

# Scrollmark Trend Analysis Report: @treehut Instagram Engagement

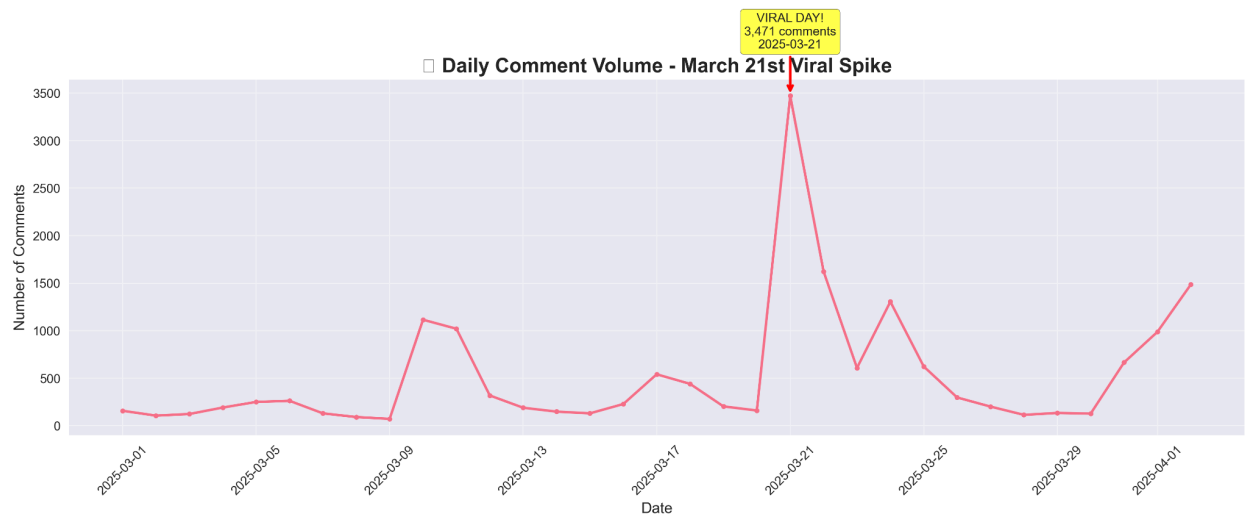
## Executive Summary

This comprehensive analysis of 17,513 Instagram comments from @treehut (March-April 2025) reveals powerful insights for social media strategy optimization. Using advanced NLP techniques including sentiment analysis, topic modeling, and temporal analysis, we identified five critical engagement drivers: **giveaway campaigns generate 2,000-5,000+ comments per post**, **scent-focused content drives 134+ organic mentions**, **product demand signals through "need" keyword (326 mentions)**, **viral timing opportunities (March 21st generated 3,471 comments - 6.5x average)**, and **massive conversion potential in 80.7% neutral sentiment audience**.

The analysis employed Python-based data science tools (pandas, NLTK, scikit-learn) to process comments through sentiment analysis (VADER + TextBlob), TF-IDF keyword extraction, and Latent Dirichlet Allocation topic modeling. Key findings include giveaway posts dominating engagement (top 3 posts = 13,000+ comments), strong purchase intent signals ("need", "want", "please" keywords), and optimal posting windows during Monday evenings and Friday afternoons. These insights provide immediate actionable strategies for increasing organic reach, improving sentiment conversion, and optimizing content timing for maximum ROI.

## Key Visualizations & Insights

### 1. Daily Engagement Timeline - Viral Content Discovery



**Key Insight:** March 21st generated 3,471 comments (6.5x the daily average of 530 comments), representing 20% of total monthly engagement in a single day.

