Research on the Dynamic Strategy of Social Media Marketing with AI Enablement--Construction of Interaction Mechanism Based on Sentiment Analysis and Real-time Feedback

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Abstract: With the dynamic change of social media marketing environment, the traditional static push strategy has been difficult to meet the diversified and emotional interaction needs of users.Based on artificial intelligence technology, this paper constructs a dynamic optimization of social media marketing strategy system, combining emotion analysis and real-time feedback mechanism.By collecting the user data of platforms such as Twitter and Weibo, the emotion recognition is carried out by adopting the BERT emotion classification model, and a real-time response system is designed, so that the content dynamic push based on the user emotion change is realized.The empirical analysis shows that the sentiment analysis model has higher classification accuracy, the real-time feedback mechanism significantly shortens the response time, and the dynamic strategy is superior to the traditional model in terms of user stickiness, conversion rate and brand favorable impression.Cross-platform tests with different audiences further verify the universality and application value of this strategy.The research results show that the emotion perception and instant interaction mechanism under AI can effectively drive the optimization of social media marketing effect, and provide a new path and theoretical support for enterprises to achieve precision marketing and emotional resonance.

Keywords: AI enabling;Social media marketing; Sentiment analysis; Real-time feedback mechanism; Dynamic strategy optimization

Introduction

With the rapid development of Internet technology, social media has become an important platform for communication between brands and users. As a new marketing tool, social media marketing has played a huge role in realizing brand communication and promoting user transformation.However, with the increasing diversification of users 'demands, extremely rich content ecology and accelerated information update speed, the traditional static and one-way social media

marketing strategy faces a series of challenges such as insufficient interactivity, lagging response and difficult to accurately grasp the emotional changes of users.Especially under the background of emotion-dominated consumption decision -making, how to sense users 'emotions in time and dynamically adjust marketing content has become an important topic to improve the effectiveness of social media marketing.

1 Literature review

1.1 Application of ai in social media marketing

In recent years, artificial intelligence technology has been widely used in the field of social media marketing, promoting the intelligent and personalized transformation of marketing methods [1].In terms of automatic content generation, through natural language generation (NLG) technology, enterprises can automatically write customized tweets, advertising slogans or push content according to user interest and behavior data, greatly improving marketing efficiency and response speed.Personalized recommendation system uses machine learning algorithm to deeply mine user's historical browsing records, interactive behaviors and interest preferences, realizing accurate push of products, content or services, and significantly improving user click rate and conversion rate [2].In addition, intelligent customer service technology also shows great potential in improving user experience. Through AI customer service robot based on dialogue system, it can

realize 24-hour automatic reply to user consultation, guide users to complete purchase decision, effectively reduce manual customer service pressure and improve user satisfaction.On the whole, the introduction of AI technology makes social media marketing achieve a qualitative leap in content generation, information distribution and customer service.

1.2 The role of sentiment analysis in marketing

As an important branch of natural language processing, sentiment analysis plays an important role in social media marketing [3]."Emotion recognition technology through the user comments, posts, messages and other text data of the emotional tendency of classification and quantification, so that enterprises can real-time grasp the user's emotional changes and potential needs, and then guide the marketing decision.Through sentiment analysis, users "emotional attitudes towards specific products or brands can be seen in the advertising planning stage, and advertising content and communication strategies can be optimized. In crisis public relations, timely identification of signs of negative emotions gathering is helpful for enterprises to quickly take intervention measures to prevent the deterioration of the situation. In content operation, push rhythm and topic heat can be dynamically adjusted based on sentiment analysis results, so as to improve user stickiness and interaction rate.A growing body of research has shown that integrating sentiment analysis into social media marketing processes can

effectively increase user engagement and enhance the emotional connection between brands and users, thus driving marketing effectiveness.

1.3 Real-time feedback mechanism and user interaction

With the highly dynamic social media environment, feedback mechanism based on real-time data stream analysis has become an important means to improve the quality of user interaction.Real-time feedback mechanism through the user behavior, mood swings and external environment changes in the immediate capture, to achieve dynamic optimization of marketing strategies and rapid response [4].Specifically, the real-time data stream technology enables enterprises to obtain the behavior data such as user likes, comments and forwarding at the first time, and fine-tune the content push, interactive speech and promotion activities in combination with the emotion recognition results, so as to maintain the continuous and efficient communication rhythm with users.Dynamic optimization strategy can not only adapt to the rapid changes of user interest and emotion, but also timely respond to emergencies or public opinion crisis, and enhance the brand's adaptability.The practice shows that the introduction of real-time feedback mechanism helps to break the limitation of information lag in traditional marketing, significantly improve user experience, promote the transformation of users from passive reception to active participation, and then form a virtuous interactive cycle.

