Research on Social Attitudes of Groups and Individuals Based on Online Platforms (Postprint)

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Abstract

Social attitudes reflect citizens' judgments and feelings toward society, representing a crucial aspect that demands significant attention in social governance. This article analyzes the advantages and disadvantages of traditional social survey methods, subsequently demonstrating the theoretical and practical feasibility of internet-based computational social attitude analysis. The paper introduces a computational model for social attitudes based on online behavior, developed by the research group from the Institute of Psychology, Chinese Academy of Sciences, and applies this model to calculate social attitudes in Guangdong Province. The interpretability of the model is further validated through correlations between the social attitude indicator of "local economic satisfaction" across various cities in Guangdong Province and the region's macroeconomic indicators. Additionally, it introduces the University of Pennsylvania' s approach to predicting citizen well-being using Twitter data and mapping well-being across the United States. The computational method employing predictive models utilizes authentic and objective data, eliminates influences from factors such as social desirability, substantially reduces costs, shortens the original research cycle, and preliminarily achieves real-time computational sensing of social attitudes, holding significant practical implications for the long-term dynamic monitoring of various social attitude indicators. It is hoped that this approach can complement offline social survey methods with mutual advantages, jointly providing decision support for social governance.

Full Text

Preamble

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Identifying Social Attitude Based on Network Behavior

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Abstract

Social attitude reflects public judgment and sentiment toward society, representing a critical component that social governance must prioritize. This paper analyzes the strengths and weaknesses of traditional social survey methods, demonstrating the theoretical and practical feasibility of computing social attitudes based on internet behavior. We introduce a computational model for social attitude prediction developed by the Institute of Psychology, Chinese Academy of Sciences, and apply this model to calculate social attitudes in Guangdong Province. The correlation between the "local economic satisfaction" indicator derived from our model and regional macroeconomic indicators further validates the model' s interpretability. Additionally, we review research from the University of Pennsylvania that predicted citizen well-being using Twitter data to create a U.S. happiness map. The predictive modeling approach utilizes authentic and objective data, eliminates influences such as social desirability bias, substantially reduces costs, and shortens traditional research cycles, enabling real-time computational sensing of social attitudes. This methodology holds significant practical value for long-term dynamic monitoring of social attitude indicators and should complement offline survey methods to jointly support decision-making in social governance.

Keywords: social attitude, network behavior, social governance

1. Traditional Social Survey Methods

China is currently undergoing accelerated social transformation, with social members gradually forming diverse interest groups. As interest structures become complex and social demands multiply, more decisions must be entrusted to societal 博弈, addressing development issues through citizen participation. To innovate effective mechanisms for preventing and resolving social conflicts and adapt to social transformation and economic transition, China has shifted from traditional social management to modern social governance [**?**]. Social governance represents a collective action encompassing government, social organizations, and citizens, wherein citizens' actions are profoundly influenced by their social attitudes. When people maintain positive attitudes toward contradictions in social governance, it facilitates smooth progress; conversely, negative attitudes may intensify conflicts and hinder further development [**?**].

Social attitude reflects public judgment and sentiment toward society, constituting a critical focus for social governance. In contemporary society, public social attitudes serve not only as a "barometer" but also carry significance for social governance participation. Social attitude [**?**, **?**] arises from social factors —when individuals encounter social matters, regardless of whether these align

with their material or ideological needs, they generate affirmative or negative, approving or opposing, approaching or rejecting experiences [**?**]. Consequently, individuals develop attitudes of varying directions, intensities, and centrality based on the differential significance of social matters. Social attitudes manifest through societal trends, fashions, public opinion, and members' life satisfaction, future confidence, social motivation, and social emotions. They interact with mainstream ideology and exert vague, latent, and emotional influences on social members through mechanisms such as social identification, emotional contagion, and deindividuation [**?**, **?**].

Based on social attitude surveys, large-scale and efficient monitoring of indicators such as economic satisfaction, life satisfaction, and government satisfaction can more sensitively detect changes in public sentiment than macroeconomic statistics alone. While analyzing current social conditions through macroeconomic and social statistics primarily focuses on macro-level economic structural issues, public attitudes represent a more direct factor reflecting social problems [**?**]. Timely understanding of public opinion, objective real-time assessment of public events, social sentiment, and social psychology [**?**], and early identification of social instability factors can provide scientific foundations for decision-making.

