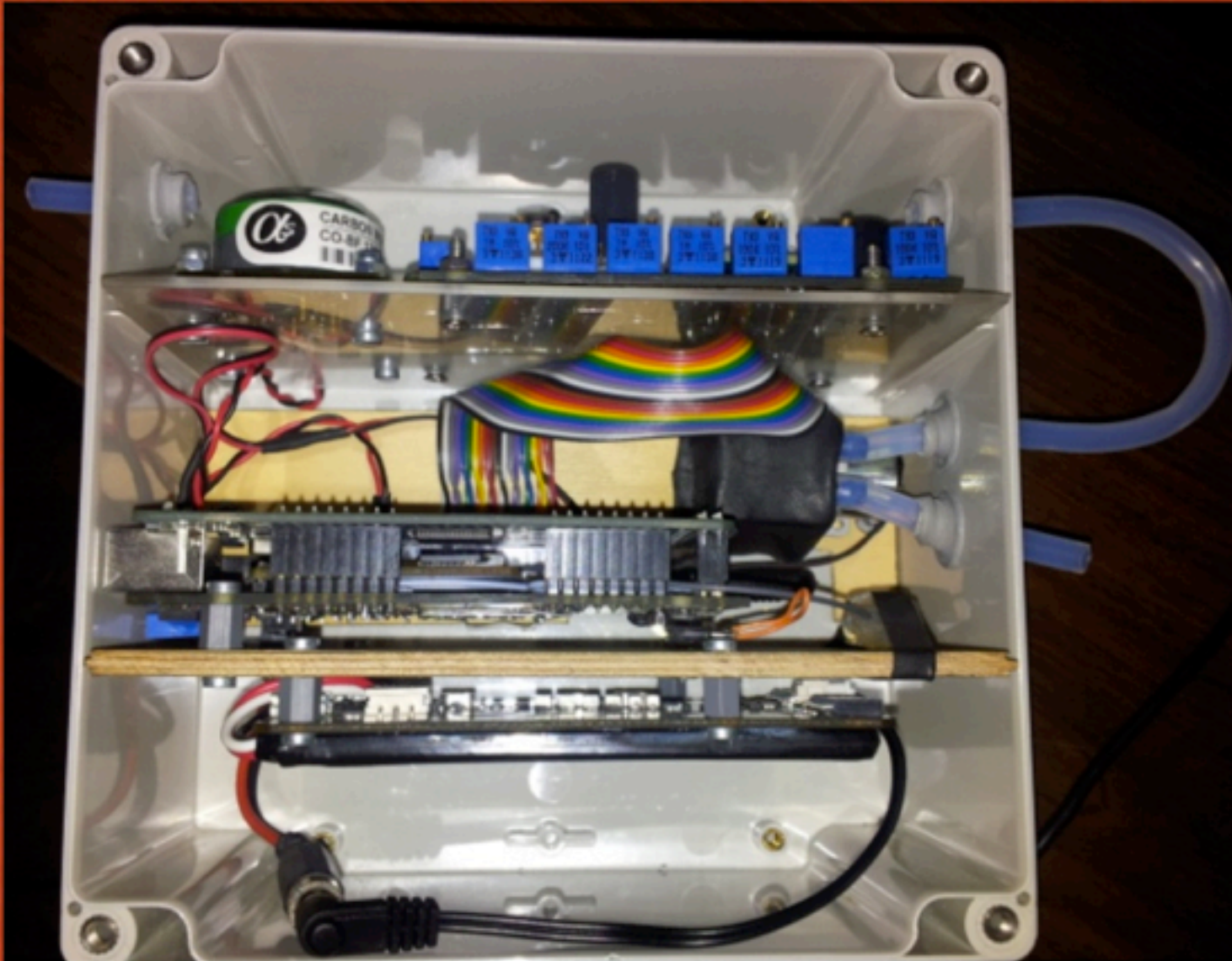
- Artificial: 0.63
- Disturbance: 0.51
- Feeling: 0.52
- Isolation: 0.52



