

Spy vs. Spy: Anonymous Broadcasting over Networks

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Anonymity in Social Networks

I hate dealing with this illness!

Makes me feel damaged!

Jason Rezaian's Year of Imprisonment in Iran

Wednesday marks the one-year anniversary of the Washington Post reporter's detention in the Islamic Republic.

Saudi Man Gets 10 Years, 2,000 Lashes Over Atheist Tweets

Personal Confessions

Political Activism

Russian Activists and Journalists Attacked at

شكرًا شباب

FACE BOOK

Can we design social networks that protect user anonymity?

The Problem

- Design a distributed messaging protocol that:
- a) Spreads content quickly over an underlying contact graph
 - b) Prevents an adversary with network oversight from linking messages to their sources

Adversarial Models

Snapshot Adversary

Adversary observes:

- A single snapshot (i.e., which nodes have the message at time T)
- The underlying graph

Spy-based Adversary

Spies with probability p

Colluding spies observe:

- Message contents
- Any message metadata
- The underlying graph

Information Flow in Networks

Most social networks spread content symmetrically based on user input.

Spreading Pattern

Snapshot Adversary

Spy-based Adversary

Source Likelihood: Diffusion

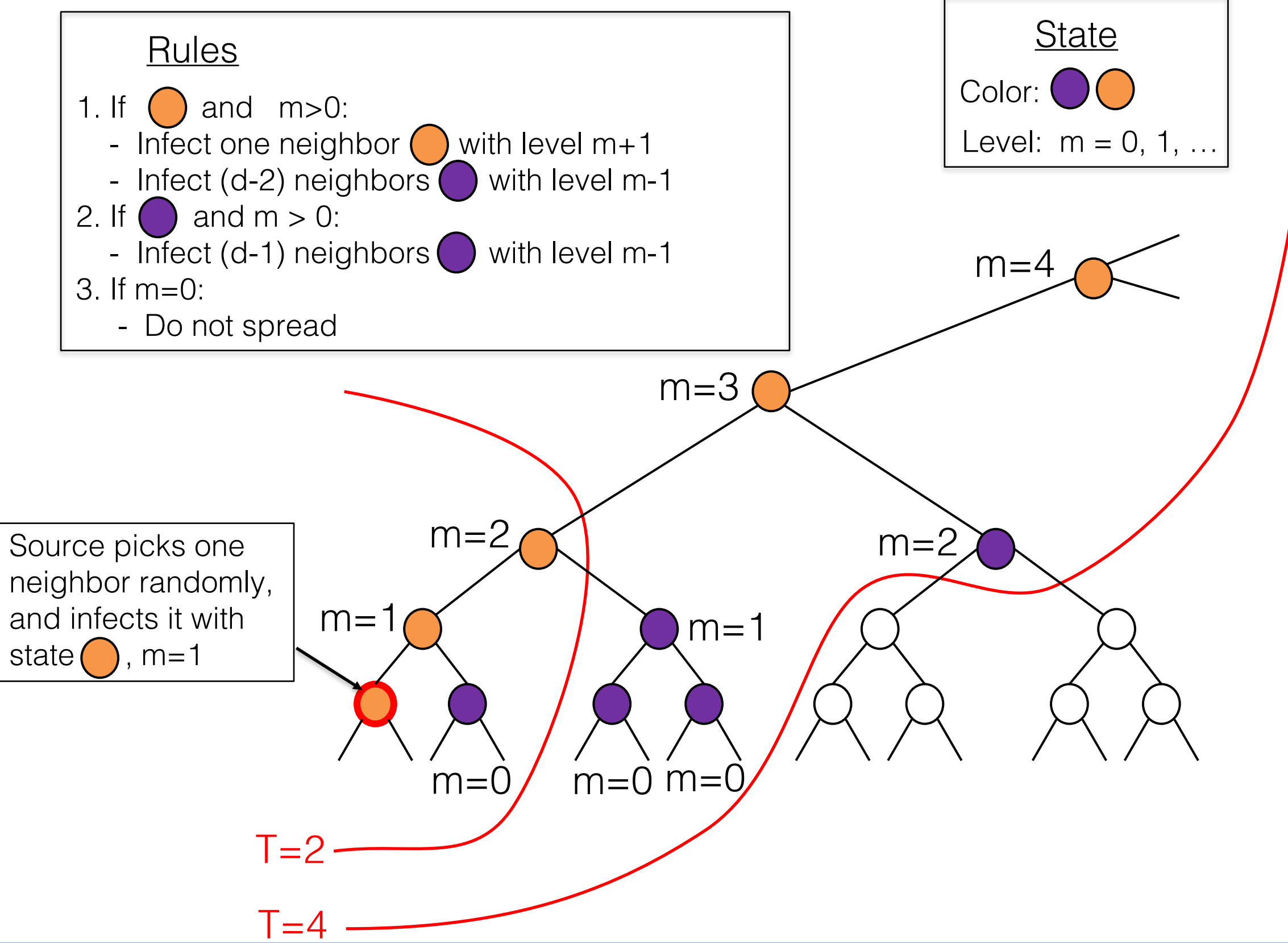
Proposed Solution

Solution: Break the symmetry

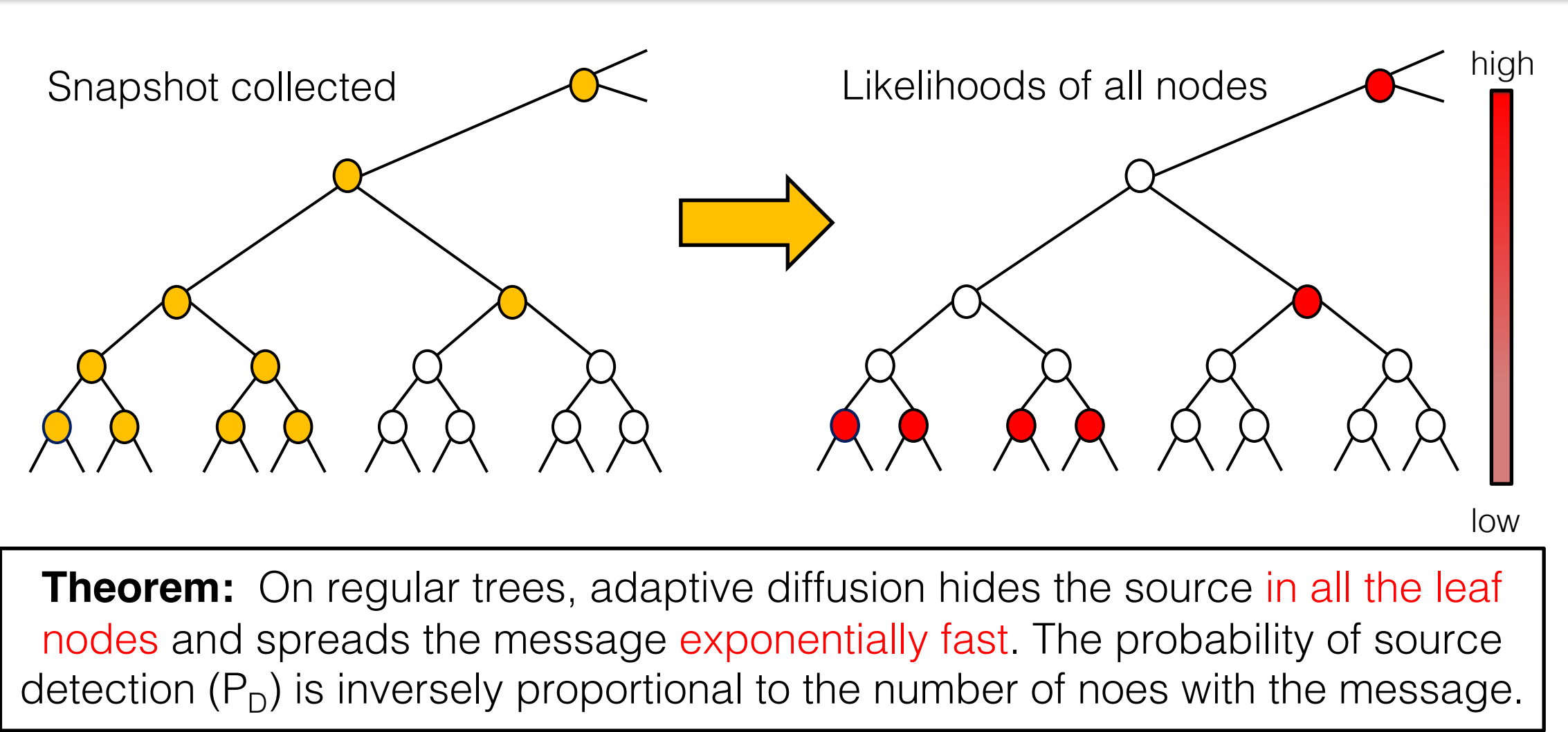
Proposed Solution: Adaptive Diffusion

Adaptive diffusion breaks the symmetry of random diffusion to provide strong, provable anonymity guarantees.

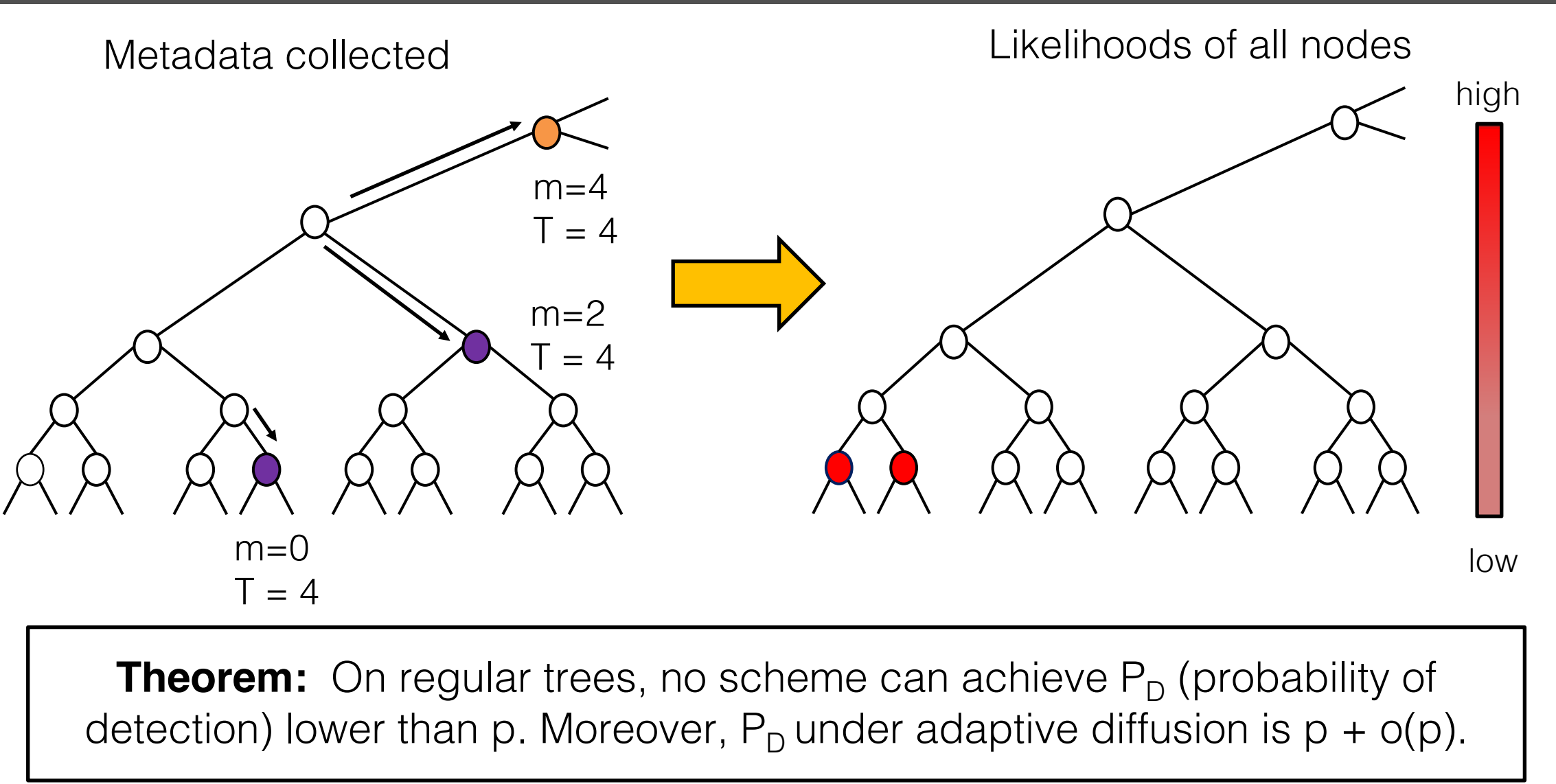
Idea: Build a d -regular tree with the source at one of the leaves.



