Identifying Websites with Flow Simulation

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What is a website?

- Simple idea: website = webserver
- But:
  - Some websites span over several webservers, or even over several DNS domains.
  - Some webservers host different websites.
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Several applications:

- Automatic archiving of websites (without asking the content providers the list of the webpages belonging to their site).
- SiteRank: a ranking measure for websites, as PageRank for webpages.

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Outline

1 Introduction

2 Flow Simulation

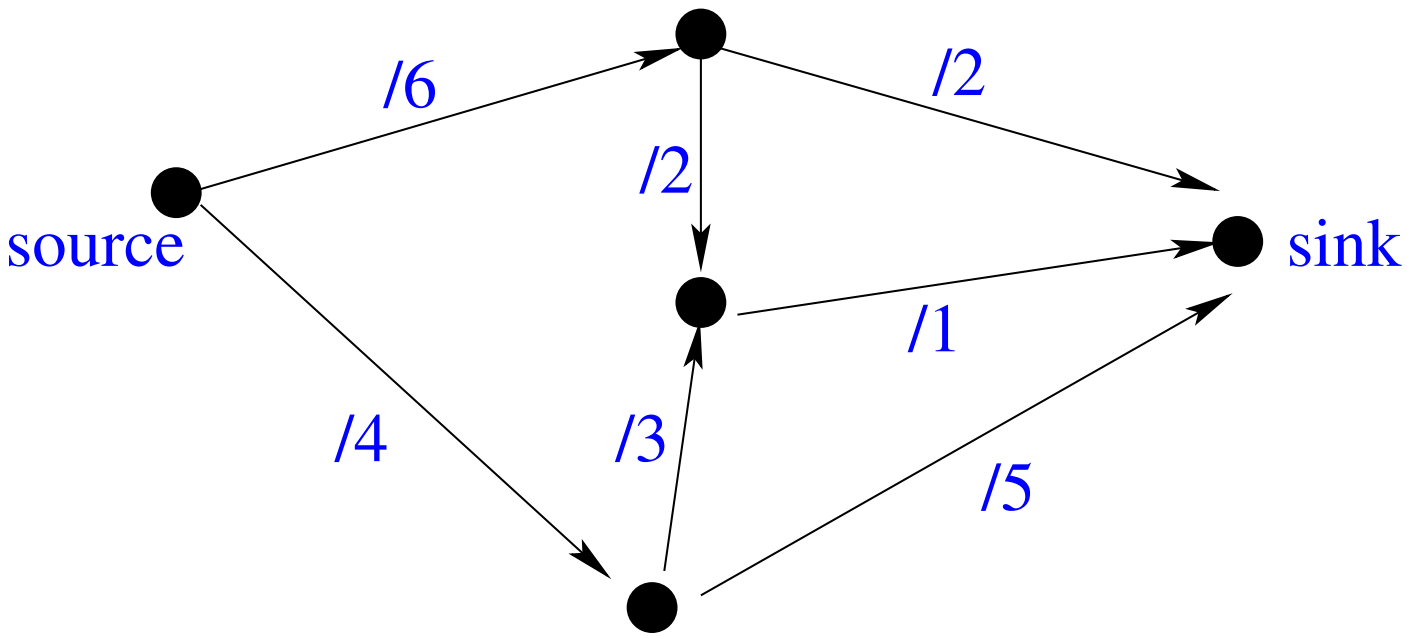
3 Seed Extension

4 Experiment

5 Conclusion

Maximum flow/Minimum cut

- Traffic network.
- Maximum flow $\equiv$ Minimum cut.



