

Machine Learning Approach for Marketing Intelligence: Managerial Application

Keerti. S. Mahajan*, S.S.Jamsandekar*, Dr. A M. Gurav**

*Department of Computer Studies, SIBER, Kolhapur. (MS), India.

** Department of Commerce and Management, Shivaji University, Kolhapur. (MS), India.

ksmahajan@siberindia.edu.in, ssjamsandekar@siberindia.edu.in, annasahebg@yahoo.co.in

Abstract

Marketing Intelligent Approach is a cutting edge for marketing management support system to deal with knowledge by machine learning and other soft computing techniques. The range of potential applications of machine learning techniques in marketing management are consumer behavior, optimization of product-market structure, managing the market mix, strategic marketing, finance domain etc describes the synergy between marketing and intelligent systems, specially machine learning techniques. Interactive promotion is a matching field for marketing; where intelligent systems can be applied. The above description suggests us that marketing is a multifaceted field of decision making. Marketing decision is a combination of judgments and analysis which involves a huge degree of intuition in which knowledge and expertise are required to take decision, therefore here Artificial Intelligence (AI) can play an important role. Machine learning is an AI component that observes historic data of actions and does experiential learning by putting the knowledge to use to perform similar process in new computational settings¹. This paper describes about the potential benefits associated with the application of machine learning techniques to the field of marketing management. It also describes the fundamental techniques and introduces relevant marketing fields to which machine learning approach such as Data Mining, AI, and Soft Computing techniques could be applied.

Keywords: *Market Intelligence, Managerial Aspects, Soft Computing, Artificial Intelligence, Machine Learning.*

1. Introduction:

In the Era of digitization, E-Commerce sites are blooming like mushrooms, each with a lucrative and exciting product offers, causing a hard-hitting competition in market. Digitalization is the buzz word in the global scenario. In this situation the marketing team of the organization needs to grill down which will help to face the challenges of dealing with massive volumes of users and come up with new marketing strategies. It's practically infeasible for marketers to assemble and process such huge amounts of data from various sources - ranging from websites to mobile apps to buying behavior and offer redemption. Here, where Machine learning can play a vital role in analyzing the huge data, through application of machine learning algorithms the customer and the log databases could be mined easily to provide insights on the success or failure of marketing campaign. Machine learning has risen up to help marketers analyze historical campaign data to deliver highly targeted marketing offers. Managers of marketing takes decisions about their products, distribution channels, advertising brands, price etc, based on the behavior of customers, competitors, suppliers, some uncertain factors like political issues, government rules and overall economy of the country. And to get the desired output; marketing decision making involves strategic issues and marketing mix

instruments such as product development, innovation, long term planning and segmentation of customers, market target, market place, expansion and growth. The above illustration defines that marketing is very complex field for managers to make decisions as marketing decision is based on analysis and judgment in which knowledge, expertise and experiences of professional's plays a vital role. To help managers to make decisions based on analytical and judgmental factors marketing Intelligence system can be used in which artificial intelligence (AI) can play a major role in Digital Analytics. AI deals with human intelligence and can be represented in computers using different AI techniques such as machine learning, pattern recognition, clustering, knowledge representation, reasoning, heuristic search, sentiment analysis, opinion mining, trend analysis, behavior pattern study, location searching etc. All these elements of AI are relevant in marketing decision makers who use their knowledge and intuition to solve marketing problems. This paper focuses on Machine learning approach for digital data analytics in identification of consumer segmentation and consumer behavior patterns (to find influencer performance data).

2. Review and Background of paper:

The growth of digital analytics using social media in marketing. Today, social networking has become very popular at a global level. For example Twitter, Face book, Watsup, and Instagram etc. These social media are having more than million active users which can be described as networks of friends and professional for interaction to share and digest information which helps for marketing activities such as promotion, advertising and consumer behavior from the information attainment to post purchase behavior.

Peter Duchessi et al, presented in their paper about the interaction of management, organization and artificial intelligence, researchers described methodological approaches such as case and empirical studies to get knowledge about AI in organization. According to researchers both case and empirical studies that should be focused on whole organization or a segment of organization will give insight into how the AI technique is deployed³.