case study on

Air quality monitoring

SensorBox



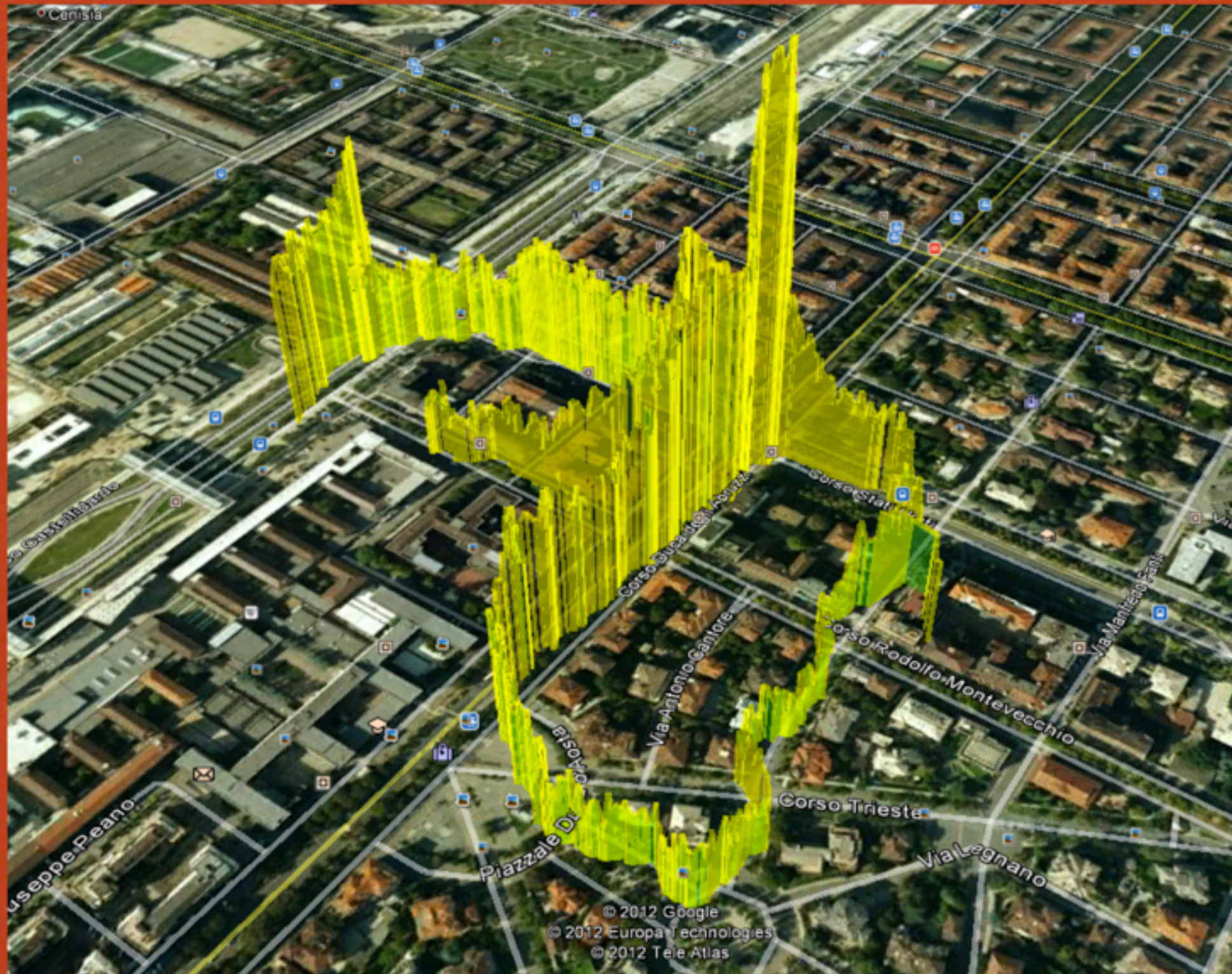
Li-po battery of 4500 mAh

Measurement rate of 1 Hz

Power consumption of 2.5 W

Battery duration of 6-7 hours

CO measurement



NO₂ measurement



Main objectives

- * monitor personal exposure
- * extract relevant and reliable environmental information
- * investigate and stimulate fundamental shifts in public opinion
- * stimulate an efficient usage of shared resources

Thanks to:



SAPIENZA
UNIVERSITÀ DI ROMA



SENSOR - BOX

Thanks to:

Stefano Ingarra (CSP)



Andrea Molino (CSP)

Bart Elen (VITO)

Jan Theunis (VITO)



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Jan Theunis (VITO)



WIDENOISE^{3.0}



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SENSOR - BOX

Stefano Ingarra (CSP)

Andrea Molino (CSP)

Bart Elen (VITO)

Jan Theunis (VITO)



Thanks to:



Saverio Caminiti

Claudio Cicali

Pietro Gravino

Gabriele Paolacci

Vito D.P. Servedio

Francesca Tria

Massimo Warglien

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