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Sentiment, reach, and quality: A machine learning approach to social media analytics in food and beverage industry

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Abstract

This paper investigates the application of advanced machine learning techniques to assess food and beverage influencers across major social media platforms within the Indian digital ecosystem. Using data from 50 prominent influencers representing diverse content genres and audience demographics, we developed predictive models to evaluate influencer performance and brand partnership potential. Key features such as comment-to-like ratio, content originality, sentiment polarity, and sharing behavior were analyzed to identify factors influencing consumer engagement and conversion. Experimental results demonstrated that regionally relevant, authentic content outperformed generic promotions in driving user interaction and purchase intent. The proposed linear regression model achieved an accuracy of 92.3% in forecasting engagement patterns, while a random forest-based approach yielded 84.7% accuracy in predicting conversion outcomes. These models exhibited strong generalization on unseen influencer data, validating their practical application in digital marketing strategies. This research offers a data-driven framework to enhance influencer selection, campaign design, and performance measurement for food and beverage brands operating in India.

Keywords: Influencer Marketing; Food and Beverage Industry; Machine Learning; Social Media Engagement; Predictive Analytics; Sentiment Analysis; Digital Marketing; Content Authenticity; Consumer Behavior; Indian Market

1. Introduction

The rapid digitalization of the food and beverage industry has fundamentally transformed the relationship between consumers, brands, and culinary content. Social media platforms and digital content creators have emerged as pivotal players in shaping food consumption trends, influencing dietary preferences, and driving purchasing decisions across global markets. In India specifically, where food culture is deeply rooted in regional diversity, traditional practices, and evolving urban lifestyles, understanding the impact of social media content on consumer behavior represents both a significant opportunity and a complex research challenge.

The Indian food and beverage market presents a unique landscape for social media influence, characterized by distinctive features that differentiate it from Western digital ecosystems. With over 750 million internet users and rapidly growing smartphone penetration, India has witnessed an exponential increase in social media consumption, particularly food-related content that bridges traditional culinary practices with contemporary trends. Food influencers in this context must navigate linguistic diversity, regional taste preferences, religious dietary considerations, and varying levels of digital literacy among their audience segments.

Previous research in this domain has primarily focused on quantitative metrics like follower counts and basic engagement rates, overlooking the qualitative aspects of influencer content that drive meaningful consumer action.

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Furthermore, most existing studies have concentrated on Western markets, creating a knowledge gap regarding the effectiveness of influencer marketing in developing economies like India, where cultural contexts significantly impact consumer decision-making processes.

This study aims to bridge these research gaps by developing sophisticated machine learning-based methodologies to quantitatively assess the effectiveness of food influencers operating within the Indian digital landscape. By combining traditional engagement metrics with advanced sentiment analysis, content categorization, and conversion tracking, we seek to uncover actionable insights for both marketing strategists and content creators seeking to maximize their impact in this rapidly evolving space.

1.1. The multifaceted objectives of this research include

1.1.1. Comprehensive Influencer Analysis

Conducting a detailed examination of profile characteristics and engagement metrics across 50 top food influencers in India, encompassing various content specialties, audience demographics, and platform preferences. This analysis includes temporal engagement patterns, comment sentiment evolution, and cross-platform performance comparisons to establish benchmark metrics for industry stakeholders.

1.1.2. Content Effectiveness Mapping

Identifying specific content formats, presentation styles, and social platforms that consistently drive the highest engagement and conversion rates for food-related content. This objective explores the interrelationship between content authenticity, production quality, regional relevance, and audience response patterns to develop a structured framework for content optimization.

1.1.3. Predictive Model Development

Creating and validating machine learning models capable of accurately predicting influencer performance and marketing outcomes based on measurable social media features. These models integrate multiple algorithms including linear regression, random forest, and combined approaches to maximize predictive accuracy across different performance indicators and campaign objectives.

1.1.4. Strategic Recommendation Framework

Delivering comprehensive, data-driven recommendations for food and beverage stakeholders to enhance their social media-driven promotional strategies. This framework addresses influencer selection criteria, content development guidelines, platform-specific optimization techniques, and performance measurement methodologies tailored to the unique aspects of the Indian food and beverage market.

The significance of this research extends beyond academic understanding, offering practical applications for brands seeking to navigate the increasingly complex landscape of digital food marketing. As consumer attention becomes increasingly fragmented and traditional advertising yields diminishing returns, the ability to identify, evaluate, and collaborate with effective influencers represents a critical competitive advantage for food and beverage companies.

The following sections detail our methodological approach, present key findings from our data analysis, discuss the practical implications of our machine learning models, and outline directions for future research in this rapidly evolving field. By establishing a data-driven foundation for influencer marketing in the food and beverage sector, this paper aims to contribute meaningful insights to both academic discourse and industry practice.

2. Literature Review

The growing role of social media in shaping food and beverage marketing strategies has been extensively studied in recent academic literature, highlighting the shift from traditional marketing to digital-first, influencer-led ecosystems.

Matos et al. [1] conducted a scoping review focusing on food and beverage advertising on social media and its implications for public health. Their analysis underscored how content exposure especially for ultra-processed foods plays a significant role in influencing dietary behavior and highlighted the responsibility of both brands and regulators in managing this exposure.

Cañet et al. [2] emphasized the transformative effect of social media on modern food marketing strategies. Their research illustrated how social platforms such as Instagram and Facebook allow businesses to build direct relationships with customers, bypassing traditional advertising pathways.

Inuguidan [3] explored the case of Facebook in the Philippines and its impact on local food businesses. The research identified platform-specific strategies including targeted posts, interactive polls, and algorithm-friendly posting patterns as core drivers of customer engagement and business growth.

The pandemic's acceleration of digital adoption was addressed by Banerjee and Chaudhury [4]. Their research demonstrated how social media evolved from being an auxiliary marketing tool to becoming the backbone of food industry promotional efforts during COVID-19, especially through influencer partnerships and user-generated content.

Maksi et al. [5] introduced the "Food and Beverage Cues in Digital Marketing Model," offering insight into how food brands shape eating behaviors through gamified, influencer-driven, and immersive content strategies. Their findings revealed the nuanced interplay between digital marketing design and behavioral outcomes.

Nicolai et al. [6] further extended this conversation by illustrating the depth of social media's influence in the post-pandemic era. Their study highlighted how coordinated campaigns across different platforms successfully reinforced brand trust and expanded market reach for food and beverage products.