Currently, domestic social attitude research in China typically employs social survey methods dispersed across various research projects, with few comprehensive and systematic surveys. Due to the large populations involved, interviews and observations are impractical, making questionnaire surveys the predominant method [**?**]. The process involves recruiting and training investigators to distribute and collect questionnaires from participants, then aggregating results to assess public social mentality. Through social surveys, researchers can understand public attitudes to some extent, such as the relationship between life satisfaction and government satisfaction [**?**], attitudes toward "animal welfare" [**?**], and demographic social attitude surveys [**?**].

A complete survey cycle includes investigator recruitment, face-to-face surveys, and statistical analysis, requiring substantial investments in personnel and time. Based on experience, a survey of 10,000 participants costs approximately hundreds of thousands of RMB. Due to the requirement for broad coverage, survey cycles are often lengthy, typically 3–6 months, meaning results are available only after at least one quarter, compromising timeliness.

Developed countries and regions have long conducted social attitude surveys through professional institutions, ensuring systematic implementation. The Institute for Social Research (ISR) at the University of Michigan has annually monitored changes in life values and lifestyles of post-WWII youth since 1975, surveyed Black Americans' lives annually since 1979, and conducted World Values Surveys since 1989. The UK' s National Center for Social Research (NCSR) has surveyed household expenditures annually since 1957 and social attitudes annually since 1983. While these institutions' surveys cover extensive scopes, they are costly and typically require six months to one year to complete.

Survey methods possess solid theoretical and practical foundations, enabling fair and balanced random sampling across different groups and regions. Through trained administrators, survey quality can be effectively controlled. However, broad coverage necessitates more investigators and higher costs, resulting in low timeliness. Moreover, questionnaire-based data collection is susceptible to social desirability bias.

2. New Opportunities from the Internet for Social Mentality Surveys

Contemporary society has entered the networked era, with mobile phones, computers, and the internet permeating all aspects of daily life, bringing tremendous changes. New media possesses unique advantages over old media in information volume, presentation formats, content, and timeliness, profoundly impacting current social life. As a public opinion arena, social networks can reflect public social attitudes [**?**]. Social attitudes reflected in network behavior deserve attention, as they reveal public concerns and regular patterns of attention. Utilizing and studying these attitudes can help grasp public thoughts and provide foundations for social governance.

According to a China Internet Network Information Center (CNNIC) report, by December 2015, China' s internet user population reached 688 million, with an internet penetration rate of 50.3%. In today' s networked environment, diverse samples are more easily collected, and network behavior research is unrestricted by time or space. As an expression channel for social attitudes, social networks offer distinct advantages in timeliness, speed, accuracy, and authenticity [**?**].

According to Brunswik' s "lens model" [**?**], private spatial environments often contain clues that characterize individuals' psychological traits (e.g., room decoration styles and personal item arrangements). Through "behavioral residue," these clues manifest in various daily scenarios and contexts, including internet space [**?**, **?**], implying that users' "behavioral traces" in cyberspace can reflect their psychological characteristics. Numerous studies have explored relationships between internet behavior and psychological traits to provide foundations for optimal human-computer matching and positive interaction.

Existing research has analyzed psychological traits based on network behavior. Gosling et al. [**?**] examined associations between Facebook users' Big Five personality traits and network characteristics, designing 11 social features and concluding that social activity level can predict extraversion. Correa et al. [**?**] investigated relationships between Big Five personality and social media usage, finding that openness and extraversion positively correlated with social media use, while neuroticism correlated negatively. Campbell et al. [**?**] recruited 188 online samples and 27 frequent internet-using undergraduate students offline, demonstrating that frequent internet users were more likely to experience loneliness and internet addiction. Domestic research has also analyzed relationships between individual personality characteristics and online behavior in network

society, mapping general internet usage, preferences for different network service functions, usage patterns for specific content, and deviant behaviors onto personality measures, demonstrating the feasibility of using network behavior for personality prediction [**?**].

