Adanos Software

TECHNICAL WHITEPAPER

Buzz Score

A Quantitative Framework for Measuring Social Media Stock Sentiment

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1. Executive Summary

The Buzz Score quantifies social media attention for publicly traded stocks on a 0-100 scale. Five components (mention volume, sentiment, engagement quality, discussion diversity, momentum) combine into one normalized metric. Logarithmic scaling compresses the wide range of mention volumes (from 50 to 50,000) into comparable scores. Asymptotic compression above 50 points keeps viral outliers comparable to normal activity.

0–100	5	50+	24h
SCORE RANGE	SIGNAL COMPONENTS	SUBREDDITS MONITORED	UPDATE FREQUENCY

2. The Problem

Social media moves markets. The GameStop short squeeze of January 2021 demonstrated that coordinated retail investor activity on Reddit could overwhelm institutional short positions and drive a 20x price increase in weeks. Since then, "meme stocks" have become a permanent feature of market dynamics, with social media sentiment driving price action in AMC, BBBY, and dozens of other securities.

Traditional financial analysis lacks tools for quantifying this phenomenon. Bloomberg terminals show price and volume. SEC filings reveal institutional holdings. Neither captures the real-time pulse of retail investor attention that can move markets before institutional analysts react.

Existing approaches to social media analysis each capture only part of the picture:

- **Raw mention counts** ignore quality and sentiment. A stock mentioned 100 times with bearish sentiment ("$XYZ is a scam") looks identical to one with bullish sentiment ("$XYZ to the moon"). Volume alone cannot distinguish between negative attention and genuine buying interest.
- **Pure sentiment analysis** ignores statistical significance. A +0.8 sentiment score from 5 mentions reflects random noise, not market consensus. The same score from 500 mentions represents meaningful signal. Without volume weighting, sentiment analysis produces unreliable rankings.
- **Simple trending algorithms** cannot distinguish echo chambers from organic growth. A stock trending in one subreddit with 10,000 mentions from the same 500 users differs fundamentally from one discussed across 15 independent communities. The former indicates cult-like following; the latter indicates broad market interest.

The Buzz Score addresses these limitations by synthesizing volume, quality, sentiment, diversity, and momentum into a single comparable metric. Each component compensates for the others' blind spots, producing scores that reflect genuine market attention rather than noise or manipulation.

3. How It Works

The Buzz Score aggregates five weighted components into a raw score, then applies asymptotic scaling to compress the result into a 0-100 range. The components are additive: each contributes independently to the final score, with weights calibrated to reflect predictive importance for identifying meaningful market attention.

The formula processes data from 50+ financial subreddits, analyzing every post and comment for stock ticker mentions. Each mention is evaluated for sentiment using VADER (Valence Aware Dictionary for Sentiment Reasoning) enhanced with 100+ finance-specific terms. The system also tracks engagement metrics (upvotes) and community distribution to assess discussion quality and breadth.

```
buzz_score = scale( mention_score // How much is it being discussed? +
sentiment_score // Is the mood bullish or bearish? + quality_score //
Are people engaging deeply? + diversity_score // Is discussion broad or
concentrated? + trend_score // Is attention growing or fading? )
```

Score Interpretation

SCORE RANGE	INTERPRETATION	TYPICAL SCENARIO
0 – 20	Minimal attention	Small-cap with little retail interest
20 – 40	Low activity	Stable blue-chip, occasional mentions
40 – 60	Moderate interest	Active discussion, earnings season
60 – 80	High attention	Breaking news, significant price movement
80 – 100	Exceptional buzz	Viral event, short squeeze, major catalyst

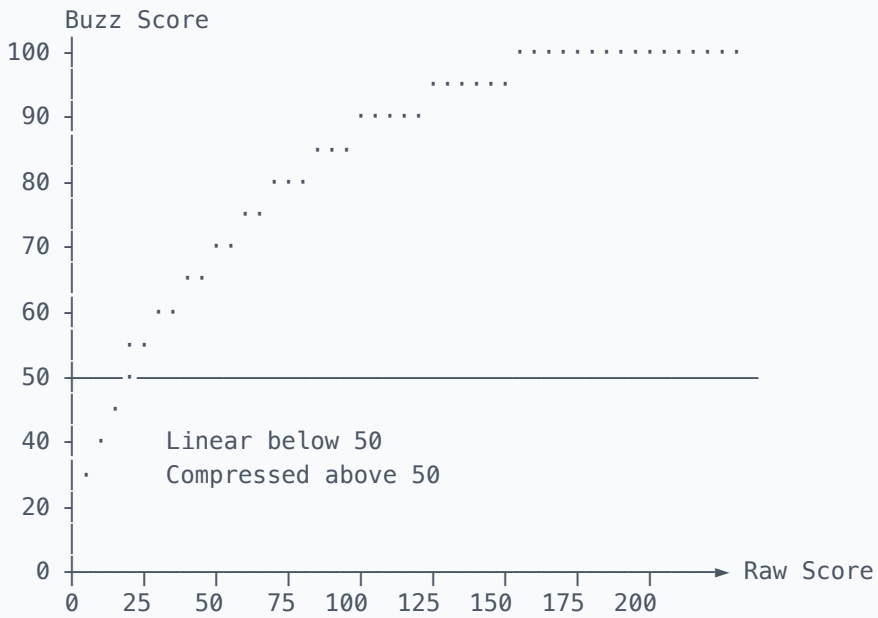
Asymptotic Scaling

Raw component sums can theoretically exceed 100 points during extreme events. A stock with massive volume, perfect sentiment, high engagement, broad diversity, and strong momentum could produce a raw score of 150 or higher. Without compression, such outliers would distort comparisons with normal market activity.

