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Social media mining

Social media mining is the process of obtaining big data from user-generated content on social media sites and mobile apps in order to extract patterns, form conclusions about users, and act upon the information, often for the purpose of advertising to users or conducting research. The term is an analogy to the resource extraction process of mining for rare minerals. Resource extraction mining requires mining companies to sift through vast quantities of raw ore to find the precious minerals; likewise, social media mining requires human data analysts and automated software programs to sift through massive amounts of raw social media data in order to discern patterns and trends relating to social media usage, online behaviours, sharing of content, connections between individuals, online buying behaviour, and more. These patterns and trends are of interest to companies, governments and not-for-profit organizations, as these organizations can use these patterns and trends to design their strategies or introduce new programs, new products, processes or services.

Social media mining uses a range of basic concepts from computer science, data mining, machine learning and statistics. Social media miners develop algorithms suitable for investigating massive files of social media data. Social media mining is based on theories and methodologies from social network analysis, network science, sociology, ethnography, optimization and mathematics. It encompasses the tools to formally represent, measure and model meaningful patterns from large-scale social media data.[1] In the 2010s, major corporations, governments and not-for-profit organizations engaged in social media mining to obtain data about customers, clients and citizens.

Contents

Background

As defined by Kaplan and Haenlein,[2] social media is the "group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content." There are many categories of social media including, but not limited to, social networking (Facebook or LinkedIn), microblogging (Twitter), photo sharing (Flickr, Instagram, Photobucket, or Picasa), news aggregation (Google Reader, StumbleUpon, or Feedburner),

video sharing (YouTube, MetaCafe), livecasting (Ustream or Twitch), virtual worlds (Kaneva), social gaming (World of Warcraft), social search (Google, Bing, or Ask.com), and instant messaging (Google Talk, Skype, or Yahoo! messenger).

The first social media website was introduced by GeoCities in 1994. It enabled users to create their own homepages without having a sophisticated knowledge of HTML coding. The first social networking site, SixDegrees.com, was introduced in 1997. Since then, many other social media sites have been introduced, each providing service to millions of people. These individuals form a virtual world in which individuals (social atoms), entities (content, sites, etc.) and interactions (between individuals, between entities, between individuals and entities) coexist. Social norms and human behavior govern this virtual world. By understanding these social norms and models of human behavior and combining them with the observations and measurements of this virtual world, one can systematically analyze and mine social media. Social media mining is the process of representing, analyzing, and extracting meaningful patterns from data in social media, resulting from social interactions. It is an interdisciplinary field encompassing techniques from computer science, data mining, machine learning, social network analysis, network science, sociology, ethnography, statistics, optimization, and mathematics. Social media mining faces grand challenges such as the big data paradox, obtaining sufficient samples, the noise removal fallacy, and evaluation dilemma. Social media mining represents the virtual world of social media in a computable way, measures it, and designs models that can help us understand its interactions. In addition, social media mining provides necessary tools to mine this world for interesting patterns, analyze information diffusion, study influence and homophily, provide effective recommendations, and analyze novel social behavior in social media.

Uses

Social media mining is used across several industries including business development, social science research, health services, and educational purposes.[3][4] Once the data received goes through social media analytics, it can then be applied to these various fields. Often, companies use the patterns of connectivity that pervade social networks, such as assortativity—the social similarity between users that are induced by influence, homophily, and reciprocity and transitivity.[5] These forces are then measured via statistical analysis of the nodes and connections between these nodes.[3] Social analytics also uses sentiment analysis, because social media users often relay positive or negative sentiment in their posts.[6] This provides important social information about users' emotions on specific topics.[7]

These three patterns have several uses beyond pure analysis. For example, influence can be used to determine the most influential user in a particular network.[3] Companies would be interested in this information in order to decide who they may hire for influencer marketing. These influencers are determined by recognition, activity generation, and novelty—three requirements that can be measured through the data mined from these sites.[3] Analysts also value measures of homophily: the tendency of two similar individuals to become friends.[5] Users have begun to rely on information of other users' opinions in order to understand diverse subject matter.[6] These analyses can also help create recommendations for individuals in a tailored capacity.[3] By measuring influence and homophily, online and offline companies are able to suggest specific products for individuals consumers, and groups of consumers. Social media networks can use this information themselves to suggest to their users possible friends to add, pages to follow, and accounts to interact with.