These studies collectively demonstrate that using network behavior to identify users' psychological traits is entirely feasible, with model prediction accuracy reaching acceptable levels. The efficiency of computational models enables timely analysis and identification of psychological characteristics, including social attitudes, across large populations, facilitating corresponding social governance recommendations at both theoretical and practical levels.

3. Establishment of a Computational Model for Social Attitude Based on Network Behavior

Building on prior research, this paper proposes a network behavior-based social attitude research methodology comprising three steps: data collection, model training, and model application, as illustrated in Figure 1 [Figure 1: see original paper].

In the data collection phase, questionnaires are administered to obtain actual social attitude indicators as ground truth, while network behavior data is analyzed to extract behavioral features. During model training, network behavior features serve as independent variables and individual social attitudes as dependent variables, establishing individual social attitude prediction models through machine learning algorithms. In the model application phase, batch user network data is collected, features are extracted, and public social attitudes are computed through the prediction model to understand public sentiment and opinion trends.

Based on existing research using network behavior to predict psychological traits, primary network features include: demographic characteristics (age, gender, registration date, education level); usage behavior features characterizing potential behavioral patterns, examining user interaction modes, personalized expression, and privacy protection; and linguistic features examining language themes on social media from psychological and emotional expression perspectives. Commonly employed models include linear regression, neural networks, and parametric regression models, with specific effectiveness varying due to data feature differences.

In Li et al.'s study [**?**], participants' social attitude questionnaire scores served as outcome variables, while behavioral statistics and text content features served as predictor variables. Linear regression, neural networks, and incremental multitask regression algorithms were employed for modeling, with model accuracy and Pearson correlation coefficients shown in Table 1 .

The optimal model achieved an average accuracy of 82.83% for social attitude prediction, with correlation coefficients ranging from 0.39 to 0.47. In social

or personality psychology, correlations are generally considered acceptable and meaningful when reaching 0.4 [**?**]. Therefore, this model satisfies the prerequisites for large-scale application.

Current domestic research includes studies predicting mental health status, subjective well-being, personality traits, depression, and anxiety based on social network data [**?**, **?**]. Foreign researchers have conducted related studies using the Twitter platform [**?**], covering psychological well-being, political orientation, and elections. The University of Pennsylvania predicted individual well-being through Twitter and Facebook content, achieving a correlation coefficient of 0.62 with life satisfaction scale values, thereby validating prediction effectiveness [**?**].

Empirical studies domestically and internationally demonstrate the feasibility of computing social attitudes through user data from networks and communication platforms. Utilizing network data enables timely and effective acquisition of public social attitudes, representing an ideal approach for sensing social sentiment.

4. Using Social Attitude Computational Models for Large-Scale, High-Timeliness Surveys

This section explores the effectiveness of using social attitude computational models for large-scale, high-timeliness social attitude surveys through case studies.

4.1 Social Attitude Computation for Weibo Users in Guangdong Province

To further validate the social attitude prediction model' s effectiveness, we applied the trained model to calculate the "local economic satisfaction" indicator for various cities in Guangdong Province and examined its correlation with regional macroeconomic indicators [**?**]. Using prefecture-level cities as units, we first employed the trained model to compute each city' s average local economic satisfaction ranking for 2012, then retrieved corresponding macroeconomic indicator rankings from the 2012 Guangdong Statistical Yearbook. Pearson correlation coefficients between the two ranking sequences are presented in Table 2 .

The results demonstrate significant positive correlations between local economic satisfaction and multiple economic indicators, including per capita GDP (r = 0.66), total agricultural output (r = 0.58), grain production (r = 0.45), peanut production (r = 0.49), vegetable production (r = 0.60), year-end hog inventory (r = 0.59), slaughtered hogs (r = 0.58), pork production (r = 0.58), total retail sales of consumer goods (r = 0.45), retail sales in wholesale and trade (r = 0.44), and per capita income of employed staff (r = 0.51). These correlations effectively validate the interpretability of public social attitude computational results.

4.2 U.S. Twitter User Happiness Map

Schwartz et al. at the University of Pennsylvania [**?**] collected approximately 1 billion tweets from June 2009 to March 2010, mapping them to U.S. regions based on geolocation data. Using topics generated through LDA and word categories obtained through LIWC (Linguistic Inquiry and Word Count) as model input features, they predicted well-being through LASSO regression and evaluated effectiveness using life satisfaction questionnaires administered in these regions.