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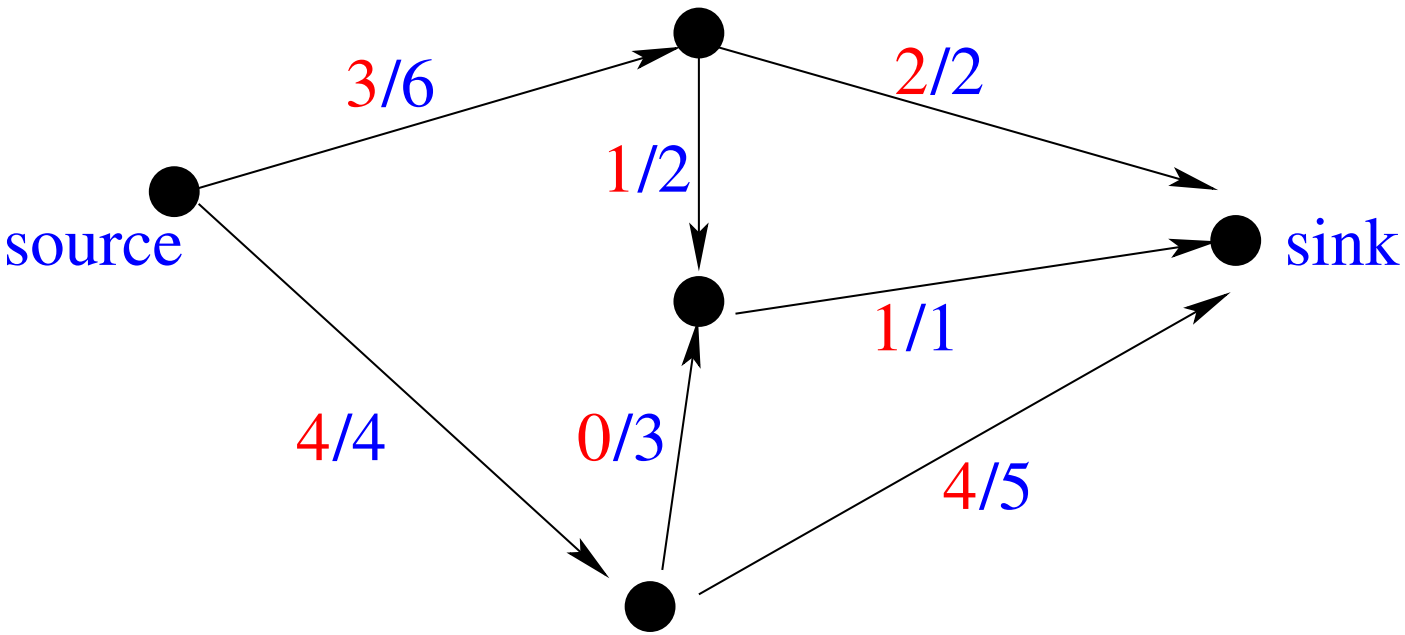

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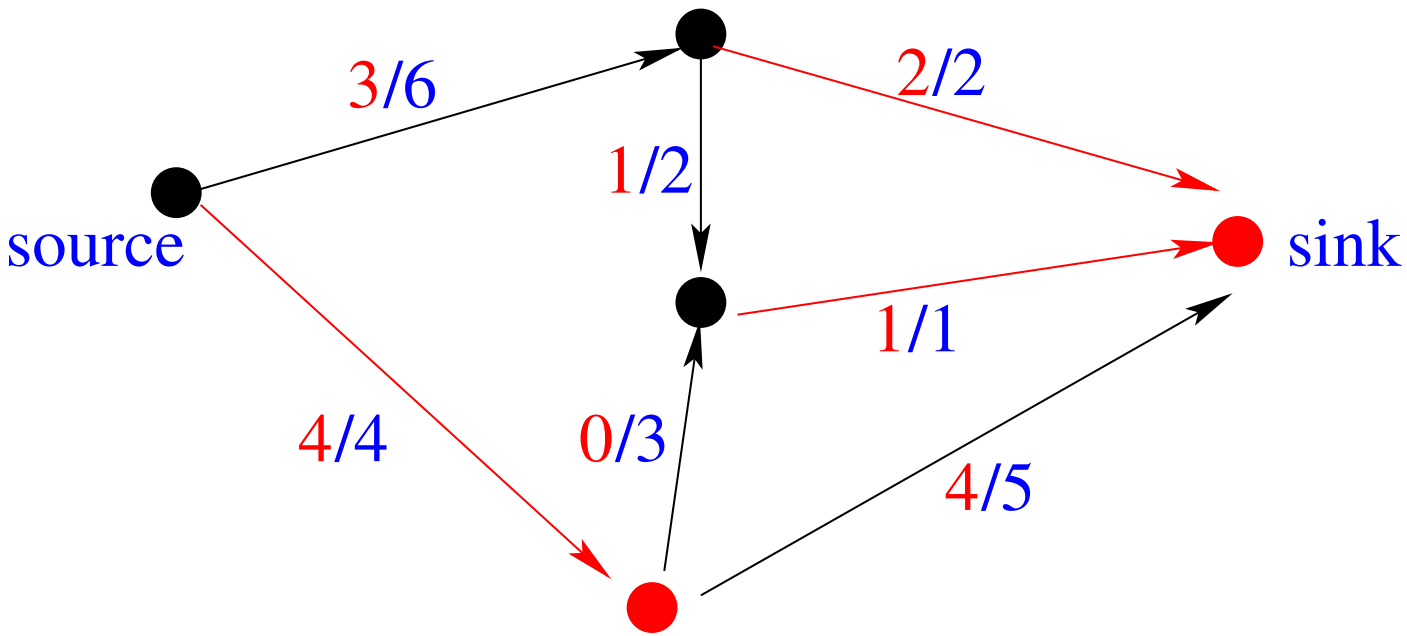

Preflow-Push algorithm

1. All nodes are assigned a height h: $h(source) = N$, $\forall k \neq source, h(k) = 0$ (N is the number of nodes)
2. Nodes with an overflow are visited, in any order.
   - If possible, the flow is pushed toward a lower node. Capacities of edges are respected.
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Theorem

The process converges, whatever the sequence of visited nodes may be. The maximum flow is obtained at the limit.