Research

Research areas

- Social media event detection – Social networks enable users to freely communicate with each other and share their recent news, ongoing activities or views about different topics. As a result, they can be seen as a potentially viable source of information to understand the current emerging topics/events.[8][9][10][11][12][13]
- Public health monitoring and surveillance - Using large-scale analysis of social media to study large cohorts of patients and the general public, e.g. to obtain early warning signals of drug-drug interactions and adverse drug reactions,[14][15] or understand human reproduction and sexual interest.[16]
- Community structure (Community Detection/Evolution/Evaluation) – Identifying communities on social networks, how they evolve, and evaluating identified communities, often without ground truth.[1]
- Network measures – Measuring centrality, transitivity, reciprocity, balance, status, and similarity in social media.[1]
- Network models – Simulate networks with specific characteristics. Examples include random graphs (E-R models), Preferential attachment models, and small-world models.[1]
- Information cascade – Analyzing how information propagates in social media sites. Examples include herd behavior, information cascades, diffusion of innovations, and epidemic models.[1]
- Influence and homophily – Measuring network assortativity and measuring and modeling influence and homophily.[1]
- Recommendation in social media – recommending friends or items on social media sites.[1][17][18]
- Social search – Searching for information on the social web.[19]
- Sentiment analysis in social media – Identifying collectively subjective information, e.g. positive and negative, from social media data.[20][21][22][23][16][15]
- Social spammer detection – Detecting social spammers who send out unwanted spam content appearing on social networks and any website with user-generated content to targeted users, often corroborating to boost their social influence, legitimacy, credibility.[24][25][26][27]
- Feature selection with social media data – Transforming feature selection to harness the power of social media.[28][29][30][31]
- Trust in social media – Studying and understanding of trust in social media.[32][33][34][35]
- Distrust and negative links – Exploring negative links in social media.[36][37][38]
- Role of social media in crises – Social media is continuing to play an important role during crises, particularly Twitter.[39] Studies show that it is possible to detect earthquakes[40] and rumors[41] using tweets published during crisis. Developing tools to help first responders to analyze tweets towards better crisis response[42] and developing techniques to provide them faster access to relevant tweets[43] is an active area of research.
- Location-based social network mining – Mining Human Mobility for Personalized POI Recommendation on Location-based Social Networks.[44][45][46][47][48][49]
- Provenance of information in social media – Provenance informs a user about the sources of a given piece of information. Social media can help in identifying the provenance of information due its unique features: user-generated content, user profiles, user interactions, and spatial or temporal information.[50][51]
- Vulnerability management – A user's vulnerability on a social networking sites can be managed in three sequential steps: (1) identifying new ways in which a user can be vulnerable, (2) quantifying or measuring a user's vulnerability, and (3) reducing or mitigating them.[52]
- Opinion mining on candidates/parties - Social media is a popular medium for candidates/parties to campaign and for gauging the public reaction to the campaigns. Social media can also be used as an

indicator of the voters' opinion. Some research studies have shown that predictions made using social media posts can match (or even improve) traditional opinion polls.[53]

Publication venues

Social media mining research articles are published in computer science, social science, and data mining conferences and journals:

Conferences

Conference papers can be found in proceedings of Knowledge Discovery and Data Mining (KDD), World Wide Web (WWW), Association for Computational Linguistics (ACL), Conference on Information and Knowledge Management (CIKM), International Conference on Data Mining (ICDM), Internet Measuring Conference (IMC).

- KDD Conference – ACM SIGKDD Conference on Knowledge Discovery and Data Mining
- WWW Conference – International World Wide Web Conference
- WSDM Conference – ACM Conference on Web Search and Data Mining
- CIKM Conference – ACM Conference on Information and Knowledge Management
- ICDM Conference – IEEE International Conference on Data Mining
- Association for Computational Linguistics (ACL)
- ASONAM conference - IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining
- Internet Measuring Conference (IMC)
- International Conference on Web and Social Media (ICWSM)
- International Conference on Social Media & Society
- International Conference on Web Engineering (ICWE)
- The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases(ECML/PKDD),
- International Joint Conferences on Artificial Intelligence (IJCAI),
- Association for the Advancement of Artificial Intelligence (AAAI),
- Recommender Systems (RecSys)
- Computer-Human Interaction (CHI)
- Social Computing Behavioral-Cultural Modeling and Prediction (SBP).
- HT Conference – ACM Conference on Hypertext
- SDM Conference – SIAM International Conference on Data Mining (SIAM)
- PAKDD Conference – The annual Pacific-Asia Conference on Knowledge Discovery and Data Mining

Journals

- DMKD Conference – Research Issues on Data Mining and Knowledge Discovery
- ECML-PKDD Conference – European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases
- IEEE Transactions on Knowledge and Data Engineering (TKDE),
- ACM Transactions on Knowledge Discovery from Data (TKDD)
- ACM Transactions on Intelligent Systems and Technology (TIST)

- Social Network Analysis and Mining (SNAM)
- Knowledge and Information Systems (KAIS)
- ACM Transactions on the Web (TWEB)
- World Wide Web Journal
- Social Networks
- Internet Mathematics
- IEEE Intelligent Systems
- SIGKDD Exploration.

Social media mining is also present on many data management/database conferences such as the ICDE Conference, SIGMOD Conference and International Conference on Very Large Data Bases.

See also

Methods

- Social media measurement
- Text mining

Application domains

- Web mining
- Twitter mining

Companies

- NUVI

Related topics

- Social media
- Profiling (information science)
- Web scraping

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