Researchers randomly sampled 10% of data from November 2008 to January 2010, selecting 1,293 counties from 2,528 U.S. counties. Approximately 30,000 topic words were generated. The 1,293 counties were randomly divided into a 75% training set (970 counties) and a 25% test set (323 counties). Model prediction effectiveness was evaluated using Pearson correlation coefficients between predicted life satisfaction and survey results. Comparing network behavior-based predictions with questionnaire-based measurements across regions revealed substantial similarity, with a Pearson correlation coefficient of 0.535, demonstrating the accuracy and practical significance of using network behavior to predict well-being (http://wwbp.org/).

4.3 Discussion

The correlation analysis between local economic satisfaction and macroeconomic indicators in Guangdong municipalities validates the effectiveness of the public social attitude prediction model. The comparison between network behavior-based happiness computation and questionnaire-based measurements across U.S. regions demonstrates the feasibility of using network behavior to predict well-being. In the networked era, the internet serves as an effective channel for acquiring public social attitudes—a factor that social governance must consider seriously. In other words, social governance needs to attach great importance to and actively study social attitudes reflected in social networks [**?**].

Network behavior data is authentic and objective, eliminates influences such as social desirability bias, substantially reduces costs, shortens traditional research cycles, enables real-time computational sensing of social attitudes, and holds significant practical value for long-term dynamic monitoring of social attitude indicators. For decision-making regarding specific public events, this approach can help timely grasp public reactions and attitudes during incidents, serving the scientific advancement and effectiveness evaluation of related governance work.

However, network behavior-based social attitude research has limitations. A certain proportion of target populations do not use the internet or leave sufficient behavioral traces on the social networks from which we obtain data. Therefore, network behavior-based social attitude research cannot completely replace offline surveys. The two approaches should complement each other' s strengths and weaknesses, jointly providing reference value for social governance.

Future developments may integrate social attitude sensing with emergency event detection and negative public opinion warning to achieve greater effectiveness. Existing research has detected domain-specific public opinion events by combining dynamic query expansion with participant emotion filtering [**?**]. Since social attitudes directly influence social behavior, incorporating social attitude indicators as computational factors may yield superior results. Additionally, for negative public opinion event prediction, existing methods combining sentiment analysis with statistical approaches as model features through LASSO regression [**?**] could similarly consider incorporating participants' social attitude indicators as features to improve model accuracy.

5. Summary and Outlook

Social attitudes are intangible yet exert undeniable influence on individual behavior, organizational development, and societal functioning. Emphasizing the connections between social attitudes, the internet, and social governance, and introducing a social attitude perspective into social governance frameworks, holds important theoretical and practical significance [**?**].

This paper proposes using network behavior data to predict public social attitudes. The data is authentic and objective, eliminates social desirability bias, substantially reduces costs, shortens research cycles, enables real-time computational sensing of social attitudes, and holds significant practical value for long-term dynamic monitoring of social attitude indicators. For specific public events, this approach can help timely grasp overall public reactions and attitudes, serving scientific advancement and effectiveness evaluation of governance work.

Network behavior-based social attitude research has limitations, as some target populations remain offline or leave insufficient digital traces. Therefore, it cannot completely replace offline surveys. The two methods should complement each other' s strengths, jointly serving social governance.

Future prospects include combining social attitude sensing with emergency event detection and negative public opinion warning. Existing methods for detecting specific domain public opinion events through dynamic query expansion combined with participant emotion filtering [**?**] could be enhanced by incorporating social attitude factors. Similarly, negative public opinion prediction methods using sentiment analysis and statistical features with LASSO regression [**?**] could improve accuracy by including social attitude indicators as features.

In summary, integrating machine learning with psychological research to conduct real-time computations through network behavior data enables dynamic and effective sensing of public social attitudes. Combined with social governance objectives, this facilitates effective monitoring of public behavior development trends. This technology holds promise as a beneficial auxiliary tool for building harmonious societies, maintaining long-term stability, promoting economic development, and alleviating social contradictions.

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Note: Figure translations are in progress. See original paper for figures.