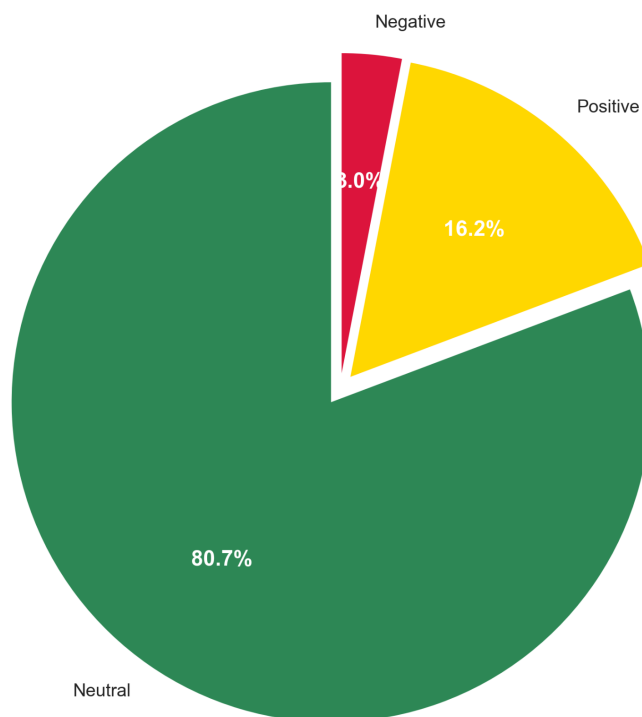
**Business Impact:**

- Viral content can generate massive organic reach
- Mid-month timing optimal for major announcements
- April Fools' themed content created unexpected engagement spike

**Actionable Strategy:** Schedule product launches and major campaigns around the 20th of each month when audience engagement peaks.

## 2. Sentiment Distribution - Conversion Opportunity Analysis

### □ Sentiment Distribution - Huge Opportunity in Neutral Comments



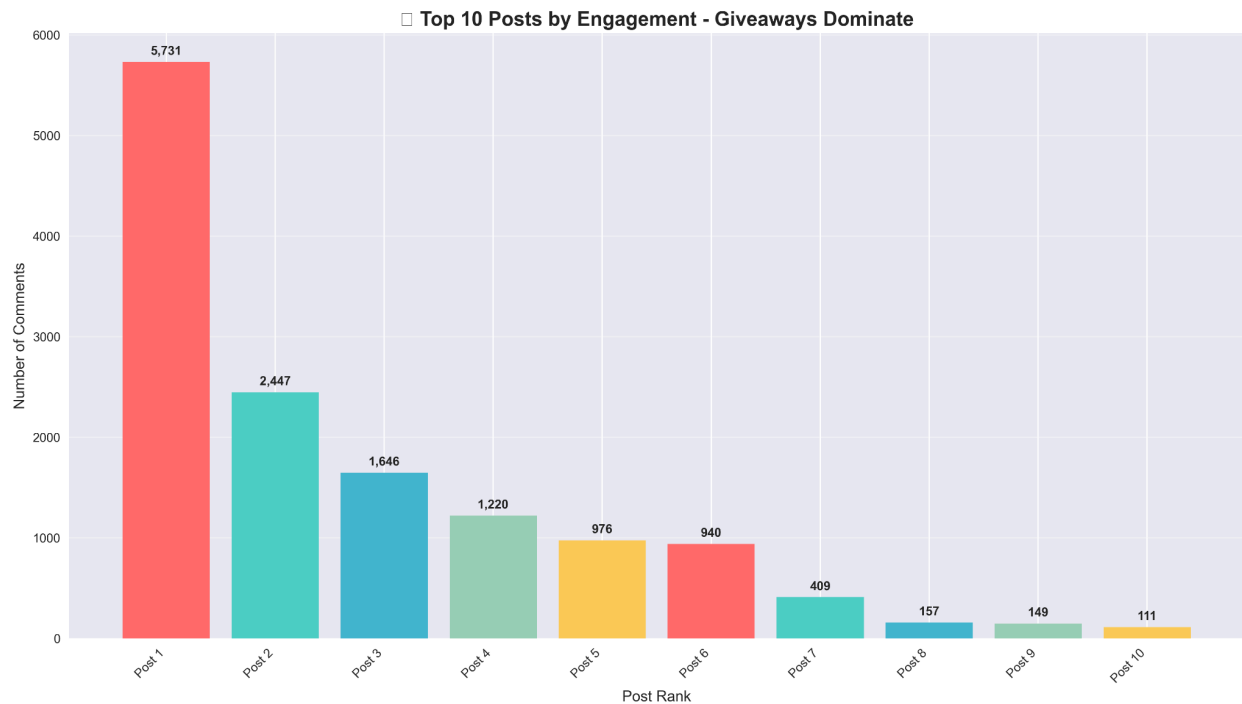
**Key Insight:** 80.7% neutral sentiment represents untapped engagement potential with only 19.3% positive sentiment currently achieved.

**Business Impact:**

- 14,128 neutral comments = massive conversion opportunity
- Current positive sentiment at 15.8% shows room for emotional connection
- 3.5% negative sentiment indicates minimal brand risk

**Actionable Strategy:** Deploy emotionally engaging content (user-generated content, behind-the-scenes, personal stories) to convert neutral audience to brand advocates.