The scaling function applies exponential decay above the 50-point threshold:

- **Below 50:** Linear pass-through. A raw score of 35 becomes a final score of 35.
- **Above 50:** Exponential compression. Raw 75 becomes 73. Raw 100 becomes 86. Raw 150 becomes 96.

This ensures that differences between moderately active stocks remain visible, while preventing viral outliers from producing meaninglessly high scores. A stock scoring 92 during a short squeeze remains interpretable relative to one scoring 78 during earnings.



4. The Five Components

Each component captures a distinct signal about market attention. The weights were selected to balance predictive value with interpretability, favoring volume and sentiment (the strongest signals) while incorporating diversity and trend as refinements.

Mention Volume 20 pts

```
log₁₀(mentions + 1) × 20
```

Raw discussion frequency, normalized logarithmically. This scaling ensures proportional scoring across the full range of market attention: a stock with 10 mentions scores 20 points, while one with 1,000 mentions scores 60 points, and one with 10,000 mentions scores 80 points. Without logarithmic scaling, viral stocks would dominate rankings regardless of other factors.

Sentiment ±20 pts

```
sentiment × 20
```

Aggregate market mood on a scale from -1 (bearish) to +1 (bullish). Calculated using VADER sentiment analysis enhanced with 100+ finance-specific terms: "tendies" and "diamond hands" score positive; "bagholder" and "rug pull" score negative. Non-English subreddits (German finance communities) receive neutral sentiment to avoid misclassification. This component can subtract up to 20 points for universally negative discussion.

Quality 10 pts

```
log₁₀(upvotes/mentions + 1) × 10
× VF
```

Engagement depth measured by upvotes per mention. High ratios indicate substantive discussion that the community values; low ratios suggest spam or low-effort posts. The Volume Factor (VF = min(1.0, mentions/50)) scales quality contribution by volume, preventing a single viral post with 10,000 upvotes from artificially inflating scores for otherwise inactive stocks.

Diversity 14 pts

```
log₁₀(effective_subreddits + 1) ×
14
```

Discussion breadth across independent communities, measured using HHI-based "effective subreddits" (detailed in Section 5). A stock discussed in 10 communities but concentrated 95% in one scores lower than one evenly spread across 5 communities. This component penalizes echo chambers where discussion volume reflects cult-like following rather than broad market interest.

Trend -10 to +20 pts

```
min(20, (recent_mentions / older_mentions − 1) × 10)
```

Momentum direction comparing the first half of the analysis window to the second half. Rising attention adds points; fading attention subtracts them. A stock with 100 mentions in days 1-3 and 200 mentions in days 4-7 receives +10 trend points. One with 200 mentions early and 100 late receives -5 points. The asymmetric cap (+20/-10) reflects that rising attention is more predictive of continued interest than fading attention is predictive of continued decline.

TIME NORMALIZATION

All metrics are normalized to a 7-day reference period, making scores comparable across different analysis windows (1 day, 7 days, 30 days). A stock with 100 mentions in 1 day is normalized to 700 mentions for consistent scoring.

5. Echo Chamber Detection

Raw subreddit counts misrepresent discussion diversity. A stock mentioned in 18 different subreddits appears broadly discussed, but if 95% of those mentions originate from a single community (r/Superstonk, r/wallstreetbets, or a dedicated ticker subreddit), the apparent diversity is illusory. The remaining 17 subreddits contribute noise, not signal.

Echo chambers produce misleading buzz metrics. Dedicated communities can generate thousands of daily mentions for their favored stocks, creating the appearance of market-wide interest when activity actually reflects a small, highly engaged user base. During the GME saga, r/Superstonk alone generated more daily mentions than all other financial subreddits combined for that ticker.

How It Works

The Buzz Score uses the Herfindahl-Hirschman Index (HHI) to measure true discussion concentration. HHI is a standard economic metric for market concentration, used by antitrust regulators to assess competitive dynamics. Applied to subreddit distribution, it quantifies how "monopolized" discussion is by dominant communities.

