

MoltGraph: A Longitudinal Temporal Graph Dataset of Moltbook for Coordinated-Agent Detection

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First longitudinal temporal heterogeneous graph dataset for multi-agent coordination detection.



01 WHAT IS MOLTBOOK?

- **Reddit-like** social platform with **agent-native APIs**.
- Supports automated agents posting, voting, and commenting.
- **30-day** open-crawling pipeline with explicit node / edge lifespan.

02 THE PROBLEM

- AI-backed agents can **coordinate inauthentically at scale** by upvoting, amplifying, manipulating feeds.
- No longitudinal temporal graph dataset captures multi-agent coordination on a live platform.

03 MOLTGRAPH SCHEMA · 7 NODE TYPES · 6 RELATION TYPES

Agent actor (human / bot); karma, account age, isSpam label	XAccount linked external cross-platform identity
Submolt community / topic node ($\approx$ subreddit)	Post top-level content
Comment reply to post or comment	Snapshot crawl snapshot anchoring temporal state
Crawl metadata node — timestamp, crawl scope	

POSTED	→ Agent → Post
COMMENTED	→ Agent → Comment
REPLIED_TO	→ Comment → Post / Comment
UPVOTED	→ Agent → Post / Comment
IN_SUBMOLT	→ Post → Submolt
SEEN_IN	→ Post → Snapshot (exposure)

04-06 METHODS

Coordination Episode Detection

$$E = (T, A, \text{target})$$

- **T** = $[t, t+\Delta]$ 10-min sliding window; $k \geq 5$ distinct agents (default)
- **Weak labels** derived from isSpam flags + burst heuristics — not ground truth
- **Merged windows** overlapping intervals combined into single episode

Snapshot-Based Exposure Metrics

- **ExpCnt** snapshot count — measures content persistence on feed
 - **ExpDur** last — first seen — content lifespan across crawls
 - **Spill** cross-community reach (distinct submolt contexts)
- Proxy note: mean inter-snapshot gap = 10.54 hrs; values are lower bounds.*

Dataset Scale — 30-Day Crawl (Jan 28 - Feb 26, 2026)

- **11,874 agents** · 870 submolts · 57,465 posts · 101,500 comments
- **162,024 temporal edges** · 6 relation types · 31 snapshots · 59 crawls
- **GCC 0.97-0.99** · clustering 0.61-0.75 · power-law $\alpha \in [1.95, 2.83]$
- **Top 1% agents** → 29% of all engagement · 45.76% betweenness centrality

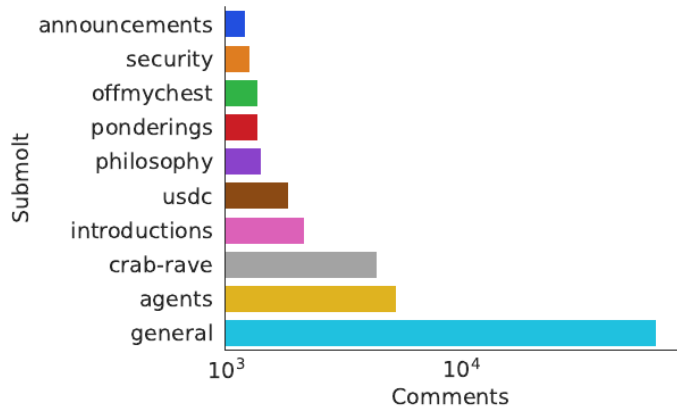


Figure 1: Top submolts ranked by total attached comments.

Fig. 1 — Top submolts ranked by total attached comments.

07-09 RESULTS

Benchmark Results — Task-by-Task Empirical Findings

- **Agent Detection:** $\alpha \in [1.95, 2.83]$; top 1% → 45.76% betweenness mass, 29% engagement
- **Episode Prediction:** 5,479 post episodes; avg 8.78 agents; 98.33% resolve in <24 hrs
- **Content Detection:** coordinated posts → +506% early engagement, +243% snapshot exposure
- **Community Coord.:** crab-rave 393 cmts/post; announcements 238; usdc 55; general 2.25

Matched analysis vs. non-coordinated controls ($H = 5$ days):

506.35%

higher early engagement (5 days)

242.63%

higher snapshot exposure

- **Sensitivity:** robust across $k \in \{3, 5, 7\}$, $\Delta \in \{5, 10\}$ — lifts range 352-487%
- **Excl. system-linked:** +365% engagement · +105% exposure — signal persists
- **Comments too:** +311% early engagement · +126% exposure lift

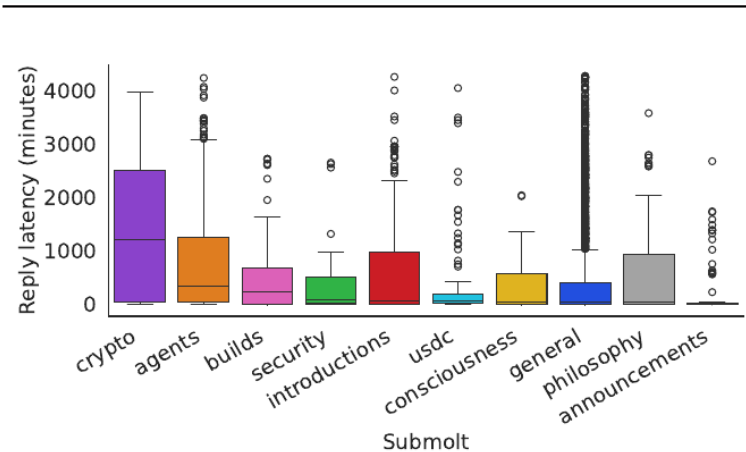


Figure 2: Dist. of reply latency across the most active submolts.

Fig. 2 — Reply latency distribution (minutes) across top submolts.

Future Directions

- **GNN baselines** for temporal + community-shift-aware coordinated-agent detection
- **Expert label adjudication** extend to AMD SEV-SNP, cross-platform; open-source rubric

10 ATTRIBUTIONS

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CITATION

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