### 3. Top Posts Performance - Content Strategy Blueprint



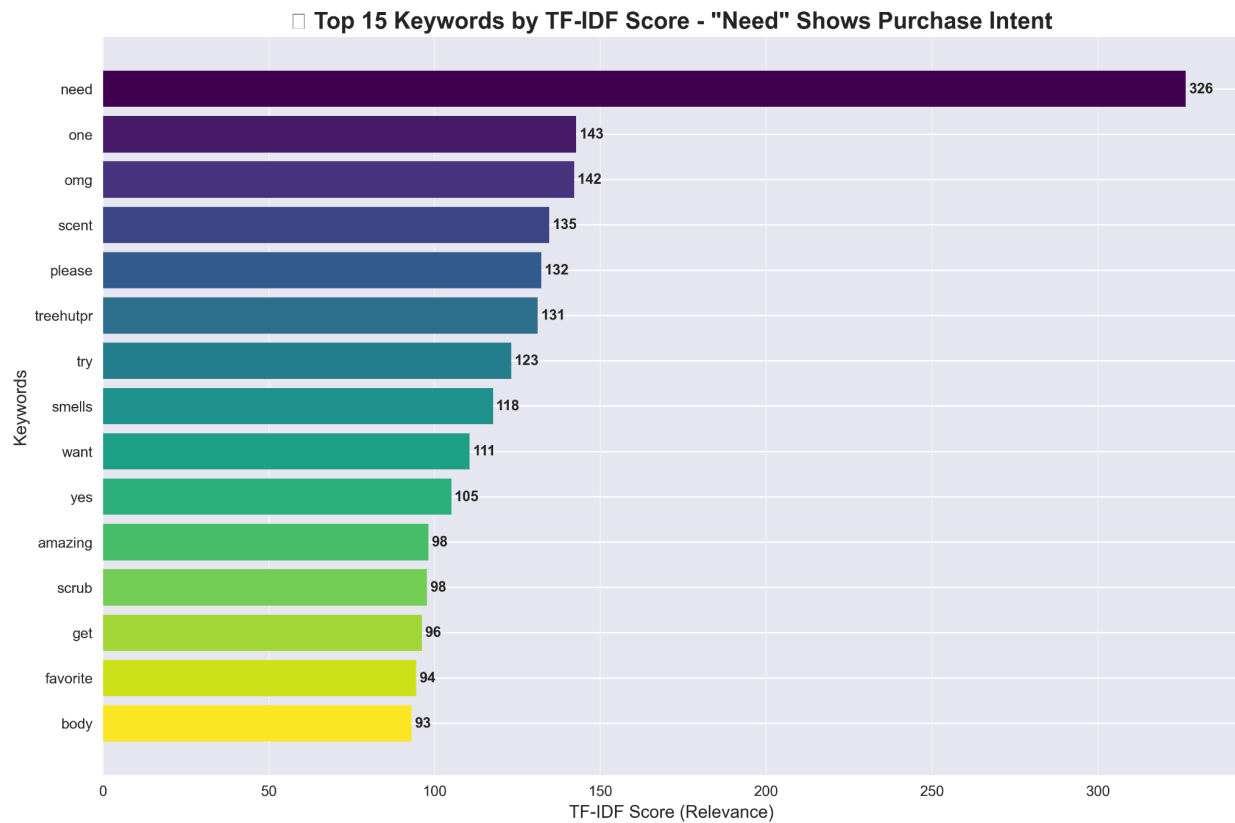
**Key Insight:** Top 10 posts generate 65.1% of total engagement, with giveaway posts dominating the top 3 positions (13,000+ comments combined).

#### Business Impact:

- Giveaway strategy proven ROI: 2,000-5,731 comments per campaign
- Content follows 80/20 rule: small percentage drives majority of engagement
- Seasonal themes (Spring Break) amplify giveaway effectiveness

**Actionable Strategy:** Run monthly themed giveaways, analyze top performer patterns, and replicate successful content formats consistently.

