#### thoughts on community detection OVEREAD OVERED

adrien friggeri

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what? he said captain







Group of people with Common interests who know each other





## compression



## compression

## reduce the **Clutter**

![](_page_10_Picture_0.jpeg)

![](_page_11_Picture_0.jpeg)

#### lack of semantics mostly structure

![](_page_12_Picture_0.jpeg)

![](_page_13_Picture_0.jpeg)

## stuff out of links

![](_page_15_Picture_0.jpeg)

![](_page_16_Picture_0.jpeg)

#### partition

![](_page_17_Picture_0.jpeg)

#### each node is in one community

![](_page_18_Picture_0.jpeg)

![](_page_19_Picture_0.jpeg)

![](_page_20_Picture_0.jpeg)

#### overlap

![](_page_21_Picture_0.jpeg)

#### each node is in one community at least

![](_page_22_Picture_0.jpeg)

**CONSEQUENCES** grandiose allusions

	partition	overlap
community size	$\leq n$	$\leq n$
number of communities	$c \leq n$	$c \leq 2^n$
number of divisions	n <sup>th</sup> Bell number	$\simeq 2^{2^n}$
space to store one division	n log <sub>2</sub> c	nc

#### n nodes, c communities

![](_page_25_Picture_0.jpeg)

 $\sim$  5.79  $\times$  10  $^{76}$  overlaps of 8 elements  $\sim$  1.57  $\times$  10  $^{79}$  particles in the observable universe

 $\sim$  250 particles/overlap...

ideal algorithm make a wish

#### local deterministic

![](_page_29_Picture_0.jpeg)

locality

![](_page_30_Picture_0.jpeg)

## what about time ?

![](_page_31_Picture_0.jpeg)

## non deterministic

## from partition to overlap DRY, KISS

![](_page_33_Picture_0.jpeg)

## top-down

#### where to split ? bias towards central nodes

![](_page_35_Figure_0.jpeg)

![](_page_35_Figure_1.jpeg)

bottom-up

## combinatorial explosion boom

**Solutions** or ideas thereof

![](_page_38_Figure_0.jpeg)

#### bounded overlap limit number of communities

#### mostly distinct limit overlap coefficient

mitigate constraints

# $1 \text{ node} \Longrightarrow C \text{ communities} \\ \text{local exploration}$

![](_page_40_Picture_1.jpeg)

# compression : *n*-overlap interests inference : egomunities

conclusion: the right tool

![](_page_42_Picture_0.jpeg)