Simona Vinerean et al. (2013) investigated about the effects of social media marketing on online consumer behavior in his paper described about 236 activities of social media users in which they had identified diversified users and segmenting these users and based on this segmentation a linear model has been developed to find how to engage with various types of audiences in order to maximize the effect of the online marketing strategy⁷.

Daniel S. Weld et al, in their paper Human Intelligence needs Artificial Intelligence has argued that artificial Intelligence techniques and methods can greatly make things easier the process of creating and managing complex crowd sourced workflows. They had presented the Clowder, which implements machine learning techniques to process models of worker performance and task difficulty. Using machine learning techniques Clowder uses decision theoretic optimization to select alternative workflow and to create personalized interfaces for individual workers and also to dynamically control the workflow. And according to researchers this optimized workflow is considerably returns higher quality output than those of generated by humans⁸.

Considering above three reviews and on the basis of observations it has found that social media awareness and use is very much significant for machine learning techniques in artificial and marketing intelligence (AMI).

3. Objectives:

- a. To know the concept of marketing intelligence system for machine learning techniques.

- b. To draw and suggest appropriate suggestions and model for effective use of artificial intelligence for marketing.

4. Research Methodology:

This research paper is conceptual based paper which is based on 10 to 30 years of Teaching-Learning-Evaluation-Research and Extension experience, administrative and management experience. The paper is based on reading, listening, discussion and observation of the sellers and buyers, social media users and all other stakeholders in last 30 years. It is experience based contribution therefore no primary data is collected. This paper has its own limitations and differences of opinions may occur with other researchers. This paper has based on marketing intelligence for using machine learning techniques as artificial intelligence which may or may not be applicable to all places and situations. Reader and Researcher may or may not like the views presented in this thought based paper, so the writers have no any claim to accept the thoughts.

5. Marketing Intelligence System:

- a. **Digital data pool for marketing analytics:** The various emerging digital marketing channels forms the source for data pool, bringing in different types of data such as mobile performance data, influencer performance data, keyword performance data, visual and text content performance data that can be analyzed to identify customer behavior, target market segments, customer churn prediction, customer lifetime value forecasting etc. the various of digital marketing channels are website, mobile apps, social media digital ads. In the Era of digitization, E-Commerce sites are blooming like mushrooms, each with a lucrative and exciting product offers, causing a hard-hitting competition in market. The marketing team of the organization needs to grill down and face the challenge of dealing with massive volumes of users and come up with new marketing strategies. It is infeasible for marketers to assemble and process such huge amount of data from various sources ranging from mobile apps and websites to buying behavior and offer redemption. Here where Machine learning can play a vital role in analysis the huge data, through application of machine learning algorithms the customer and the log databases could be mined easily to provide insights on the success or failure of marketing campaign. Machine learning has risen up to help Marketers analyze historical campaign data to deliver highly targeted marketing offers. The various emerging digital marketing channels forms the source for data pool, bringing in different types of data such as mobile performance data, influencer performance data, keyword performance data, visual and text content performance data that can be analyzed to identify customer behavior, target market segments, Customer churn prediction, Customer lifetime value forecasting etc. the various of digital marketing channels are website, mobile apps, social media digital ads.

The Figure 1 shows the different digital marketing channels and the type of data pooled in databases.

