Social Media as an Emerging E-Marketing Tool

Social media has emerged as a common means of connecting and communication with the outside world. It allows the web users to share their knowledge and experiences about the products or services with millions of users across the globe. These interactions in the form of online discussions, expressing opinions, chats, blogs etc. are considered as an electronic word of mouth (e-WOM) and have the potential to influence a large number of users. This aspect of information shared over social media is tapped by organizations for market campaigning. The chapter explores the significance of social media to enhance the marketing returns.

2.1 Introduction

Social media [Kaplan and Haenlein, 2010] is defined as a group of Internet-based applications built on the technological foundations of Web 2.0 that allow the creation and exchange of user-generated content. Kietzmann and Hermkens [2011] defined social media with respect to its seven (07) functional building blocks. These are identity, conversation, sharing, presence, relationship, reputation and groups. Each block represents a specific facet of social media and its implications for firms. Social media, as a concept was first introduced in 2004 after LinkedIn created its social networking application. The application was primarily an online technology tool that allowed people to communicate easily and share information over Internet. Expeditious growth of Internet and related network technologies has spectacularly increased the popularity of social media. Today it has emerged as a popular means of communication for online users. It provides an easy to access platform for web users to create and most importantly
to distribute their own content on an unprecedented scale. Following are the varied services provided by different types of social media sites [Pritam and Huan, 2012].

- **Blogging:** A blog comprises of online journals often combined with audio or video podcasts created by individuals or organizations e.g., Huffington Post, Business Insider, Engadget.

- **Social News:** Social news refers to sharing and selection of news stories and articles by community of users e.g., Digg, Slashdot, Reddit.

- **Social Bookmarking:** It is a centralized online service which enables users to add, annotate, edit, and share bookmarks of web documents. Social bookmarking along with tagging feature is a significant feature of the social book-marking systems that enables users to organize their bookmarks in flexible ways and develop shared vocabularies. These sites allow users to bookmark particular Web content for storage, organization, and sharing. E.g., Delicious, StumbleUpon.

- **Online Social networking:** Online social networks are web-based services that allow individuals and communities to connect digitally with their real-world friends and their acquaintances. Users interact with each other through status updates, comments, media sharing, messages, etc. e.g., Facebook, Myspace, LinkedIn.

- **Opinion, Reviews and Ratings:** The primary function of such sites is to collect and publish reviews or ratings for existing products, services, entertainment, businesses, places or any other entity. e.g. Epinions, Yelp, Cnet.

The pervasive use of these services across the four corners of the globe for different purposes by billions of web users on a daily basis generates massive amount of data pertaining to social media every day. Recent reports of web traffic as per Facebook\(^1\) and Twitter\(^2\) reports estimate that Web traffic data of approximately 149 million and 90

million unique U.S. visitors per month on both these sites, respectively. According to the video sharing site YouTube\(^3\), more than 4 billion videos are viewed per day, and 60 hours of videos are uploaded every minute. The picture sharing site Flickr\(^4\), as of August 2011, hosts more than 6 billion photo images. Web-based, collaborative, and multilingual Wikipedia hosts over 20 million articles attracting over 365 million readers.

Mining and monitoring these exponentially growing social databases can prove to be advantageous in various domains. [Shen et al., 2012]. The next section elaborates on how online social data can be mined and utilized for one such domain, the e-commerce domain.

### 2.2 Mining Social Media for e-Marketing

The large, complex and frequently changing behavior of social media data makes it imperative for data miners to develop new and effective mining techniques. Apart from user-generated content social media databases are noisy, distributed, dynamic and unstructured in nature. These characteristics make it different from classical “attribute-value” data processed by conventional data mining techniques [Pritam and Huan, 2012]. The various data mining techniques such as clustering, feature selection, association rule mining, anomaly detection [Han and Kamber 2006] etc. forms the basis for this new phenomenon called social media mining. Social media mining techniques have potential to effectively extract valuable information from vast databases. Such extracted information has been utilized in various domains to facilitate decision making [Turoff et.al., 2002], destabilizing terrorist networks [Nasrullah and Henrik, 2006], behaviour evolution [Baojun et.al., 2010], discovering social relationship [Carson et.al., 2010], marketing intelligence [Zhang et.al., 2010], and many more applications [Cross and Parker, 2004].