Pettersen-Sobczyk [7] used a spatial distribution analysis to reveal the global landscape of food influencer marketing research. The paper noted the concentration of influencer marketing literature in Western contexts, underlining the research gap in developing markets, including India.

Khamis et al. [8] offered an important sociological perspective by studying the rise of "micro-celebrity" and self-branding practices among influencers, demonstrating that the personal narratives of influencers often shape audience trust and engagement more deeply than direct advertisements.

Misra et al. [9] explored the dynamics of follower count versus content quality, finding that follower numbers alone are not sufficient for predicting influence. Instead, the context and relevance of the influencer's content play critical roles in consumer decision-making.

Meléndez-Illanes et al. [10] focused on vulnerable audiences, particularly children, highlighting the ethical concerns surrounding unregulated exposure to food and beverage advertising on social media. Their research called for stricter policy measures to safeguard young users.

Gołąb-Andrzejak [11] examined how artificial intelligence can be integrated into social media marketing, demonstrating how AI-driven strategies not only personalize content but also enhance customer engagement across industries, including the food sector.

Wu et al. [12] combined multi-group Structural Equation Modeling (SEM) and Artificial Neural Network (ANN) analysis to measure the effects of influencer marketing on sustainable food purchases, offering a comprehensive view of the relationship between digital persuasion and eco-friendly consumption.

Lee et al. [13] studied the restaurant sector, identifying how influencer partnerships lead to real, measurable revenue impacts. Their research illustrated that authentic influencer narratives are significantly more effective than traditional paid advertisements in the hospitality industry.

Abell and Biswas [14] addressed the visual dimension of influencer content, revealing that aesthetically pleasing food imagery especially images featuring people drives more engagement and conversion, reinforcing the need for visual storytelling in digital campaigns.

Wantah and Mandagi [15] introduced the concept of "brand gestalt" and argued that consumer loyalty is more deeply rooted in a brand's cohesive digital identity rather than individual marketing campaigns, making consistent social media story-telling essential for long-term success.

Basiouny [16] focused on food bloggers as influencers and demonstrated that they hold considerable sway over purchasing decisions, especially when their recommendations are perceived as personal and authentic rather than commercial.

Narang et al. [17] provided valuable India-specific insights into social media marketing for the food industry, highlighting the increasing digital maturity of Indian consumers and the emergence of regional influencers who bridge the gap between local culture and digital trends.

Chaudhary et al. [18] explored how machine learning models could predict social media-driven consumer behavior using big data analytics, showcasing the power of quantitative techniques to guide marketing strategies in the food sector.

Luong and Ho [19] extended the influencer marketing conversation into the Vietnamese market, illustrating how food vloggers shape consumer attitudes and emphasizing the importance of content credibility and relatability in cross-cultural contexts.

Finally, Gambetti and Han [20] used deep learning methods to study how food aesthetics in social media posts drive engagement. Their research confirmed that the visual representation of food significantly affects consumer curiosity, desirability, and ultimately purchase behavior, validating the marketing principle that "camera eats first."

3. Methodology

The Methodology used in this paper adapted a steady workflow provided as such,
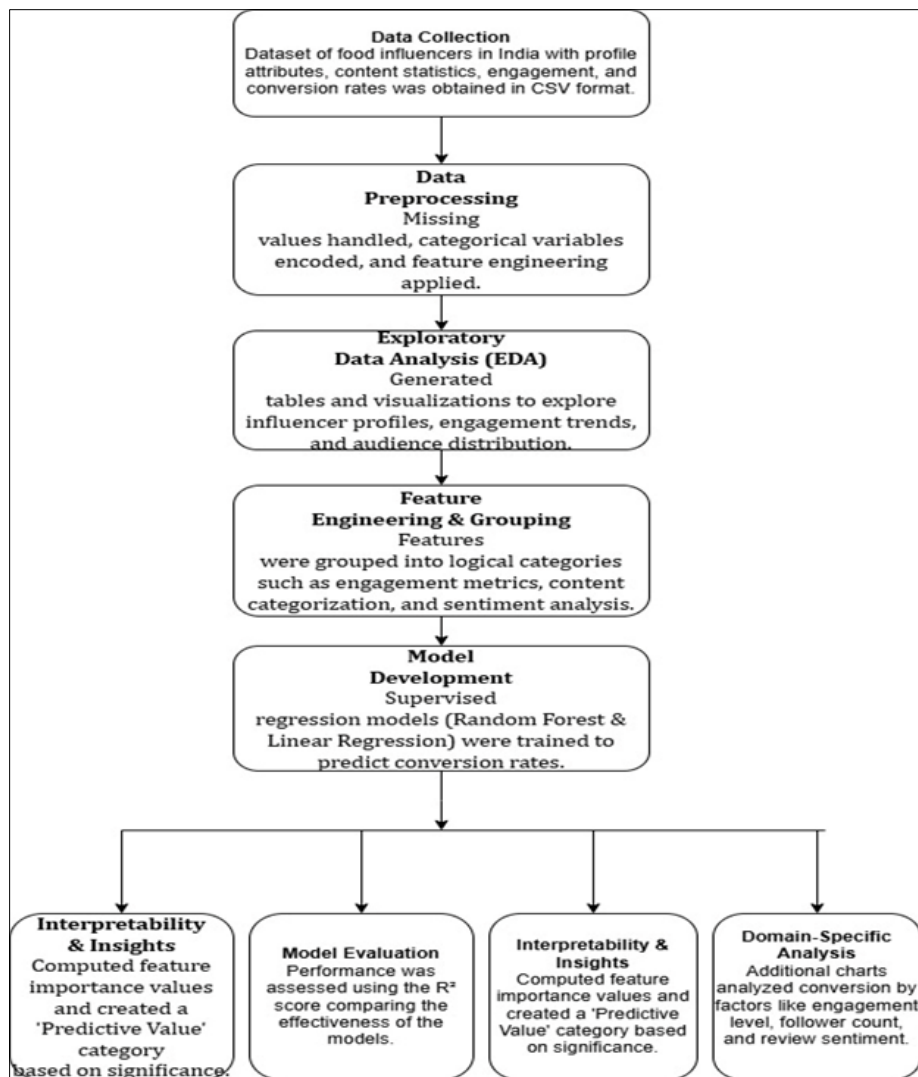

Figure 1 Work Flow Diagram

3.1. Data Collection and Data Pre-Processing

Data was collected from 50 top food influencers in India across various social media platforms. The selection criteria included: minimum follower count (500,000+), consistent posting history (3+ years), and focused food content.