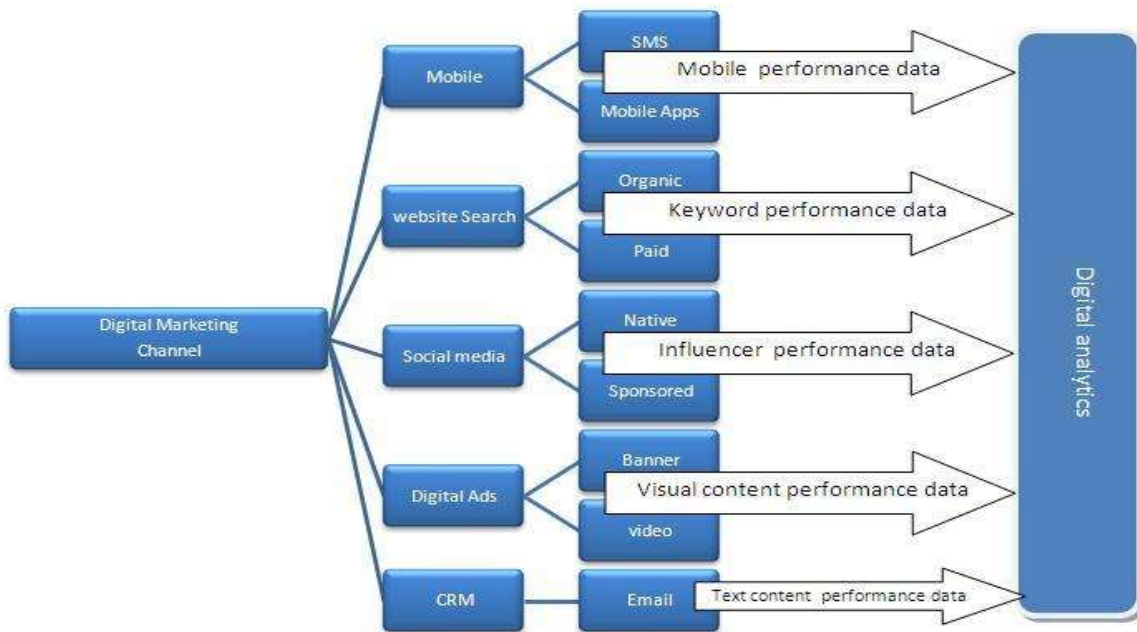
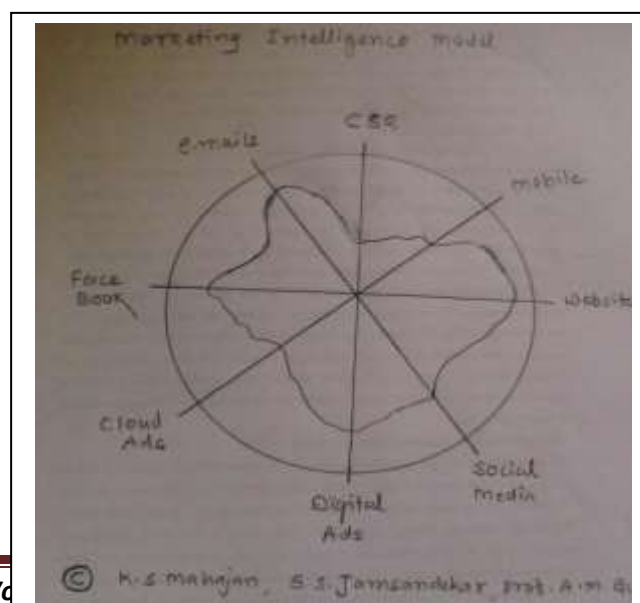


Figure 1: Digital marketing channels. (Source: www.slideshare.net/Gayatri_choda/digital-marketing-25585750)

The biggest challenge faced by modern business is utilizing huge data available to business people in a more effective and actionable. The data generated through the various sources is often not explored to the fullest, as a result, many of the digital consumer buying behavior is overlooked. Machine learning techniques can be used to determine which customers may be interested in achieving an outcome. It has interpreted that the mobile, website search, social media, digital ads, CRM, etc are the digital network channels where mobile performance, key word performance, influencer performance, visual contents performance, text contents performance etc are major marketing intelligence system parameters which have been affecting on digital marketing. The researchers have suggested radar techniques for measurement of cause and effect of marketing intelligence. This radar technique will help for digital analysis, effect measurement, strategy determination and implementation and customer relation management (CRM).



b. Market segmentation and Machine Learning: The cluster market consists of some number of relatively identical groups, each with discrete needs and requirements. The market segmentation identifies that the total market demand for products is essentially assorted and, therefore, it can be disaggregated into segments with different requirements¹, the endeavor of segmentation is to find those market segments which would be most vulnerable to their actual offerings and distinguish them from those who might be reached only by using more challenging marketing techniques. For the marketers to judge that their organization is better than competitors, and their product offerings appeal to the target segments, STP that is segmentation, targeting, and positioning marketers stab to identify those market segments and direct activities at the segments⁶. In this perspective, machine learning, a wide subfield of artificial intelligence and data mining, is concerned with the development of algorithms and techniques that allow computers to 'learn'. An algorithm or a learning machine able to learn from data will extract rules and patterns from data sets. Machine learning has a wide variety of applications, including natural language processing, speech recognition, object recognition, bio-informatics, medical diagnosis, etc. In economics, finance and marketing, there is wide band of applications, such as marketing segmentation, consumer buying behavior, product mix, customer mix, customer perception, stock market analysis, detecting credit card fraud⁵, helps to take managerial decision to accurately predict the needs of customer and improve the profitability.