In the present scenario, organizations are employing social media as an e-marketing tool to boost ecommerce. Social media marketing refers to the process of gaining attention of web users through social media sites [Mangold and Faulds 2009]. The social media based marketing strategies create and distribute content to attract attention and encourage readers to share it with others. Social media has become a hybrid element of promotion mix because in a traditional sense it enables companies to talk to their customers, while in a nontraditional sense it enables customers to talk directly to one another [Mangold and Faulds 2009]. Thus strategic use of social media improves company’s profitability and its position in the industry by facilitating brand popularity [Vries and Gensler et al. 2012], sales promotions [Bonilla-Warford, 2010], customer relationship [Sashi 2012], find new customers [Weston 2008] and other marketing practices [Samuel 2012]. It also provides an inexpensive platform for communicating a marketing message [Skul 2008]. This proliferating significance of social media data motivated various researchers to utilize social media data for recommending the products, opinion mining, sentiment analysis, influence modelling etc as discussed in the following sections.

2.3 Mining Social Media for Product Recommendation

Social Network is considered as an ideal platform for interactions and sharing of experiences and recommendation among electronic peers. Sharing of information and relationship over social network provides rich source of information about user interest, preferences and friends. It allows the user to indicate whom they trust and distrust, creating links in the network. It has been observed that in online systems people chatting with each other (using instant messaging) are more likely to have a common interest (their web searches) [Adali et.al., 2010, Beth et.al., 1994; Kautz et.al., 1997]. This correlation between the social behaviour and similarity behaviour motivated researchers to integrate social network information into traditional recommendation systems for enhancing their performance. Recommender Systems are defined as the systems that
generate personalized recommendations for the users by analyzing their past opinions on various types of products and services [Resnick and Varian, 1997]. Based on the filtering strategies, these systems are categorized as content based recommender systems and collaborative recommender systems. Content based recommender systems extracts relevant items based on the correlation between the content of the items and the users’ past personal preferences [Ferman et.al., 2002]. However, personal preferences change over time with the changing needs of user, thus difficult to capture. Moreover content based approach analyzes the features of each item which is sometimes difficult to obtain. On the contrary, collaborative filtering (CF) recommender systems computes the active users’ items of interests based on the preferences of like-minded peer group. Referral Web [Kautz et.al., 1997] was one of the first systems that suggested the combination of direct social relations and collaborative filtering (CF) to enhance searching for documents and people. Analysis of social bookmarking site ‘Delicious’ revealed high similarity between the tag vector of a URL and its keyword vector extracted from the corresponding web page [Guo and Zhao, 2008]. Sinha and Swearingen, [2001] established that recommendations from friends are more preferable to collaborative filtering recommender systems in terms of quality and usefulness. It was also emphasized that tag-based profiles produce better personalized recommendation of tracks within the popular music portal ‘Last.Fm’ than conventional ones. Vatturi et. al., [2008] presented a personalized bookmark recommendation system using a CF approach that leveraged tags. It was based on the assumption that users would be interested in pages annotated with tags similar to ones they have already. Studies also established that incorporation of explicit social network information in CF systems improves the quality of recommendation in various domains such as music [Konstas et.al.,2009], clubs [Groh and Ehmig, 2007], and news stories [Leman, 2007].

The various studies discussed above extracted user preferences for a product by observing the explicit social network information. User’s often indicate their interests and preferences via opinions, expressed for a product or service. This implicit information is also utilized by researchers for various tasks as discussed in the next section.
2.4 Opinion Mining and Sentiment Analysis