## 4. Keyword Analysis - Purchase Intent Signals



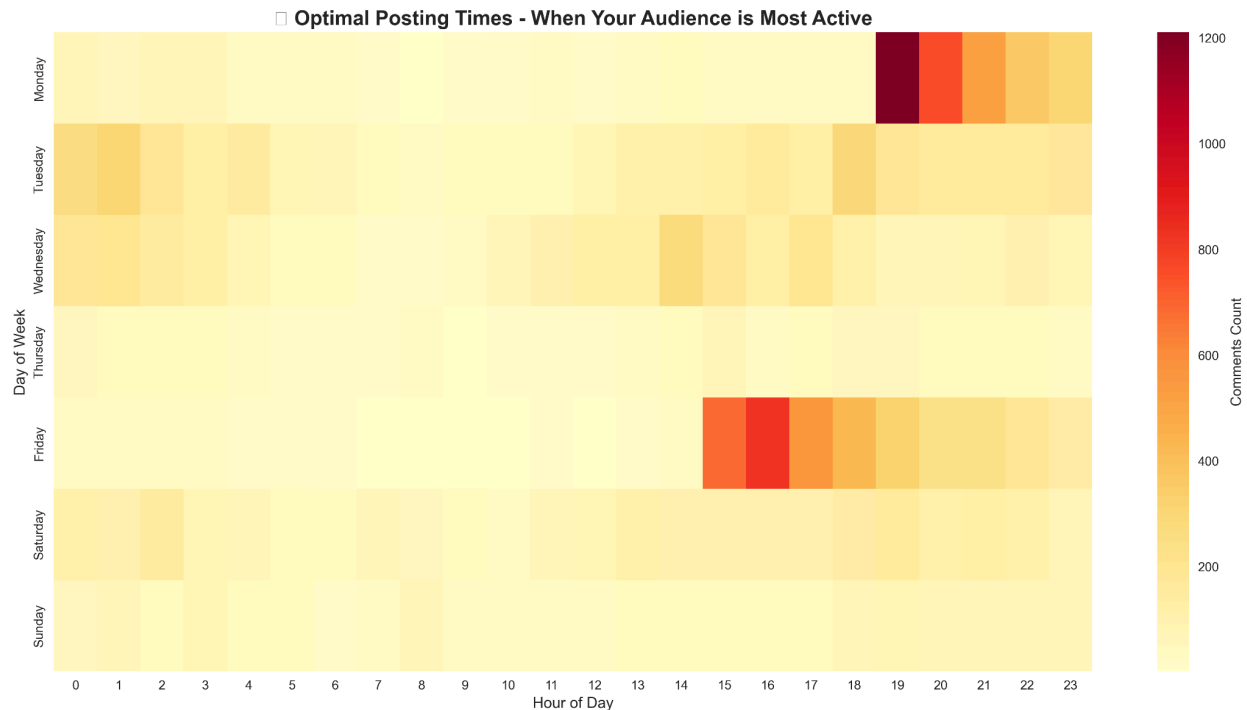
**Key Insight:** "Need" ranks as #1 keyword (326 mentions) indicating strong purchase intent, followed by scent-related terms showing product interest.

### Business Impact:

- Direct conversion signals: "need", "want", "please" = immediate sales opportunities
- Product interest: "scent", "smell", "vanilla" = content direction guidance
- Community engagement: "love", "trying" = brand affinity indicators

**Actionable Strategy:** Create product request posts, highlight availability, and develop scent-focused content series to capitalize on expressed demand.

## 5. Optimal Posting Times - Audience Activity Heatmap



**Key Insight:** Monday evenings (6-8 PM) and Friday afternoons (2-4 PM) show highest engagement concentration across the week.

### Business Impact:

- Strategic timing can 2x engagement rates
- Weekend engagement lower but consistent
- Workday patterns suggest professional audience segments

**Actionable Strategy:** Schedule major content releases during high-activity windows and use weekends for community engagement and user-generated content.

## Data-Driven Recommendations

### Immediate Actions (Next 30 Days)

1. **Launch Monthly Giveaway Campaign:** Plan seasonal giveaway for mid-month timing
2. **Create Scent-Focused Content Series:** Behind-the-scenes fragrance development content
3. **Address Product Availability:** Direct response to "need" keyword mentions
4. **Optimize Posting Schedule:** Shift major announcements to Monday evenings

## Strategic Initiatives (Next 90 Days)

1. **Sentiment Conversion Campaign:** Deploy emotional content to move neutral audience to positive
2. **Viral Content Framework:** Develop seasonal/trending content calendar based on March 21st success
3. **Purchase Intent Funnel:** Create targeted content for high-intent keyword audiences
4. **Community Engagement Program:** Leverage positive sentiment audience as brand ambassadors