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Adaptation to the World Wide Web

Website

Nodes of a traffic network delimited by a MaxFlow / MinCut.

- Nodes: webpages, progressively crawled.
- Edges: hyperlinks.
- Capacities: edit distance between URLs.
- A virtual source, pointing to a seed of pages with infinite capacity edges.
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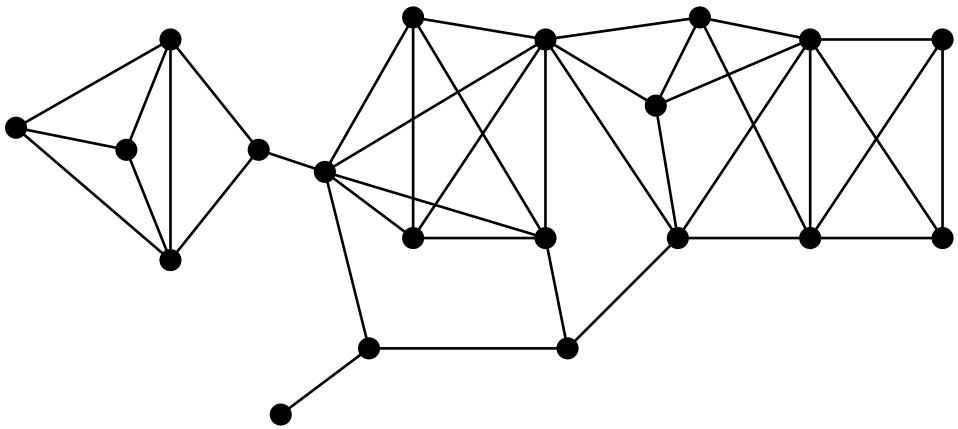
An off-line graph clustering algorithm



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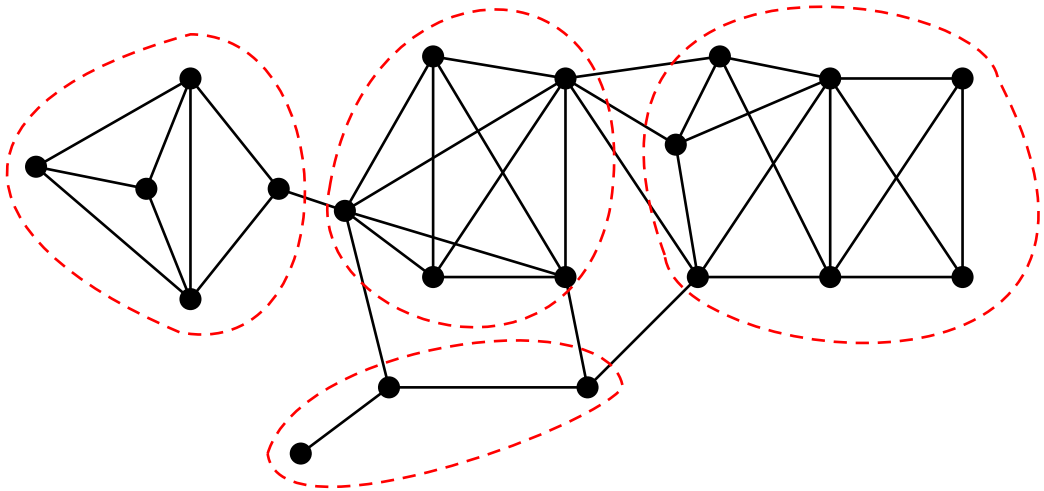

Flow simulation from MCL clusters

Process

1. MCL Clustering of a large, a priori relevant, portion of the Web graph.
2. Identification of the most relevant cluster(s).
3. Flow simulation starting from this cluster.

Advantages over MCL alone

- Dynamic discovery of clusters.
- Use the fact that the graph is directed.

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Experiment description

GEMO website identification

1. Crawl of a large part of `*.inria.fr/*`
2. MCL clustering of the obtained graph
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Results

	Pages	Precision	Recall
Flow Simulation	8	87.5%	1.3%
MCL	320	99.7%	33.0%
MCL + Flow Sim.	788	90.4%	86.4%
`http://www-rocq.inria.fr/verso/*`	221	100%	44.4%
`http://*.inria.fr/verso/*`	683	100%	68.6%

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