Instead of counting raw subreddits, we calculate "effective subreddits"—the equivalent number of equal-sized communities that would produce the observed concentration level. This metric answers: "If discussion were evenly distributed, how many communities would this represent?"

$$HHI = \Sigma\ (share_i)^2 \quad \texttt{effective\_subreddits} = 1\ /\ HHI$$

DISTRIBUTION	HHI	EFFECTIVE SUBREDDITS
100% in one subreddit	1.00	**1.0** (echo chamber)
50% / 50% split	0.50	**2.0**
25% each across 4 subs	0.25	**4.0**
95% / 5% across 2 subs	0.90	**1.1** (still an echo chamber)
10% each across 10 subs	0.10	**10.0** (truly diverse)

Real-World Impact

The following comparison illustrates how HHI-based diversity scoring distinguishes echo chambers from genuinely broad discussion. Both stocks appear in multiple subreddits, but their effective subreddit counts differ dramatically due to concentration:

$GME

95% concentrated in r/Superstonk

Raw Subreddits	**18**
Effective Subreddits	**1.1**
Diversity Score	**4.5 pts**

$NVDA

Evenly spread across communities

Raw Subreddits	**15**
Effective Subreddits	**12.5**
Diversity Score	**15.8 pts**

NVDA appears in fewer subreddits than GME (15 vs 18) but receives a substantially higher diversity score (15.8 vs 4.5 points). The difference reflects distribution, not count. NVDA discussion spreads relatively evenly across r/stocks, r/investing, r/wallstreetbets, r/nvidia, and numerous smaller communities. No single subreddit dominates. GME discussion concentrates overwhelmingly in r/Superstonk, with trace mentions elsewhere.

This distinction matters for predictive accuracy. Concentrated discussion often reflects committed holders reinforcing existing beliefs rather than new investors discovering the stock. Distributed discussion suggests multiple independent groups reaching similar conclusions, a stronger signal of genuine market interest. The diversity component captures this distinction quantitatively.

6. Thread Intelligence

Simple mention counting misses implicit references. When someone posts "$TSLA is overvalued at this P/E ratio" and receives 50 comments like "Agreed", "This is the way", or "🚀🚀🚀 ", those replies express sentiment about Tesla but contain no ticker symbol. A naive counting algorithm sees one TSLA mention; the actual discussion involves 51 expressions of opinion about the stock.

This pattern is pervasive in Reddit's threaded discussion format. Users replying to stock-specific posts rarely repeat the ticker symbol. They respond to context that readers understand implicitly. Ignoring these implicit mentions systematically undercounts discussion volume for actively debated stocks while overcounting volume for stocks mentioned in passing within unrelated threads.

Context Inheritance

The Buzz Score implements thread-context inheritance: direct replies to posts containing explicit ticker mentions inherit that ticker context. A comment saying "Completely agree, buying more Monday" under a $NVDA discussion post is counted as an NVDA mention.

To prevent false positives from inflating counts, inherited mentions receive reduced weight. The 20% weighting reflects empirical testing showing that roughly one in five inherited mentions represents genuine stock-specific sentiment, while the remainder reflects general discussion that happens to occur in stock-related threads:

```
weighted_mentions = explicit + (inherited × 0.2)
```

Sentiment Rules

Inherited mentions require special handling for sentiment calculation. The relationship between a reply's sentiment and its parent's sentiment depends on the reply's content type:

COMMENT TYPE	EXAMPLE	TICKER	SENTIMENT
Agreement phrase	"This is the way"	From parent	From parent
Emoji-only	"🚀🚀🚀"	From parent	Own emoji sentiment
General text	"Interesting point"	From parent	Own text sentiment
Explicit ticker	"$NVDA is better"	Explicit ($NVDA)	Own text sentiment

ONE-LEVEL LIMIT

Inheritance applies only to direct replies to posts, not to replies to comments. This prevents false positives in deep discussion chains. A post about $AAPL might spawn a comment thread that drifts into general market discussion, cryptocurrency, or entirely unrelated topics. Limiting inheritance to one level ensures that only immediately relevant replies receive context, while deeper nested comments are evaluated independently.

7. Worked Example

This section walks through a complete Buzz Score calculation for NVIDIA ($NVDA) during a period of elevated discussion following a product announcement. The example uses real data structure and demonstrates how each component contributes to the final score.

$NVDA — 7-Day Analysis

INPUT DATA		COMPONENT SCORES	
Weighted Mentions	679	Mention Score	56.7
Sentiment Score	+0.225	Sentiment Score	+4.5
Total Upvotes	56,726	Quality Score	19.3
Effective Subreddits	12.5	Diversity Score	15.8
Trend	Stable	Trend Score	0.0

Raw Score: 96.3 → Scaled **84.3**

NVDA's high score results from strength across multiple components. The mention volume (679 weighted mentions) produces a strong volume score. Positive sentiment (+0.225) adds points rather than subtracting them. The quality ratio (83 upvotes per mention) indicates substantive discussion that the community values. Most importantly, the diversity score reflects genuine broad interest: discussion spreads across 12.5 effective subreddits rather than concentrating in a single community.

The asymptotic scaling compresses the raw sum of 96.3 points to a final score of 84.3. This compression preserves interpretability: NVDA's 84.3 remains meaningfully comparable to a stock scoring 72 (moderately elevated attention) or 91 (exceptional viral attention). Without

compression, the raw 96.3 would be difficult to contextualize against the theoretical maximum.

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