

Growthless: AI-Based Social Influencer Growth Advisor: An Intelligent Approach for Engagement Prediction and Content Optimization

Tanvi Ramdas Bhosale.¹, Rudraksha Dattu Shinde², Ninad Namdev Pawar³, Yash Sachin Shinde⁴,
Vedant Aabaso Pawar⁵

^{1,2,3,4,5} *Department of Computer Science and Engineering, Yashoda Technical Campus, Faculty of
Engineering, Satara, Maharashtra, India*

Abstract—This paper presents an AI-Based Social Influencer Growth Advisor: (GrowthPluse) designed to help influencers improve their social media performance using data-driven insights. The system collects data from multiple platforms and analyzes engagement metrics such as likes, comments, shares, views, and posting time. It uses machine learning to predict future engagement and recommend the best time to post, while Natural Language Processing suggests effective captions and hashtags. The proposed solution also provides content ideas, sentiment analysis of comments, and an interactive dashboard for easy interpretation of results. Overall, it helps influencers make smarter decisions, increase audience reach, and achieve consistent growth.

Index Terms—Social Media Analytics, Influencer Marketing, Artificial Intelligence, Machine Learning, Natural Language Processing, Engagement Prediction, Recommendation System.

I. INTRODUCTION

Social media has transformed communication into a competitive environment where influencers must understand timing, content style, hashtags, and audience behavior to grow effectively. Simply posting quality content is no longer enough, because success now depends on making informed decisions based on engagement patterns and platform trends. However, most built-in analytics tools only show numbers without explaining what actions to take next.

Influencers often struggle to interpret low engagement, identify underperforming content, or adjust their strategy in a meaningful way. Managing multiple accounts and keeping up with rapidly changing trends makes this challenge even harder.

This paper presents an AI-Based Social Influencer Growth Advisor that analyzes historical social media data and uses machine learning and natural language processing to generate personalized recommendations. It suggests optimal posting times, content ideas, hashtags, and engagement strategies, while also providing pre-post content review and sentiment analysis of comments. The system helps influencers convert raw analytics into practical guidance for better growth and audience reach.

II. OBJECTIVES

The primary objectives of this research are:

- Build a system to collect historical engagement data from Instagram, Facebook, Twitter, and LinkedIn APIs for analyzing influencer content performance over time.
- Apply machine learning to predict future engagement levels, enabling data-driven posting decisions.
- Identify optimal posting times based on individual audience activity patterns, avoiding generic advice.
- Use NLP to analyze captions, extract keywords, and suggest relevant hashtags for better visibility.
- Develop a recommendation engine for content ideas, drawing from past successes and niche trends.
- Create a pre-post AI assistant for uploading content to get instant feedback on captions, hashtags, and predicted engagement.

- Perform sentiment analysis on audience comments to gauge reactions and refine content strategies.
- Design an intuitive dashboard with graphs and charts for easy access to metrics, trends, and insights across platforms.
- Enable multi-platform management, collaboration suggestions with matching brands/creators, and network growth from one interface.

III. LITERATURE REVIEW

Kumar et al. showed that machine learning can predict social media engagement using historical data, making performance analysis more accurate and data driven. Verma and Joshi discussed how NLP can be used for hashtag recommendation, while Gupta and Nair proved that sentiment analysis helps understand audience reactions and feedback. SMM-2-1.pdfsciencedirect+1

Singh, Mehta, and Rao found that recommendation systems improve content relevance by suggesting personalized posts. Ahmed et al. also showed that hybrid recommendation methods can increase the accuracy and usefulness of suggestions for users. journals. asianresassoc+1

Kulkarni and Desai, Sharma and Jain, and Thomas highlighted the growing importance of AI-based tools in social media analytics. Their studies confirm the need for a single intelligent system that combines prediction, recommendation, hashtag generation, and content optimization for influencer growth. publishing. emanresearch+2

IV. INFLUENCER IMPACT ANALYSIS

If an influencer starts using this software, the most immediate impact is improved decision-making through data-driven insights. Instead of guessing what to post, when to post, or which hashtags to use, the influencer receives personalized recommendations based on past engagement patterns. The software can increase audience engagement by suggesting better posting times, stronger captions, and more relevant content ideas. It also helps identify what type of posts perform well, so the influencer can focus more on successful content formats and reduce low-performing ones. Another important impact is time savings and consistency. The influencer spends less effort on

manual analysis and can manage content planning more efficiently. Over time, this can lead to better reach, stronger follower growth, improved content quality, and more professional social media performance.

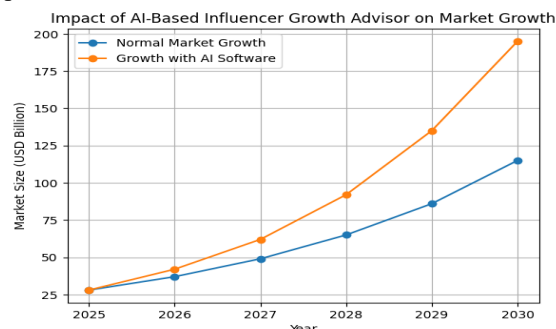


Fig. 1. Impact of AI-Based Social Influencer Growth Advisor

V. METHODOLOGY

The methodology focuses on the design and implementation of an AI-Based Social Influencer Growth Advisor using historical social media data, machine learning, and natural language processing. The system is developed to analyze user performance, generate insights, and provide personalized recommendations for content optimization and audience growth.

5.1. Data Collection

Data is collected from multiple social media platforms such as Instagram, Facebook, Twitter, and LinkedIn using their APIs. The collected data includes posts, captions, hashtags, likes, comments, shares, views, timestamps, and audience interaction details. This data is stored in a structured database for further processing.