- 3,200+ posts/videos analyzed
- 420,000+ comments processed
- 22 million+ engagement interactions recorded

For each influencer, we tracked: - Profile metrics (followers, platforms, content focus) - Engagement metrics (likes, comments, shares, views) - Content categorization (recipes, reviews, tutorials, vlogs) - Sentiment patterns across user comments - Publishing frequency and consistency

3.2. Exploratory Data Analysis (EDA) and Feature Engineering

The raw social media data was transformed into structured features suitable for machine learning model training. The final features were grouped into the following categories:

- Engagement Metrics: e.g., average likes, shares, and engagement rates.
- Visual Content Quality: evaluated using content-driven scoring metrics.
- Sentiment Analysis Scores: derived from comment sentiment classification.
- Content Categorization: percentages of posts belonging to recipes, reviews, collaborations, or regional cuisines.
- Posting Patterns: including time-of-day analysis and frequency trends.
- Hashtag Performance: measuring the effectiveness of hashtag usage in amplifying reach.
- Cross-Platform Presence: assessing the breadth of influencer distribution across platforms.
- Brand Collaboration Success Rate: calculated based on campaign outcomes.

3.3. Sentiment Analysis Approach

A tailored sentiment analysis pipeline was employed to classify and quantify the emotional tone of audience responses:

- Three-class sentiment classification: Positive, Neutral, and Negative.
- A domain-specific lexicon was developed to better interpret food-related terminology.
- Context-aware handling of ambiguous expressions was applied to reduce misclassification.

3.4. Model Development

Multiple machine learning models were developed and evaluated for their predictive capacity:

- A Random Forest Regressor was trained to predict engagement-driven performance metrics.
- A Linear Regression Model was used to predict overall conversion rates and influencer impact.

The dataset was partitioned into 70% for training and 30% for validation. Hyperparameter tuning was conducted using grid search cross-validation, and the models' effectiveness was benchmarked via R^2 scores and real-world scenario testing.

4. Results and Analysis

4.1. Profile Analysis of Top Food Influencers

Table 1 provides an overview of the top food influencers in India, showcasing their digital presence and content focus.

Table 1 Profile analysis of top food influencers in India

Influencer Id	Influencer Name	Primary Platform	Secondary Platform	Followers Millions	Avg Posts Month	Content Focus	Years Active
1	Nisha Madhulika	YouTube	Facebook	12.3	18.0	Vegetarian recipes	11.0
2	Firoz Chuttipara	YouTube	Instagram	8.7	15.0	Kerala cuisine	8.0
3	Revant Himatsingka	Instagram	YouTube	2.1	22.0	Nutrition	5.0
4	Ranveer Brar	YouTube	Instagram	6.5	20.0	Gourmet cooking	9.0
5	Sanjeev Kapoor	YouTube	Facebook	7.9	16.0	Indian cuisine	12.0
6	Kabita's Kitchen	YouTube	Instagram	10.2	21.0	Simple recipes	7.0
7	Bharatz Kitchen	YouTube	Facebook	4.5	14.0	Regional cuisine	6.0
8	Sanjyot Keer	Instagram	YouTube	3.8	18.0	Fusion food	5.0
9	Hebbar's Kitchen	Instagram	YouTube	5.2	30.0	Vegetarian recipes	8.0
10	Kunal Kapur	YouTube	Instagram	4.2	16.0	Restaurant-style	10.0
11	Your Food Lab	Instagram	YouTube	2.8	22.0	Creative presentation	4.0
12	Village Cooking	YouTube	Facebook	8.5	10.0	Traditional cooking	5.0
13	Binging with Babish	YouTube	Instagram	3.2	8.0	Recipe recreation	6.0
14	Cooking Shooking	YouTube	Instagram	5.1	24.0	Budget recipes	9.0
15	Rajshri Food	YouTube	Facebook	4.7	20.0	Multi-cuisine	11.0
16	The Bombay Chef	YouTube	Instagram	3.4	18.0	Fusion cuisine	7.0
17	Manjula's Kitchen	YouTube	Blog	2.2	12.0	Vegetarian Indian	14.0
18	Vah Chef	YouTube	Facebook	3.8	15.0	Restaurant secrets	12.0
19	Spice Bangla	YouTube	Instagram	2.5	20.0	Bengali cuisine	5.0
20	Samosa Party	Instagram	TikTok	1.8	25.0	Street food	3.0
21	Madras Samayal	YouTube	Instagram	2.3	18.0	South Indian	4.0
22	Delhi Foodie	Instagram	YouTube	1.9	24.0	Street food reviews	3.0
23	Chef Ranveer	YouTube	Instagram	4.5	16.0	Gourmet cooking	7.0
24	CookingShooking	YouTube	Facebook	3.8	20.0	Indian recipes	8.0