Social media has dramatically changed the way consumers express their views. They can now post reviews and opinions towards social events, political movements, company strategies, marketing campaigns, and product preferences through blogs (such as the blogosphere), forums (such as Yahoo Forums), social network sites (including YouTube, Facebook, and Flikr), virtual worlds (such as Second Life), and tweets (Twitter). These opinions can be mined to provide valuable information to answer many new and exciting social, political and business related questions. Opinion mining focuses on extracting valuable information from user generated online corpora such as customer’s reviews, blogs, forums etc. It is defined as a technology that extracts people’s opinion, perceptions about the entities or events and provides valuable information extracted from data [Kim et.al.,2009]. Opinion mining tasks can be performed at the document level [Turney, 2002; Pang et al., 2002], sentence level [Riloff and Wiebe, 2003; Yu and Hatzivassiloglou, 2003], or feature level [Hu and Liu, 2004a 2004b; Popescu and Etzioni, 2005; Liu and Maes, 2005]. Extracting opinions expressed in comparative sentences is a difficult task, and some preliminary studies were done in this direction [Jindal and Liu, 2006,2008; Liu, 2010; and Pang and Lee, 2008]. Literature often referred opinion mining as sentiment analysis, sentiment classification [Bo et.al., 2004], affective classification [Wang, 2007] and affective rating [Sara et.al., 2006]. Sentiment analysis is mostly used in opinion mining to identify sentiment, affect, subjectivity, and other emotional states in online text. Sentiment analysis is hard because languages used to create contents are ambiguous. Various efforts have been made in this direction for prediction of semantic orientation of adjectives [Vasileios, 1997], sentiment classification of terms [Turney et, al., 2002], determination of semantic orientation [Turney et.al., 2003]. Sentiment analysis and opinion mining tools allow business organizations to understand product sentiments, brand perception, new product perception, and reputation management. These tools help users to perceive product opinions or sentiments on a global scale. Movie reviews and product reviews have been extensively studied for this purpose. It has also been observed that online reviews work as an electronic word of mouth publicity (e-WOM) for a
product in the Internet world. Consumers often get influenced by reviews of their friends/acquaintances or social group mates. This is more apparent when these individuals share similar interests. Spread of message through peer influence on a social site is being tapped by organizations for market campaigning and product promotion. The next section discusses the various ways in which this social influence can be modeled.

2.5 Modeling Social Influence

Social influence is the observed affect on an individual due to the emotions, opinions or behavior of another individual. It is based on the assumption that when users see their social contacts performing an action they may decide to perform the action themselves. It has been observed that the information shared through social sites may cause direct or indirect influence spread over network [Pritam and Huan, 2012]. The strength of direct and indirect influence between users in both the homogeneous [Dietz, et al., 2007; Tang 2009; Xiang 2010] and heterogeneous environments has been studied. The social influence has been used by companies to market new products by first convincing a small number of influential users called seeds to adopt the product. These seeds maximize the influence spread through the effect of “word of mouth” in the social network [Domingos and Richardson, 2001; 2002; Kempe et al., 2003]. However these models are based on the assumption that consumers propagate only positive information about the products [Fowler and Christakis, 2008]. In “word of mouth” based marketing strategies the promotional efforts have been carried out by the customers themselves and thus these strategies are much more cost effective as compared to conventional methods [Domingos and Richardson, 2001]. One of the prominent strategies that adopt similar kind of methodology for promoting new product is viral marketing. Viral marketing is defined as “marketing technique that seek to exploit pre-existing social networks to produce exponential increases in brand awareness, through processes similar to the spread of an epidemic” [Datta, et al., 2005]. It targets limited number of initial users called seeds and distribute free or discounted product to them. These seeds share their experiences with
their friends who then pass the message to their circle. Thus the message takes the form of virus that spread through contacts with others and over a period of time it covers portion of network. The gain achieved by this strategy is associated with the selection of individuals used for this seeding process. The selection of targeted users, so as to maximize the net profit is a well-defined optimization problem and has been proved an NP-Hard problem [Kempe, 2003]. However targeting a specific group of customers with their appropriate interests needs an optimization. Besides, the ultimate gain achieved by marketing activity depends on the how optimally the resources such as cost, seeds have been applied. Nature inspired algorithms [Zhang et.al., 2010] have become an indispensable tool for solving such optimizations.

This work applies one of the nature inspired algorithms, the firefly algorithm, to address this issue. It aims at mining social media for effective e-marketing by employing the strategy adopted by fireflies to move to brighter objects. The work presents a model of product promotional plan that takes the advantage of attraction mechanism of firefly algorithm along with quick spread behavior of e-WOM for market campaigning. The next chapter discusses in detail the various steps involved in the framework for targeted product promotion on social networks using firefly algorithm.