1.4 The shortcomings and research value of existing research

Although AI technology, sentiment analysis and real-time feedback mechanism have been preliminarily applied in social media marketing, most of the existing studies focus on a single technical dimension, and lack of systematic exploration of the integrated application of sentiment analysis and real-time feedback.Most of the literatures either focus on the role of emotion recognition in predicting user behavior or the contribution of real-time data processing to marketing strategy adjustment, but have not fully revealed the complete path of dynamic evolution of real-time strategies driven by emotion.In addition, in the aspect of dynamic policy adaptability, most of the existing studies are mainly static models, and lack of research on adaptation mechanism under the situation of continuous fluctuation of user emotion, change of content life cycle and multi-platform heterogeneous data fusion.Therefore, the research on the dynamic social media marketing strategy based on the combination of emotion analysis and real-time feedback can not only fill the existing theoretical blank, but also has important practical value and application prospect, and has positive significance for improving the personalized level, response speed and emotional resonance of social media marketing [5].

2 Study design and methods

2.1 Research framework design

Based on AI technology to enable social media marketing as the starting point, combined with emotion analysis and real-time feedback mechanism, this study constructs a dynamically adjusted interactive strategy system.The whole research process is divided into five stages, which are data collection, data preprocessing, emotion analysis, real-time feedback mechanism design and strategy dynamic optimization.First, ensure that the sample is broad and representative by capturing a large number of user-generated content (UGC) on multiple social media platforms.Secondly, the system data cleaning and preprocessing, eliminate noise and irrelevant information, lay the foundation for subsequent modeling.Then, based on deep learning and natural language processing technology, an emotion analysis model is constructed to identify the emotional state of the user in real time.Then, the real-time feedback mechanism is designed and deployed to dynamically adjust the marketing strategy by combining the emotion change trend and user behavior data.Finally, some measurement experiments indicate the validity and applicability of the proposed dynamic strategy.The whole framework emphasizes the real-time data flow, the accuracy of emotion recognition and the timeliness of strategic response. The construction logic of interaction mechanism follows the closed-loop mode of "perception-analysis-feedback-adjustment," aiming to realize intelligent interaction with the same frequency resonance of users 'emotions.

2.2 Data sources and pre-processing

The data source mainly selects social media platforms with a wide user base and high interactive activity, such as Twitter, Weibo, Facebook, etc., covering the information such as the content released by the official account of the brand, user comments, forwarding and likes records, so as to ensure the diversity and dynamics of the data.The data collection adopts the method of combining Python crawler technology and platform open API interface, and is carried out under the premise of following data use specification and privacy protection.In the preprocessing stage, firstly, the original data is cleaned to remove advertising information, invalid links, emoticons and meaningless characters; secondly, the text content is reasonably segmented by adopting a word segmentation technology so as to facilitate subsequent feature extraction and modeling; and finally, non-target language content and low-quality texts are eliminated by a noise filtering algorithm, so that the overall quality of the data and the training effect of the model are improved.

2.3 Emotion analysis model construction

In the stage of emotion analysis, we use the BERT sentiment classifier as the main model, and integrate the multiple models with the lightweight sentiment analysis tools such as TextBlob and SnowNLP to improve the accuracy and robustness of emotion recognition.BERT

model has the ability of deep semantic understanding and can accurately capture the complex emotional tendency in user expression, while TextBlob and SnowNLP have good adaptability in processing short text and Chinese text.The emotion analysis task is set to three categories (positive, neutral and negative), and a multi-label classification mechanism is introduced to capture mixed emotion features.The model performance evaluation indicators include Accuracy, Recall and F1 value, which are used to measure the overall correctness, recall ability and classification balance of classification results respectively. The stability and generalization ability of the model are ensured by cross-validation method.

2. 4 Design of real-time feedback mechanism

In order to realize the real-time strategy adjustment based on the dynamic change of emotion, a complete real-time feedback mechanism is designed.The mechanism takes the mood fluctuation trend as an input variable, dynamically judges the user mood change node by setting an emotion threshold, and timely triggers a strategy adjustment action.Specifically, when a negative emotion aggregation is detected, the system will give priority to pushing soothing, positive guidance content; when a positive emotion is detected, the frequency of pushing promotional or brand-enhancing content will be increased.The feedback response time is controlled within 5 minutes to ensure timely response to user emotional changes.At the same time, according to the real-time feedback results, the system automatically optimizes the push rhythm, topic selection and content tone, realizes iterative strategy optimization based on feedback data, and improves the interactive effect and user satisfaction.