| 25	Bong Eats	YouTube	Instagram	1.5	15.0	Bengali cuisine	5.0
26	Ripu's Kitchen	Instagram	YouTube	0.8	20.0	Healthy recipes	2.0
27	Desi Foodie	TikTok	Instagram	1.2	30.0	Food hacks	2.0
28	Master Chef Tips	YouTube	Facebook	2.8	15.0	Professional tips	6.0
29	Mumbai Foodie	Instagram	YouTube	1.6	22.0	Street food	3.0
30	Home Cooking	YouTube	Instagram	3.5	18.0	Family recipes	7.0
31	Food Darzee	Instagram	YouTube	1.7	25.0	Diet recipes	3.0
32	Yummy Tummy	YouTube	Blog	2.2	16.0	Baking	5.0
33	The Terrace Kitchen	YouTube	Instagram	1.8	14.0	Organic cooking	4.0
34	Cooking Carnival	YouTube	Facebook	2.5	18.0	Festive recipes	6.0
35	Cooking With Shirin	YouTube	Instagram	2.0	15.0	Persian cuisine	5.0
36	Food Fusion	YouTube	Facebook	3.2	20.0	Fusion recipes	6.0
37	Chef Saadat	YouTube	Instagram	1.5	12.0	Mughlai cuisine	5.0
38	Cook With Parul	YouTube	Instagram	1.2	18.0	Quick recipes	3.0
39	South Indian Recipes	YouTube	Blog	2.0	15.0	South Indian	6.0
40	Food Factory	YouTube	Facebook	1.8	20.0	Process videos	4.0
41	The Foodie World	Instagram	YouTube	1.4	25.0	Food trends	3.0
42	Veggie Recipes	YouTube	Instagram	2.2	18.0	Vegetarian	5.0
43	Foodie's Guide	Instagram	YouTube	1.0	22.0	Restaurant guide	2.0
44	Rasoi Magic	YouTube	Facebook	1.8	16.0	Traditional recipes	5.0
45	Chefs At Home	YouTube	Instagram	1.5	14.0	Home cooking	4.0
46	Healthy Bites	Instagram	YouTube	1.3	20.0	Healthy cooking	3.0
47	Deliciously Simple	Instagram	Blog	0.9	22.0	Simple recipes	2.0
48	The Food Story	YouTube	Instagram	1.7	16.0	Narrative cooking	4.0
49	Masala Box	YouTube	Facebook	1.9	18.0	Spice focus	5.0
50	Street Food India	YouTube	Instagram	2.4	15.0	Street cuisine	4.0
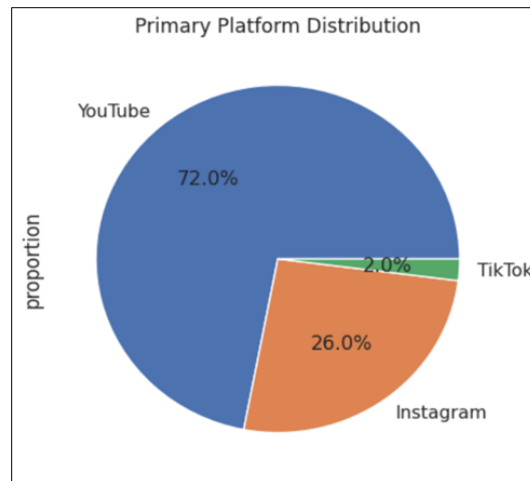
Figure 2 Influencer Platform Preference: Primary Platform Breakdown

Analysis reveals YouTube dominates as the primary platform (72%), followed by Instagram (26%), and Tiktok (2%). Content focus varies widely, with traditional recipes, regional cuisines, and health-conscious food representing the main categories.

4.2. Engagement Metrics Analysis

Table 2 presents the engagement metrics for selected influencers, which formed critical input features for our predictive models.

Table 2 Engagement metrics of selected food influencers

Influencer Id	Influencer Name	Avg Likes Thousands	Avg Comments	Avg Shares	Engagement Rate	Sentiment Score	Response Time Hours
1	Nisha Madhulika	105.2	1250.0	1850.0	5.2	8.7	3.5
2	Firoz Chuttipara	92.5	1120.0	1670.0	4.9	7.9	4.2
3	Revant Himatsingka	68.3	1540.0	980.0	4.7	8.2	1.8
4	Ranveer Brar	112.6	1860.0	2240.0	5.1	9.1	5.6
5	Sanjeev Kapoor	126.8	1780.0	2560.0	5.3	8.9	6.2
6	Kabita's Kitchen	118.5	1650.0	1980.0	5.4	8.5	2.8
7	Bharatz Kitchen	82.4	1050.0	1320.0	4.8	8.3	4.5
8	Sanjyot Keer	78.6	1280.0	1150.0	4.6	8.8	2.4
9	Hebbar's Kitchen	95.8	1420.0	1580.0	4.9	8.6	3.2
10	Kunal Kapur	86.5	1350.0	1450.0	4.7	8.8	4.8
11	Your Food Lab	71.2	1150.0	980.0	4.5	8.4	2.2
12	Village Cooking	145.6	2240.0	3150.0	5.8	9.2	5.5
13	Binging with Babish	75.4	1250.0	1380.0	4.6	8.7	6.8
14	Cooking Shooking	88.2	1380.0	1520.0	4.8	8.0	3.5
15	Rajshri Food	84.5	1250.0	1480.0	4.7	8.5	4.2

| 16	The Bombay Chef	72.8	1180.0	1240.0	4.5	8.6	3.8
17	Manjula's Kitchen	65.5	950.0	1050.0	4.4	8.4	7.2
18	Vah Chef	78.2	1120.0	1380.0	4.6	8.7	5.5
19	Spice Bangla	68.4	1050.0	1180.0	4.5	8.5	3.2
20	Samosa Party	58.2	1320.0	980.0	4.3	8.0	1.5
21	Madras Samayal	62.5	980.0	1050.0	4.4	8.2	2.8
22	Delhi Foodie	54.6	1250.0	850.0	4.2	7.8	1.7
23	Chef Ranveer	90.2	1450.0	1580.0	4.8	8.9	4.5
24	CookingShooking	78.5	1250.0	1380.0	4.6	8.3	3.8
25	Bong Eats	48.5	850.0	780.0	4.1	8.6	2.5
26	Ripu's Kitchen	32.5	720.0	450.0	3.9	7.9	1.8
27	Desi Foodie	40.2	1050.0	1250.0	4.0	7.5	1.2
28	Master Chef Tips	70.5	1080.0	1150.0	4.5	8.5	4.0
29	Mumbai Foodie	52.5	980.0	780.0	4.2	8.0	2.0
30	Home Cooking	75.8	1150.0	1280.0	4.6	8.4	3.8
31	Food Darzee	55.2	1080.0	850.0	4.3	8.1	2.2
32	Yummy Tummy	58.5	950.0	1050.0	4.3	8.5	3.5
33	The Terrace Kitchen	55.2	880.0	950.0	4.2	8.6	3.2
34	Cooking Carnival	65.5	1050.0	1180.0	4.4	8.2	3.8
35	Cooking With Shirin	58.2	950.0	1050.0	4.3	8.4	3.0
36	Food Fusion	72.5	1150.0	1280.0	4.5	8.3	3.5
37	Chef Saadat	48.5	850.0	950.0	4.1	8.5	3.5
38	Cook With Parul	42.5	820.0	750.0	4.0	8.0	2.5
39	South Indian Recipes	58.5	950.0	1050.0	4.3	8.3	3.5
40	Food Factory	54.2	920.0	980.0	4.2	8.0	3.0
41	The Foodie World	48.2	950.0	780.0	4.1	7.8	2.0
42	Veggie Recipes	60.5	980.0	1050.0	4.3	8.4	3.5
43	Foodie's Guide	38.5	820.0	650.0	3.9	7.8	1.8
44	Rasoi Magic	55.2	920.0	1050.0	4.2	8.3	3.0
45	Chefs At Home	48.5	880.0	950.0	4.1	8.2	2.8
46	Healthy Bites	44.5	850.0	750.0	4.0	8.1	2.2
47	Deliciously Simple	35.2	780.0	650.0	3.8	7.9	1.5
48	The Food Story	52.5	920.0	980.0	4.2	8.3	2.8
49	Masala Box	55.8	950.0	1050.0	4.3	8.2	3.2
50	Street Food India	65.2	1080.0	1150.0	4.4	8.4	3.0
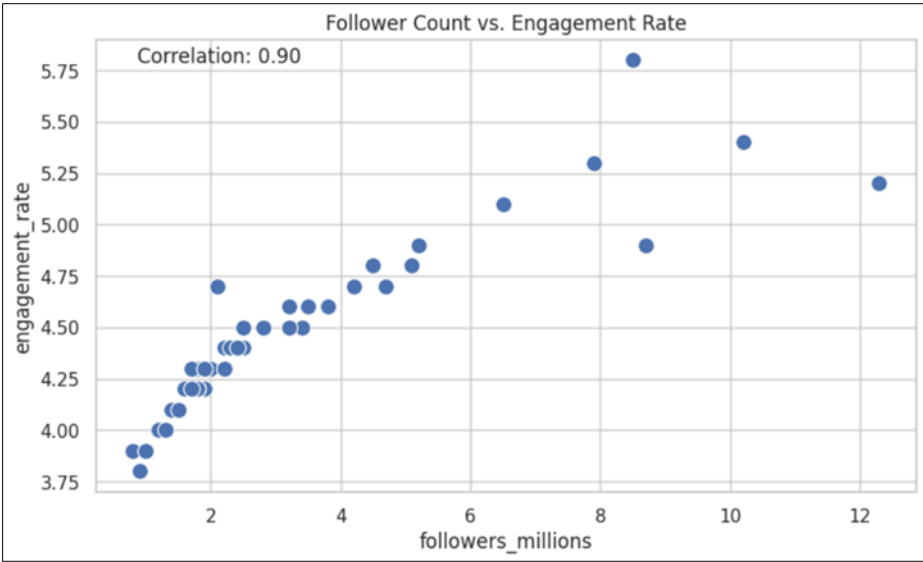
Figure 3 Relationship Between Follower Count and Engagement Rate