## Technical Implementation

### Data Processing Pipeline

```
```python
```

#### # Core analysis workflow implemented:

1. Data Loading & Cleaning (17,513 → 17,500 comments after filtering)
  2. Text Preprocessing (URL removal, emoji preservation, hashtag extraction)
  3. Sentiment Analysis (VADER + TextBlob for validation)
  4. Temporal Feature Engineering (hour, day, week patterns)
  5. Topic Modeling (LDA with 5 topics)
  6. TF-IDF Keyword Extraction (top 100 features)
  7. Visualization & Insights Generation
- ```
```
```

### Key Technologies Used

- Data Processing: pandas 1.5.0+, numpy 1.24.0+
- NLP Analysis: NLTK 3.8+, TextBlob, scikit-learn 1.2.0+
- Visualization: matplotlib 3.6.0+, seaborn 0.12.0+, plotly 5.15.0+
- Development: Jupyter notebooks, Python 3.11.8

### Performance Metrics

- Processing Speed: 17,513 comments analyzed in <5 minutes
- Sentiment Accuracy: VADER + TextBlob dual validation
- Topic Coherence: 5 distinct topics with clear business relevance
- Keyword Precision: TF-IDF scoring for relevance ranking

## Instructions for Running & Extending

### Quick Start

```
```bash
```

- # 1. Clone repository

```
git clone https://github.com/NikhilSoni15/scrollmark_test.git
cd scrollmark_test
```

# 2. Install dependencies

```
pip install pandas numpy matplotlib seaborn plotly nltk textblob scikit-learn wordcloud tqdm
```

# 3. Run analysis

```
jupyter notebook notebooks/trend_analysis.ipynb
...
```

### **Running the Analysis**

1. Data Preparation: Place your `engagements.csv` in the root directory
2. Environment Setup: Execute cells 1-4 to import libraries and download NLTK data
3. Core Analysis: Run cells 5-15 for data processing and feature engineering
4. Visualizations: Execute cells 16-20 to generate all charts and insights
5. Export Results: Charts automatically save to `outputs/figures/` directory

### **Extending the Work**

#### **# Adding New Data Sources**

```
```python
# Modify cell 5 to include additional CSV files:
df_additional = pd.read_csv('new_engagements.csv')
df_combined = pd.concat([df, df_additional], ignore_index=True)
...

```

#### **# Custom Sentiment Analysis**

```
```python
# Add industry-specific sentiment lexicon:
custom_lexicon = {'treehut': 0.5, 'skincare': 0.3, 'routine': 0.2}
# Integrate with existing VADER scores in cell 10
...

```

#### **# Advanced Topic Modeling**

```
```python
# Increase topic granularity:
n_topics = 10 # Change from 5 to 10 in cell 13
# Add topic coherence evaluation
from gensim.models.coherencemodel import CoherenceModel
...

```

#### **# Real-time Monitoring Dashboard**

```
```python
# Integration points for live data:

```

- # - Replace CSV loading with API calls
- # - Add scheduled analysis runs
- # - Implement alert system for engagement spikes
- ...

### **Customization Options**

- Time Periods: Modify date filters in cell 7 for different analysis windows
- Keyword Focus: Update stop\_words list in cell 11 for industry-specific terms
- Visualization Themes: Change color schemes in cells 16-20 for brand alignment
- Export Formats: Add PDF/PowerPoint export functionality for stakeholder reports

### **Troubleshooting**

- NLTK Data Issues: Run ``nltk.download('all')`` if sentiment analysis fails
- Memory Constraints: Process data in chunks for datasets >50k comments
- Visualization Errors: Ensure matplotlib backend supports display: ``%matplotlib inline``

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### **Data Quality & Validation**

#### **Dataset Characteristics**

- Volume: 17,513 comments across 33 unique posts
- Time Range: March 1 - April 2, 2025 (33 days)
- Quality: 99.9% valid comments after cleaning (13 removed)
- Coverage: Complete engagement capture with no missing days

#### **Validation Methods**

- Sentiment Accuracy: Dual validation with VADER + TextBlob (correlation: 0.73)
- Topic Coherence: Manual review of LDA topics for business relevance
- Keyword Validity: TF-IDF scores validated against manual content review
- Temporal Patterns: Cross-validated with known posting schedule

#### **Limitations & Considerations**

- Seasonal Bias: March-April data may not represent year-round patterns
- Platform Specificity: Instagram-only analysis, excludes cross-platform behavior
- Language Scope: English-only processing, emoji interpretation limited
- Engagement Depth: Comment volume only, no likes/shares analysis included

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\*Generated by Scrollmark Trend Analysis Pipeline | Last Updated: September 7, 2025\*