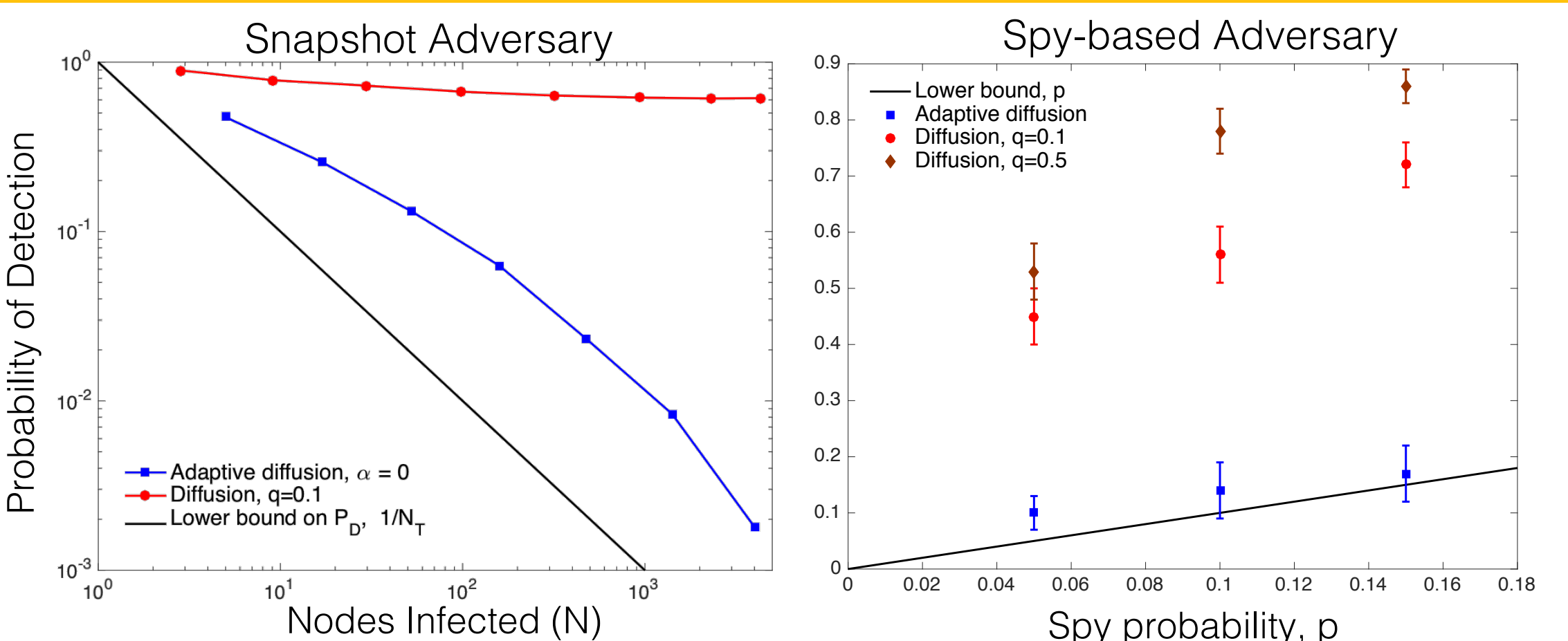
Regular Trees: Snapshot Adversary



Regular Trees: Spy-based Adversary



Adaptive Diffusion on Real Graphs



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VIRTUAL ORGANIZATION
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