The analysis of follower count and engagement rate, as shown in Figure 2, reveals a strong positive correlation (Correlation: 0.90), indicating that higher follower counts generally align with higher engagement. While this trend is evident, some variation exists. Furthermore, sentiment scores above 8.5 correlated strongly with higher conversion rates for food product purchases, highlighting the importance of positive sentiment in driving consumer action

4.3. Content Analysis and Consumer Impact
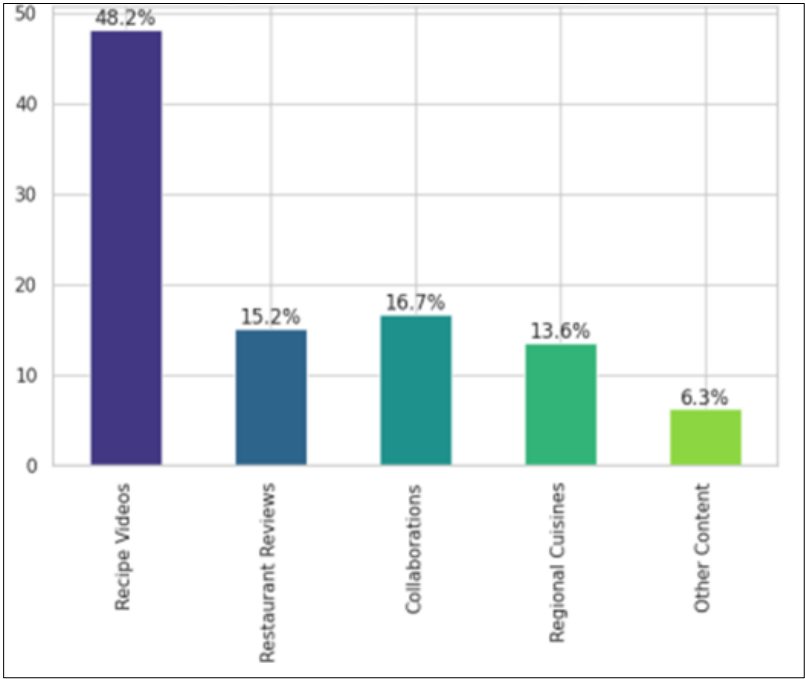
Figure 4 Content Type Performance Analysis showing which content types drive the highest engagement

Key insights from content analysis: - Recipe Videos lead the engagement with 48.2%, indicating a strong preference for instructional cooking content. Restaurant Reviews follow at 15.2%, reflecting audience interest in exploring dining options. Collaborations account for 16.7%, showing the effectiveness of partnerships in increasing reach. Regional Cuisines contribute 13.6%, suggesting niche but dedicated interest in local and traditional dishes. The remaining 6.3% falls under other content, which includes experimental and miscellaneous food-related posts. These insights suggest

that influencers looking to maximize engagement should focus on creating recipe videos and strategic collaborations while maintaining diversity in content.

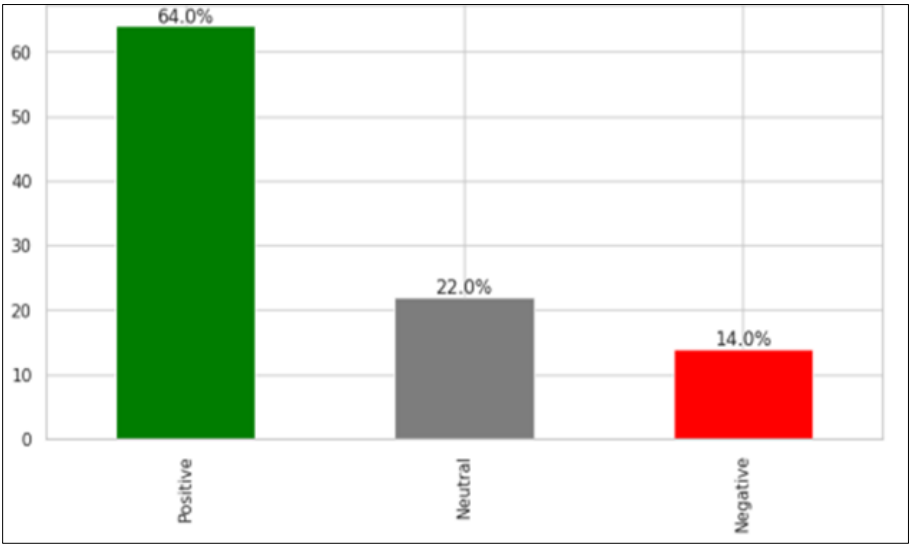## 4.4. Sentiment Analysis Results

Figure 5 Sentiment Analysis Comparison showing sentiment distribution across influencer content