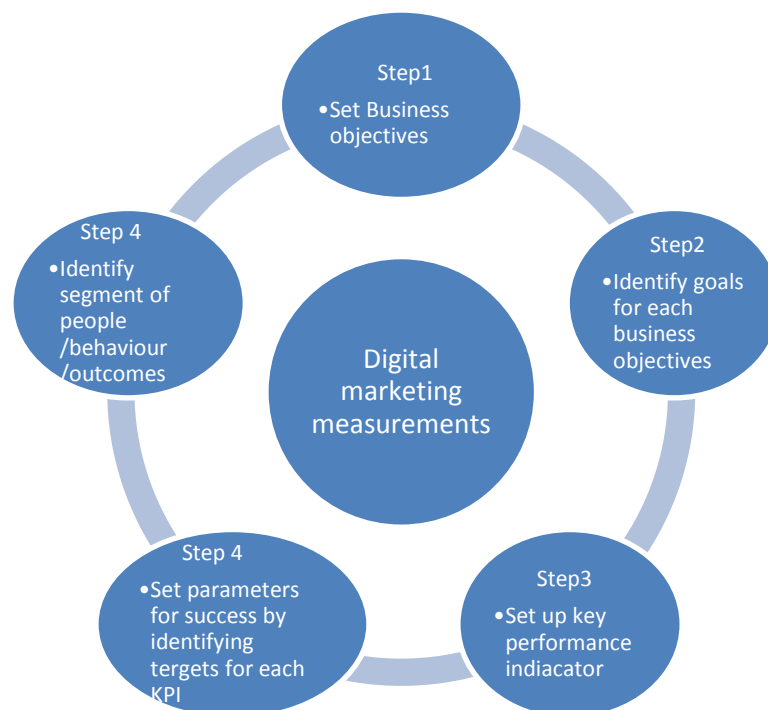


Figure 2. Steps involved in digital marketing measurement ©K.S.Mahajan, S. S. Jamsandekar, and Dr. A. M. Gurav.)

c. Machine learning for customer behavior Modeling - Some supervised machine learning techniques include decision trees, regression, Bayesian methods and deep learning (neural

networks). These algorithms also have parameters which must be tuned to achieve the best accuracy. Based customer behavior predicted, customer behavior modeling can be done which includes customer segmentation, Channel Selection, Customer churns Prediction, Customer lifetime value forecasting which is required for effective marketing and it is possible through marketing intelligence system.

- d. **Customer Segmentation:** clustering algorithms of machine learning techniques can help marketers segment their messaging campaigns down to the most homogenous smallest groups of customers having similar behaviors and preferences. Customer segmentation is based on distribution planning, logistical relations, intermediaries, physical distribution, inventory management, warehousing, transportation, required services, wholesaling retailing, customer behavior, financial position of the customer, status of the customer etc attributes have been affecting.
- e. **Channel Selection:** rather than utilizing all marketing channels and blasting customers with messages and emails enable marketers to target users on the channel the individual end customer is most likely to engage with . Link analysis can be used to pair customer and marketing channel based on past behavior. Channel selection is depend on lag of demand and lag of delivery, perishability of the goods and services, emergency about the product and service, intensity of need, location, mode of transport etc. Economic Order Quantity (EOQ) is one of the dominant parameters in selection of channels of distribution.
- f. **Customer churn prediction:** The drop off habits of the customers can be recognized by machine learning techniques to prevent customer churn and its learning can be Deployed to form rules to reduce possibilities of brand loses for the users who are at high risk of churning. Fuzzy Logic(FL), Genetic Algorithm(GA) and Support Vector Machines(SVM) are also used for churn prediction and customer loyalty index. To assess customer loyalty Lu et al. in⁹ used fuzzy evaluation to weigh different factors from which loyalty index for each customer was calculated. Casabayo et al.¹⁰ and Archaux et al. used FL and support vector machines respectively to predict churn¹¹.
- g. **Customer lifetime value forecasting:** The techniques of Machine learning can help marketers in prediction and to maximize customer lifetime value (CLV) of current customers to promote higher conversions from brands most valuable customers. Logistic regression and decision trees (DT) are the most frequently applied techniques for predicting CLV parameters. Artificial Neural Network (ANN) finds this wide applicability because of its ability to catch non-linear patterns in the data, can be used for both classification and prediction problems. In the estimation of CLV parameters ANN for classification is used to estimate consumer choice and for prediction for it is used to predict tenure and future cash flows.

