CHAPTER 7

Conclusion and Future Work

This thesis presented an online product promotion strategy that dynamically captures the user interest towards product features and exploits the social connectedness among users to identify the best initial seeds for product promotion. The performance of various modules of strategy is improved by nature inspired firefly algorithm. This chapter highlights the contribution and presents future direction of the work.

The past few years have seen a boom in social networking sites (SNS). SNS has emerged as the most preferred platform for users to share their personal opinions and suggestions with their electronic peers. These online interactions on SNS where exchange of opinions and diffusion of information takes place at global scale have overhauled the traditional communication media. The sharing of experiences and opinions about a product among electronic peers facilitates the dissemination of both positive and negative electronic word of mouth (e-WOM) in competitive environment of e-commerce. e-WOM has a great influence on the purchasing decision of consumer and forms a rich source of information for organizations to strategize their e-marketing plans. Moreover an amalgamation of millions of online users cutting across continents makes these SNS a powerful marketing platform to capture the attention of a wide range of audience on a small fraction of marketing budget.

The thesis presented a novel framework for targeted product promotional plan that dynamically captures the user interest towards product features and exploits the social connectedness among users to identify the most influential users for product promotion. The functionality of promotional plan was divided into three phases viz. market analysis, market segmentation and targeted product promotion. Each phase of strategy was
optimized by ‘firefly’ a nature inspired algorithm. The Market analysis phase mined the product reviews expressed by web users over social sites. These reviews are reflector of the user preferences and are indicators of the market trend. Pertinent product feature mentioned in these reviews were extracted through specially formulated syntactic rules. Experimental study conducted to evaluate the effectiveness of the method in capturing the preferred features from the user opinion yielded high precision values. The extracted features were further pruned with feature selection approach. The features selection approach obtained the optimal subset termed as most preferred features. To attain highest optimality; flashing behaviour of nature inspired firefly algorithm was incorporated with the basic rough set based feature selection approach. The efficacy of the presented approach (FA_RSAR) was evaluated with respect to other heuristic, random search such as Quick Reduct, Entropy Based Reduct method and other nature inspired algorithms such as GenRSAR, AntRSAR, PSO-RSAR, and BeeRSAR based on Genetic algorithm, Ant colony Optimization, Particle Swarm Optimization and Bee Colony optimization respectively. The user interest towards this obtained subset was subsequently estimated. A distinct feature based user profile was generated that implicitly extracts the most significant features for each user by mining their opinions. This estimation of users’ interest toward most preferred feature set were utilized to group them into homogeneous segments in the second phase i.e. market segmentation. The technique used for market segmentation was clustering. The viability of firefly algorithm for clustering problem was studied. The performance of the present algorithm (FClust) was evaluated with respect to PSO (Particle Swarm Optimization) and DE (Differential Evolution) based clustering techniques.

The third phase i.e. targeted product promotion, selects the most potential segment(s) for the product to be promoted. This module explored the social connectedness among users of selected segments to compute the influential probabilities and subsequently identifies the best targeted users called seeds. A hybrid metric that combines the social behavior similarity and interest similarity between users was
formulated to compute influential probabilities. The presented metric was evaluated with respect to conventional filtering approach. The results indicated that both the presented metrics performed better than conventional approach and improved the accuracy. These results established the efficacy of proposed metrics and their potential to generate more accurate recommendations. The estimated influential probabilities were then used to obtain $k$ most influential users that can maximize the influence spread where the value of $k$ depends upon the marketing budget. Maximizing influence spread with the limited seeding budget ($k$) in large network is denoted as $k$-Max-Influence Problem and proven to be NP-Hard. Therefore the viability of two prominent evolutionary algorithms i.e. Differential Evolution (DE) and Firefly (FA) for their suitability to $k$-Max-Influence problem vis-à-vis the contemporary greedy approach was explored. The results revealed that both evolutionary approaches DE and FA perform better as compared to Greedy approach with respect to maximum influence incurred as well as gain achieved by increasing the value of $k$. Amongst the evolutionary approaches FA maintains the consistency in its results and has higher probability to score over DE and Greedy based algorithms.

The work done in this thesis emphasizes on attracting the attention of a large span of web users by employing a small fraction of advertising budget and has a potential in current e-marketing scenario.

7.2 Future Work

The work done in this thesis has a good scope for further extensions along many dimensions.

- The mining of product features can be extended to extract and incorporate implicit features expressed in online reviews. An automated approach can be developed to collect and preprocess reviews from different social media sites e.g. blogs and chats etc.
Another dimension along which the study can be extended is incorporation of strengths and weaknesses of features mentioned in the reviews to estimate the degree of users’ like/dislike for a product.

The FClust approach for market segmentation can be extended for multi-objective optimization to incorporate other dimensions such as demographic, behavioral and geographic characteristics of users.

The approach considered the explicit gauging and integration of trust but can be extended to analyze and incorporate implicit trust build over social network and its implementation in dynamic scenario.