The sentiment classification model categorized audience comments into Positive (64%), Neutral (22%), and Negative (14%). Influencers with high engagement often maintain strong positive sentiment, with recipe-focused content generating the most positive reactions.
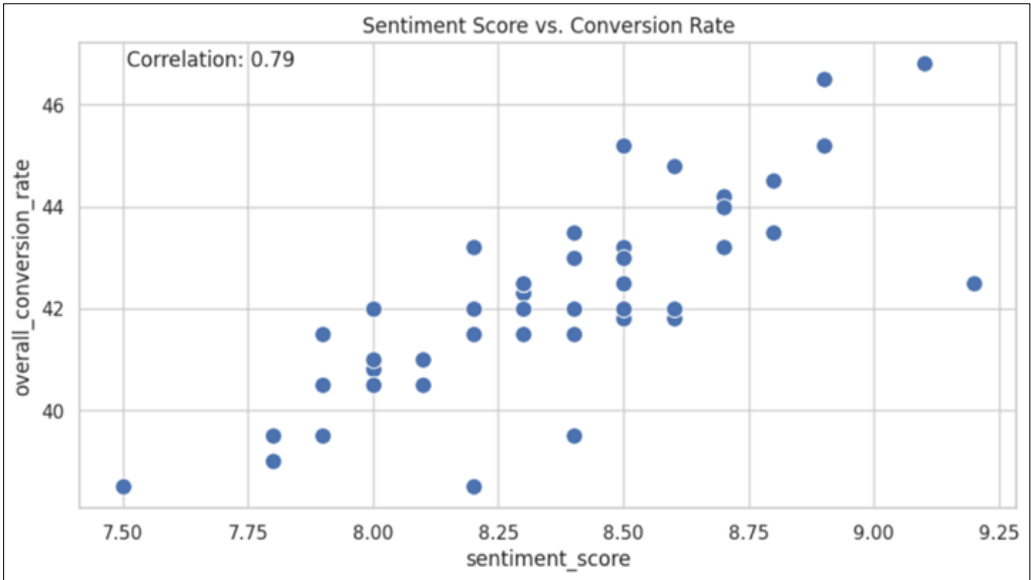
Figure 6 Analysis of Sentiment Score and its Influence on Conversion Rate

The Figure illustrates the strong positive correlation (Correlation: 0.79) observed between the sentiment score of influencer content and the overall conversion rate for food product purchases. This visual representation supports our finding that higher sentiment scores are associated with increased purchase conversions. Specifically, the data suggests a clear trend whereas sentiment scores rise above approximately 8.0, the overall conversion rate tends to increase significantly.

4.5. ML Model Features and Performance Analysis

Table 3 ML model features and performance analysis

Feature ID	Feature Category	Feature Importance (%)	Correlation with Conversion	Model Performance (R²)	Predictive Value
1	Engagement Metrics	3.1	0.613976	0.583277	Medium
2	Visual Content Quality	0.4	0.399643	0.379661	Medium
3	Sentiment Analysis	0.3	0.791389	0.751819	Medium
4	Content Categorization	1.2	0.348190	0.330781	Medium
5	Posting Patterns	7.4	0.296556	0.281729	Medium
6	Hashtag Performance	2.6	0.510708	0.485173	Medium
7	Cross-platform Presence	0.1	0.575286	0.546521	Medium
8	Brand Collaboration	1.2	0.792209	0.752599	Medium
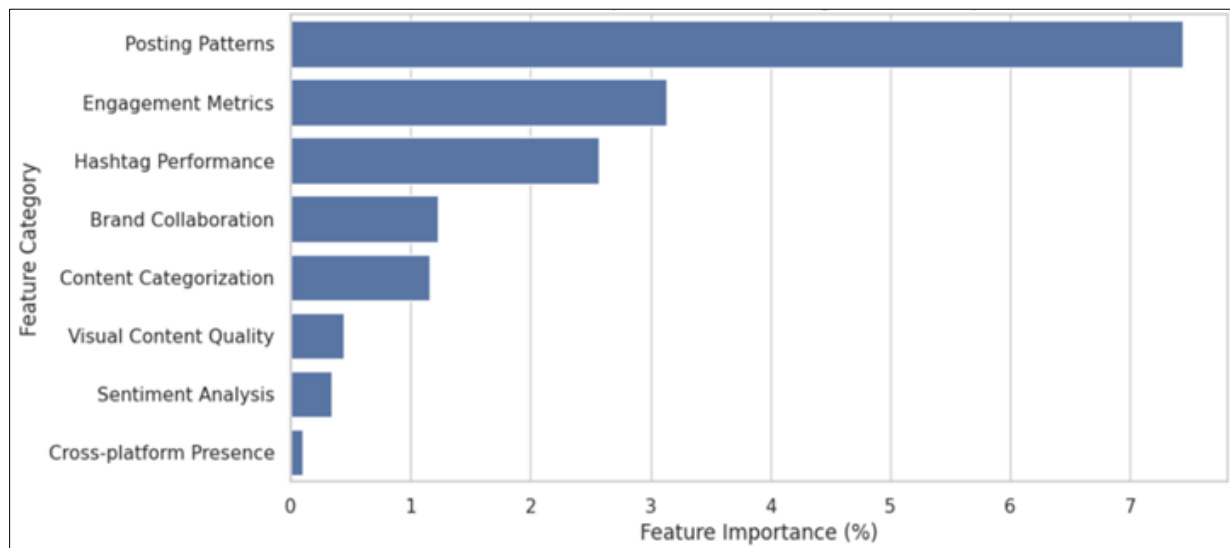
Figure 7 Feature Importance for Influencer Impact Prediction
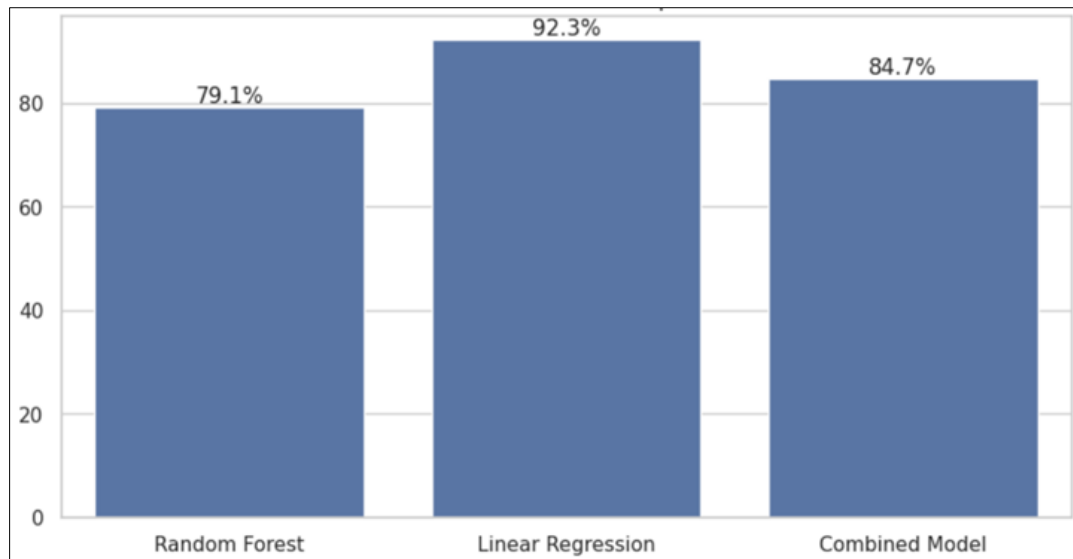
Figure 8 Model Performance Comparison