The Figure 3 depicts the blend of different Market Intelligence factors and Machine Learning techniques for better Digital Analytics

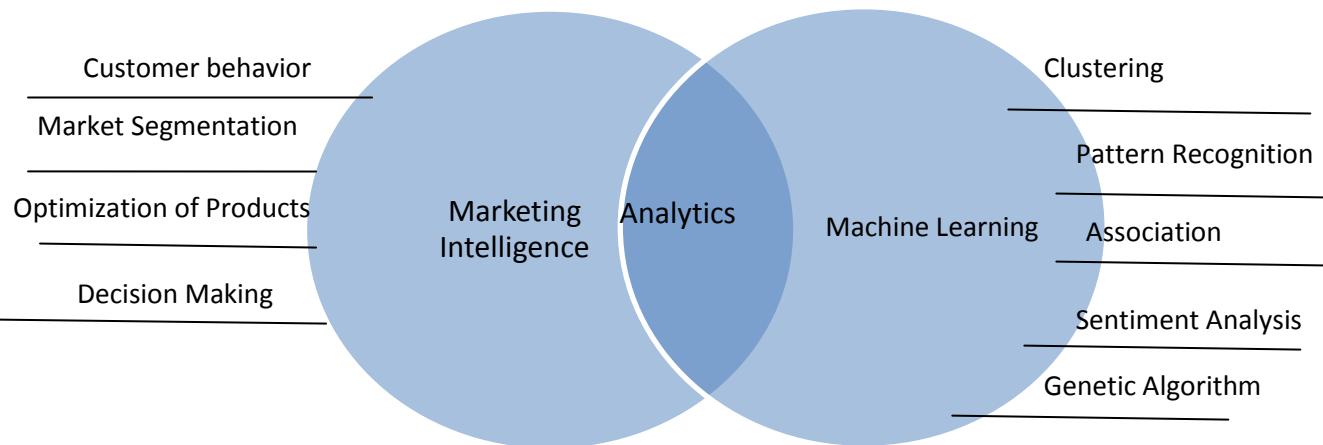


Figure: 3 Machine Learning based Marketing Intelligence.(©K. S. Mahajan, S.S.Jamsandekar and Dr. A. M. Gurav.)

6. Conclusion:

There is a huge prospect for marketer to use digital analytics for customer's behavior modeling and market segmentation. Organizations are gradually expanding their digital footprints to produce huge dataset, which is not possible with traditional counterpart. With the growing popularity and user networks in Social media at a global level, use of marketing intelligence is required. For example Twitter, Face book, Watsup, and Instagram etc. more than million active users. This can be described as networks of friends and professional to share and digest information that helps in marketing activities such as promotion and advertising Social network also offers a huge number of consumers to get natural conversations, and helps to understand consumers behavior, preferences and consumption patterns more easily and quickly. This gives marketers to take decisions to earn profit in their business and to maintain customer network. Thus machine learning methods applied to marketing issues can turn into powerful tools for mining and analysis voluminous databases. These methods increase the possibilities for researchers and marketers to gain new insights into consumer preferences while improving the accuracy on the prospective and predictive models to attract audiences to the performing products. Marketing intelligence is very much required in retail marketing. Retail marketing means selling the goods and services to the end customer in small quantity which helps for increasing opportunity and development of standard of living of the people. Retail marketing has long-long history from Barter Exchange to (→) Online Market. The retail market has undergone from barter exchange to (→) village market, to (→) hookers and peddlers market, to (→) street market to (→) stores, to (→) co-operative departmental stores, to (→) shopping malls, to (→) online markets. Gone are the days, customer suppose to "Cust-se-mer" (Die with efforts for purchasing goods and services) bud at present scenario, seller suppose to die with efforts and today's customer is the "King" of the market, so seller has to use marketing intelligence system for effective marketing and survival in the competitive market.

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