2. 5 Proof technique

In order to verify the effectiveness of the dynamic strategy system constructed by sentiment analysis and real-time feedback mechanism, this study designed A/B test experiments of control group and experimental group.The control group adopted the traditional static content push strategy without emotion change adjustment, while the experimental group adjusted the marketing content and interaction mode dynamically in real time based on the emotion recognition results.The two groups were run in the same time window, and the actual effect of the dynamic strategy was evaluated by comparing the performance of the two groups in the indicators such as user click rate, interaction rate, forwarding volume, positive emotional transition rate, etc.The experimental data were statistically analyzed by T-test and regression analysis to ensure the scientificity and reliability of the conclusions.

3 Construction of dynamic marketing strategy based on sentiment analysis and real-time feedback

3. 1 Content optimization strategy driven by sentiment analysis

In AI-enabled social media marketing, sentiment analysis has become an important

engine driving content optimization.By capturing the emotional tendencies in user text in real time, enterprises can dynamically adjust the pace of content generation and push according to different emotional states.When the overall user's mood is positive, the push frequency of brand positive energy content shall be increased in due time to strengthen the user's emotional identification and brand favor; when the accumulation of negative emotions is detected, the marketing push density shall be reduced, and the soothing and caring information shall be pushed instead, so as to avoid intensifying the user's emotional rebound. The implementation of differentiated push strategies for users in different emotional states can effectively enhance the acceptance of information and the willingness to interact.For example, for the user groups in positive emotional state, stimulating contents such as new product release and promotion discount can be pushed, while for the user groups with low mood or active negative mood, it is more suitable to push user care, problem solution or community support information, and realize the two-way promotion of personalized marketing and user emotional value by accurately matching emotional state and content attribute.

3.2 Real-time feedback system and interactive mechanism

The design of real-time feedback system is the core support for the implementation of dynamic marketing strategy, and the key lies in real-time adjustment of interaction mode based on user emotion change.The user emotion change node is monitored through real-time data stream, and when the emotion fluctuates obviously, the system immediately triggers the adjustment logic of the content and the interaction mode.For example, after a user posts a negative comment, the system can quickly recommend a solution to the problem or direct it to the customer service channel, improving service response speed and emotional repair.On this basis, a multi-round dynamic interaction mechanism is constructed, and the next round of communication strategy is further adjusted by continuously monitoring the emotional feedback after each round of interaction, so as to form a closed-loop interaction mode of emotional perception-response-re-perception-re-response.Multiple rounds of dynamic interaction can not only increase the depth of user participation, but also guide users to gradually turn to brand loyalty through the accumulation of positive emotions, thus maximizing the marketing effect driven by emotion management.

3.3 Dynamic optimization path of market effect

To ensure the continued effectiveness of a dynamic marketing strategy, it needs to be dynamically adapted to the different stages of the social media marketing lifecycle.At the initial stage of new product release, users 'emotions are usually in the state of curiosity and expectation, so we should increase the release of

high-frequency and positive emotional guidance content to stimulate attention and discussion quickly; At the mature stage of products, it is necessary to dynamically adjust the content focus according to the user's feedback emotion, strengthen the word-of-mouth management and use experience sharing, and maintain the heat; At the end of marketing, more summative and retrospective contents shall be pushed to stimulate the emotional resonance of users.At the same time, the user's mood itself has certain periodic fluctuation characteristics, such as holiday emotional high period, consumption weak period, etc., and the marketing push rhythm also needs to be adjusted synchronously with the user's emotional cycle, so as to avoid excessive interference with the user experience in the emotional trough period and improve the timeliness and fit of the push strategy.By combining the life cycle characteristics and the emotion cycle dynamic adjustment strategy, the optimal allocation of marketing resources can be realized, and the overall marketing ROI can be significantly improved.

3. 4 Typical application scenarios and case studies

In the context of brand crisis public relations, emotion analysis and real-time feedback mechanism show extremely high application value.Taking an international famous brand's response to sudden public opinion events as an example, the enterprise monitored the rapid spread of negative emotions on social media platform in real time through emotion analysis, and then started the rapid response mechanism, pushed official statement and apology information as soon as possible and opened multi-channel complaint feedback channels, effectively relieving users 'emotions and avoiding further fermentation of public opinions.Another typical scenario is that during the release period of new products, a technology enterprise tracks the instant feedback of users on the functions of new products through emotional analysis. After finding that a certain function is controversial, it quickly adjusts the publicity focus and pushes the use guidance content, and strengthens the user experience optimization measures at the same time, finally successfully reverses the emotional trend of users and maintains the continuous fermentation of new product reputation.These cases fully verify the efficiency and operability of the dynamic marketing strategy based on sentiment analysis and real-time feedback in practical application, and provide practical reference for social media marketing in different situations.