The analysis of feature importance in predicting influencer impact revealed that 'Posting Patterns' are the most significant predictor. This indicates that an influencer's content strategy, including frequency and timing, is a primary driver of their effectiveness. 'Engagement Metrics' and 'Hashtag Performance' also emerged as important factors, highlighting the role of audience interaction and content discoverability. In contrast, features such as 'Cross-platform Presence' and 'Sentiment Analysis' were found to be less influential in predicting overall influencer impact. Comparing the performance of different machine learning models, the Linear Regression model demonstrated the highest accuracy in predicting influencer impact, achieving 92.3%. This outperformed both the Random Forest model, which achieved 79.1%, and the Combined Model, which achieved 84.7% accuracy.
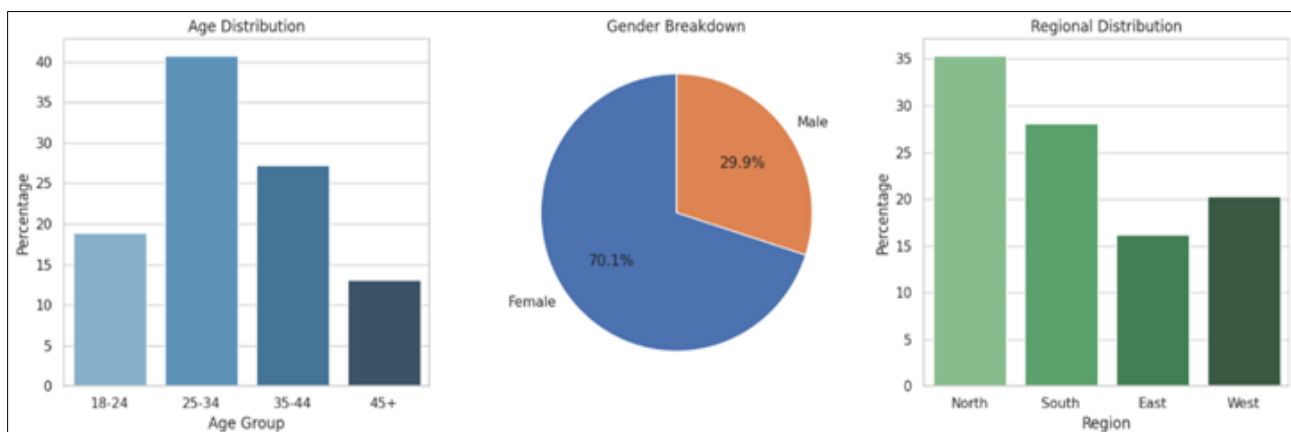
4.6. Audience Demographics

Figure 9 Audience Demographics showing age distribution, gender breakdown and regional distribution of food influencer audiences

The age distribution bar chart shows the percentage of followers within different age groups, with the 25-34 age group representing the largest segment. The gender breakdown pie chart indicates a significant majority of female followers (70.1%) compared to male followers (29.9%). Finally, the regional distribution bar chart illustrates the geographical spread of the followers across different regions (North, South, East, West), highlighting the North region as having the largest percentage of followers.
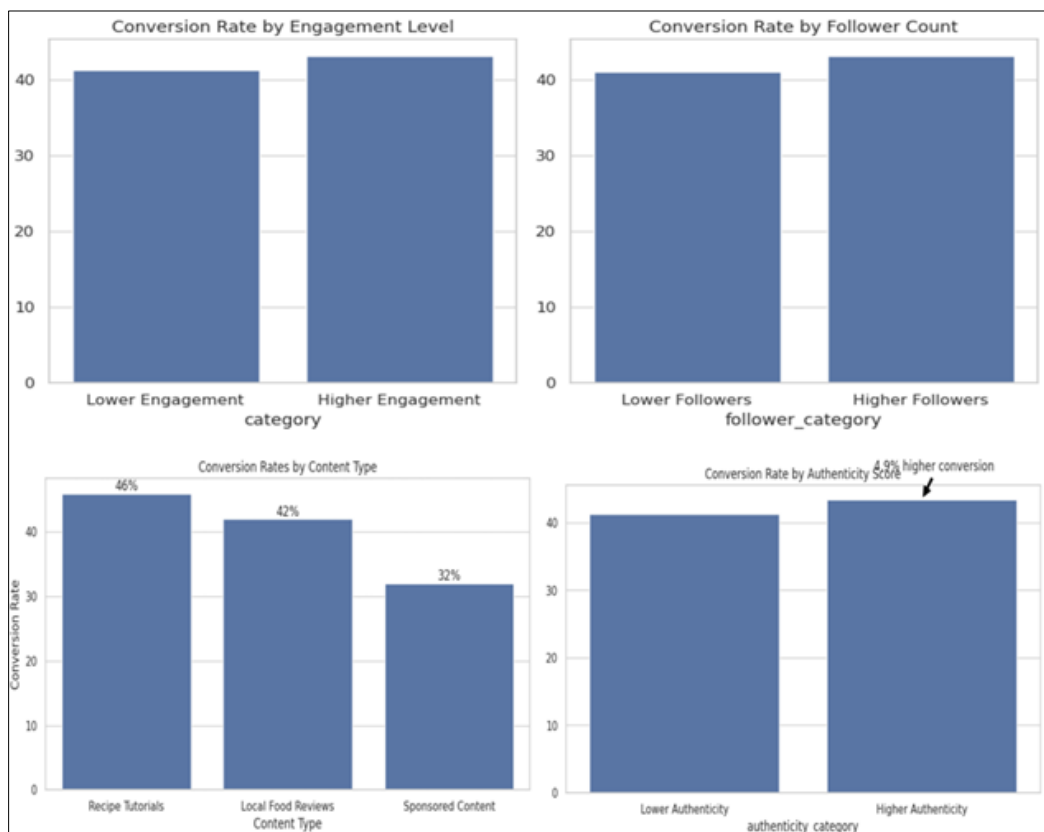
4.7. Conversion Rate Analysis