5.2. Data Preprocessing

The raw data is cleaned by removing duplicates, handling missing values, and normalizing engagement metrics. Textual data such as captions and comments is processed by removing stop words, punctuation, and irrelevant symbols. Important features such as engagement rate, posting time, and content category are extracted for analysis.

5.3 Model Training and Working Principle

The system uses machine learning models to study historical engagement patterns and predict future performance. Recommendation techniques are applied

to suggest the best time to post, trending content ideas, and suitable hashtags. Natural Language Processing is used to analyze captions and comments, while sentiment analysis helps understand audience response. The final insights are displayed through an interactive dashboard, enabling influencers to make informed decisions before and after posting.

VI. RESULTS AND DISCUSSION

6.1. Results

The proposed GrowthPluse : AI-Based Social Influencer Growth Advisor produced effective results in organizing and interpreting social media performance data. When historical engagement metrics were analyzed through the system, the dashboard displayed clear patterns in likes, comments, views, and audience activity without requiring manual interpretation.

6.1.1. Engagement Prediction and Insight Generation
The machine learning module successfully identified content trends and estimated future engagement based on past performance. The system was able to highlight high-performing posting times, suggest suitable content ideas, and recommend hashtags that matched the user's niche and audience behavior. This shows that the AI-based approach can support more informed content planning.

6.1.2 Recommendation Accuracy and Usability
The recommendation engine generated useful suggestions for improving captions, selecting better hashtags, and posting at optimal times. The pre-post assistant also helped evaluate content before publishing, which can reduce poor-performing posts and improve engagement potential. The interactive dashboard made the results easy to understand, even for users without technical knowledge.

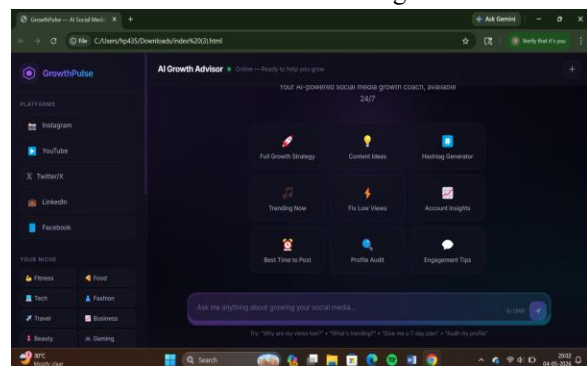


Fig 6.1.1: actual interface of software

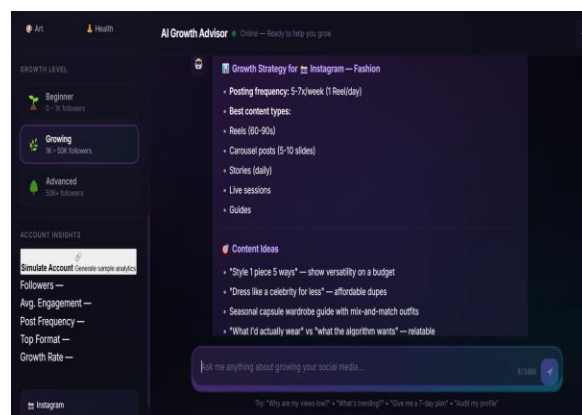


Fig 6.1.2: sample AI chat Interface

6.2 Discussion

The project demonstrates that AI can be effectively used to guide influencers in managing their social media presence. Instead of relying on trial and error, users can make decisions based on data-driven insights, which improves consistency and efficiency. The combination of machine learning and natural language processing makes the system more practical than traditional analytics tools.

The system also highlights the importance of personalization in social media growth. Different influencers may need different strategies depending on their audience, niche, and content style. By providing customized recommendations and sentiment analysis, the proposed system offers a scalable solution for improving reach, engagement, and long-term growth.

VII. CONCLUSION

This project demonstrates that an AI-Based Social Influencer Growth Advisor can improve social media growth by analyzing engagement data and giving personalized recommendations. It helps influencers choose better posting times, create stronger content, and use relevant hashtags more effectively. By combining machine learning and natural language processing, the system turns raw analytics into useful guidance. It also supports pre-post content review and sentiment analysis, making decision-making more accurate. Overall, the project reduces guesswork, improves audience engagement, and provides a smarter way for influencers to achieve consistent and sustainable digital growth.

REFERENCES

- [1] M. Ahmed et al., “A Hybrid Recommendation System for Personalized Social Media Content Suggestions,” *Journal of Web Engineering*, 2024
- [2] R. K. Sharma and V. Jain, “Social Media Analytics Using Machine Learning and Text Mining,” *Springer Lecture Notes in Networks and Systems*, 2022.
- [3] A. Thomas, “Design and Development of an AI-Based Social Media Assistant for Influencers,” *IJIRT*, 2025
- [4] M. Singh, A. Mehta, and K. Rao, “A Review on Recommendation Systems for Social Media Content Optimization,” *IEEE Access*, vol. 11, pp. 14520–14535, 2023.
- [5] A. Kumar, S. Sharma, and R. Patel, “Machine Learning Approaches for Social Media Engagement Prediction,” *International Journal of Computer Applications*, 2024
- [6] P. Verma and N. Joshi, “Natural Language Processing Techniques for Hashtag Recommendation in Social Media,” *International Journal of Advanced Research in Computer Science*, 2023
- [7] M. Singh, A. Mehta, and K. Rao, “A Review on Recommendation Systems for Social Media Content Optimization,” *IEEE Access*, vol. 11, pp. 14520–14535, 2023
- [8] R. Mehta and P. Yadav, “AI-Powered Recommendation Systems for Content Personalization,” *Journal of Emerging Technologies and Innovative Research*, 2023.