4 Empirical analysis and result discussion

4. 1 Data experimental results presentation

In order to verify the effectiveness of the sentiment analysis and real-time feedback mechanism proposed in this study, the classification accuracy, recall rate and F1 value of the sentiment analysis model are evaluated first, and the emotion change trend in the actual social media operation process is observed.At the same time, the

efficiency of real-time feedback mechanism in response to user's emotional changes is analyzed statistically.The following table presents the main performance indicators of the sentiment analysis model and the response performance of the real-time feedback mechanism.

Table 1 Statistical Table of Accuracy of Sentiment Analysis and Response Rate of Feedback Mechanism

Index	Numerical value
sentiment analysis accuracy	89.2%
Sentiment Analysis Recall	87.5%
Sentiment Analysis F1 Value	88.3%
Average Feedback Response Time (sec)	172 seconds.
us mood fluctuation capture rate	91.4%

It can be seen from Table 1 that the emotion classification model based on BERT achieves high accuracy and recall rate in social media texts, and can accurately identify the emotional changes of users.At the same time, the average response time of the real-time feedback system is controlled within 3 minutes, which can effectively follow the user's emotional dynamics for strategy adjustment, which verifies the superiority of the overall model in real-time and accuracy.

4.2 Strategy adjustment effect evaluation

In order to further analyze the effect of strategy adjustment on user behavior and brand cognition, the experimental group and the control group were set up for A/B test in the application stage of dynamic marketing strategy.Data collection and comparative analysis were conducted on the changes of user stickiness, conversion rate and brand favorable impression respectively. See the table below for relevant results.

Table 2 Comparison of changes in user behavior and brand goodwill before and after dynamic strategy application

Index	Control group (static push)	Experimental group (dynamic push)
Average daily active user growth rate	4.2%	11.6%
Increase in user conversion rate	3.8%	10.2%
Brand Positive Emotional Growth Proportion	5.5%	13.4%

It can be seen from the data in Table 2 that after introducing the dynamic marketing strategy based on sentiment analysis and real-time feedback mechanism, the experimental group is significantly better than the control group in key indicators such as daily active user growth, conversion rate improvement and brand favorable impression improvement, especially the brand positive emotion growth rate reaches 13.4%, much higher than 5.5% of the traditional static push group, indicating that the dynamic adjustment strategy effectively stimulates the positive emotion of users and strengthens the emotional connection between users and brands.

4.3 Discussion of results

In order to further explore the

applicability of AI-enabled social media dynamic marketing strategy in different platforms and different audience groups, this study conducted cross-platform experiments on Weibo, Twitter and Instagram respectively, and compared different audience groups (such as Generation Z and Generation Y) by groups. See the table below for relevant results.

Table 3 Comparison of Applicability of Dynamic Strategies for Different Platforms and Audience Groups

Platform/community	Sentiment analysis accuracy	Policy response improvement
Weibo-Generation Z	90.1%	12.8%
Twitter-Y Generation	88.4%	10.3%
Instagram-Z Generation	91.5%	14.1%

It can be found from Table 3 that dynamic marketing strategies show good adaptability on different platforms, among which Instagram platform and Generation Z user groups have the most significant improvement in emotional perception and strategic response.This indicates that the sentiment analysis and real-time feedback mechanism is especially effective for young users with more active emotional expression and frequent interaction. Meanwhile, it also suggests that enterprises should carry out personalized optimization in combination with platform characteristics and user emotional expression habits to achieve the best marketing effect when deploying dynamic marketing on different platforms and different user levels.

Conclusion

Based on emotion analysis and real-time feedback mechanism, this paper puts forward and verifies a set of efficient dynamic marketing strategy construction framework around the research of social media marketing dynamic strategy enabled by AI.The emotion analysis model realizes accurate identification of the user emotion, and a sensitive feedback mechanism is built based on the real-time data stream, so that the response time of an enterprise to the change of the user emotion is effectively shortened, and the adaptability and the interaction effect of content push are improved.The results of empirical analysis show that the dynamic strategy proposed in this paper has significant advantages over the traditional static push strategy in key indicators such as user stickiness, conversion rate and brand goodwill.At the same time, cross-platform and different audience groups of comparative tests further verify the universality and promotion potential of this strategy.On the whole, the deep integration of AI emotion analysis and real-time feedback mechanism not only optimizes the operation path of social media marketing, but also provides feasible technical support for realizing the double promotion of user experience and brand value, and lays a theoretical foundation and practical basis for the development of subsequent social media intelligent marketing system.

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