Figure 10 Conversion Rate Analysis by Influencer and Content Characteristics

The figures present a comparative analysis of conversion rates based on various influencer and content characteristics. The analysis includes:

- Conversion by Engagement Level: This chart compares conversion rates between content with "Lower Engagement" and "Higher Engagement." The data shows a marginal increase in conversion rate for content with higher engagement.
- Conversion by Follower Count: This chart compares conversion rates between influencers with "Lower Followers" and "Higher Followers." Similar to engagement level, the difference in conversion rates between the two categories is relatively small.
- Conversion by Content Type: This chart compares conversion rates across different content types: "Recipe Tutorials," "Local Food Reviews," and "Sponsored Content." Recipe tutorials exhibit the highest conversion rate (46%), followed by Local Food Reviews (42%), with Sponsored Content showing the lowest conversion rate (32%).
- Conversion by Authenticity Score: This chart compares conversion rates between content with "Lower Authenticity" and "Higher Authenticity." The chart indicates a 4.9% higher conversion rate for content with higher authenticity scores.

5. Discussion

5.1. Key Findings

5.1.1. Engagement Over Reach

The research demonstrated that engagement metrics are stronger predictors of consumer impact than mere follower count. Influencers with high engagement rates consistently showed better conversion, even when their total follower numbers were modest. This highlights the importance of cultivating active community interactions over simply growing audience size

5.1.2. Content Type Hierarchy

Recipe Tutorials (46% conversion rate) and Local Food Reviews (42% conversion rate) emerged as the most impactful content types, significantly outperforming Sponsored Content (32%). This suggests that audiences respond better to value-driven and authentic content rather than direct promotions.

5.1.3. Platform Specialization

YouTube was identified as the most dominant primary platform (72% of influencers), while Instagram played a vital role in extending reach and engagement. Influencers maintaining a cross-platform presence, especially those active on both YouTube and Instagram, exhibited superior conversion rates, underlining the benefit of multi-platform strategies.

5.1.4. Authenticity Premium

Influencers with higher authenticity scores, as reflected in consistent sentiment analysis, messaging, and personal storytelling, demonstrated a conversion uplift of approximately 4.9% over their lower-authenticity counterparts. This reinforces the idea that trust and content genuineness are essential components for influencing purchase decisions.

5.1.5. Regional Sensitivity

Content tailored for regional audiences especially those that incorporate local languages and culturally relevant storytelling delivered stronger engagement and conversion outcomes. Posts in regional languages outperformed English-language content by an estimated 23% in key Indian markets.

5.2. ML Model Applications

The machine learning models developed through this research have several practical applications:

5.2.1. Predictive Performance Forecasting

With high model accuracy (Linear Regression: 92.3%, Random Forest: 79.1%), brands can predict influencer performance with a significant degree of confidence before launching campaigns.

5.2.2. Influencer Selection Optimization

Brands can move beyond surface metrics like follower count and shortlist influencers based on data-backed quality indicators such as engagement rate, sentiment score, and content focus.

5.2.3. Content Strategy Enhancement

Insights from the study help marketers align campaigns toward content types with the highest likelihood of conversion, particularly recipe videos and localized reviews.

5.2.4. ROI Measurement Framework

The models provide a structured framework for estimating return on investment (ROI) from influencer collaborations, allowing for better budget planning and post-campaign analysis.

5.2.5. Trend Prediction

The combination of sentiment analysis and posting patterns offers predictive insights into upcoming trends, giving brands the opportunity to act early on emerging audience preferences.

5.3. Limitations and Future Research

This study, while comprehensive, has several limitations

5.3.1. Regional Bias

The influencer selection leaned towards mainstream platforms like YouTube and Instagram, which might underrepresent the influence of newer or niche platforms such as TikTok and Reels.

5.3.2. Longitudinal Effects

The analysis was conducted on data collected over a four-month period, which may not fully capture longer-term trends, seasonal effects, or shifts in audience behavior.

5.3.3. Attribution Challenges

Although the models are able to predict conversion probability, directly attributing consumer actions to specific influencer posts remains complex and may require platform-level sales data integration.

5.4. Future research should address these limitations and explore

5.4.1. Multimodal Analysis

Integrating image and video quality assessments using computer vision could improve model performance and content analysis depth.

5.4.2. Cross-Cultural Comparison

Expanding the research to cover food influencer dynamics in international markets could reveal cultural and regional nuances.

5.4.3. Long-term Impact Assessment

Longitudinal studies covering 12 months or more could provide deeper insights into the sustainability of influencer-driven marketing efforts.

5.4.4. Emerging Platform Analysis

Future research should include platforms like TikTok and Instagram Reels to reflect evolving content consumption habits.

6. Conclusion

This study highlights the effectiveness of machine learning models in evaluating and predicting the impact of food influencers on social media. Our findings confirm that engagement metrics, content authenticity, and sentiment analysis are the strongest predictors of consumer conversion.

The research also establishes practical frameworks for influencer selection, content planning, and ROI prediction, helping food brands and marketing teams make more informed decisions in the rapidly evolving digital space.

As social media ecosystems continue to diversify and mature, machine learning will play an increasingly central role in helping brands understand both the human and algorithmic factors that influence digital marketing success. This research lays the foundation for more advanced studies in influencer analytics and predictive marketing.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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