In a World That Counts: Clustering and Detecting Fake Social Engagement at Scale

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Fake Social Engagement
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frig200  Há 12 minutos
third
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Responder 

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Great Vlog you and Jade are so lovley
i miss England!!!!!!
Traduzir
Responder 

Linus TechTips  Há 27 minutos
first
Traduzir

Daniel Belcher  Há 6 minutos
Congrats for 100k
Traduzir
Responder 

ramonzenteno  Há 13 minutos
I always watch you I am from Mexico and Me Gusta tus Videos (I like your videos)
Saludos (greetings). See ya
Traduzir
Responder 

7 Gamers 1 CPU is back! But does it ACTUALLY work?!
1,406,060 views 2 months ago
A few weeks ago we unveiled the "7 gamers 1 CPU" computer, and while we ran some benchmarks, many viewers weren't satisfied. Today, we fix that.

TunnelBear message: TunnelBear is the easy-to-use VPN app for mobile and desktop. Visit http://tunnelbear.com/LTT to try it free and save 10% when you sign up for unlimited TunnelBear data....
Lockstep behavior
[Beutel et al. 2013]
Fake Engagement Detection

**Usage**: expand YouTube fake engagement detection coverage

**Given**: A graph models the engagement similarity of two entities

![Graph with nodes and edges](image)

- Known spammers/fake accounts - "seeds"

**Output**: Spammer clusters expanded from the seeds
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About LEMON

LEMON (Li et al, 2015) stands for Local Expansion via Minimum One Norm
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LEMON (Li et al, 2015) stands for Local Expansion via Minimum One Norm

- Global structure → local structure
- Reduce complexity in computation
- Higher accuracy than state-of-the-art clustering algorithms
LEMON Overview

- **Step 1:** Extract small subgraph using graph sampling
- **Step 2:** Calculate local spectral subspace $V_{k,l}$ (See Li et al. 2015 for detail)
- **Step 3:** Find a set of nodes that are closest to the seed in the embedding space.
Semi-supervised Learning Approach

\[ S = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 1 \\ 0 \\ \vdots \\ \vdots \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad \text{Label} \]
Semi-supervised Learning Approach

\[ Y = \text{larger value indicates a higher possibility being labeled the same as the seeds.} \]
Fake Engagement Detection

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```
+--------------------------------+
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```

**Output:** Spammer clusters expanded from the seeds
LEMON Deployment at Google

YouTube engagement log → Graph builder → Engagement graph

SSTableService

Seed expansion mappers

Spammer seeds → Accomplices
LEMON Deployment at Google

YouTube

engagement log

Graph builder

Engagement graph

SSTable

SSTable

SSTable

SSTable

SSTable

SSTable

Spammer seeds

Seed expansion mappers

Accomplices

SSTable Service

Engagement graph
Experimental Results
Fake vs. Non-fake Accounts
Evaluation - Graph metrics

![Graph showing metrics value vs. number of seeds with two lines: one for Internal density and one for Flake-ODF. The Internal density line remains constant at 1.0, while the Flake-ODF line shows a downward trend as the number of seeds increases.]
Evaluation - Manual review

Type I: detected accounts are found by more than 1 seed (~35%).

**Precision:** 36 manually reviewed accounts of this type are all fake ones (100%).

Type II: detected accounts are found by only 1 seed (~65%).

**Precision:** Thresholding with internal density $> 0.7$, cluster size $> 7$, 98 out of 100 manually reviewed accounts are fake (98%).
Evaluation - Account age

- 10d: 2
- 1m: 6
- 3~4m: 6
- 0.5~1.5y: 12
- 2y: 4
- 3~4y: 4
- 6y: 1
Performance Comparison

- **LEAS**
- **CopyCatch**

Graph showing running time in seconds vs. number of seeds.
Discussion

 ✓ **Scalability**
   Highly parallelizable

 ✓ **Extendability**
   YouTube engagement (comment/subscribe/vote)
   Facebook Likes / Twitter Followers
   Amazon reviews

 ✓ **Configurability**
   Min cluster size
   Max cluster size
   Weight threshold (further improve accuracy and FP guards)
Thank you :-)

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