Computational Benchmarking in Digital Marketing: An Opportunity for Machine Learning

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Abstract: With the dawn of internet revolution and digital marketing, the light on mass media advertising has been diminishing at a staggering rate and things like personalization, neuro marketing, conversion optimization, marketing automation, voice recognition have been booming, allowing the technology like Artificial Intelligence (AI) to grab the limelight. Although AI has originally been conceived during the 1950s, it has taken nearly half a century for businesses to enjoy the real benefits from its applications. It was only during the twentieth century that the insight related AI-based marketing application took a rapid and wide leap due to the accumulation of rich consumer data generated from popular social engines and private influence of industrial giants. However, AI for marketing is already on the hype and has become a pervasive part of today's competitive world. Businesses, no matter small or large, are utilizing the marketing opportunities to procure big goals and create massive breakthrough using AI. Since marketing is truly dynamic in nature and deals with the ever-changing people's emotions, AI takes its form in different business verticals, formulating itself to be the real game changer. Hence this paper attempts to address the prominent use cases of AI in marketing and also aims to establish the future scope of artificial intelligence in various marketing activities.

Keywords: Market Intelligence, Managerial Aspects, Soft Computing, Artificial Intelligence, Machine, Machine Language, Real – Time Data, Marketing Learning.

1. INTRODUCTION

Marketing, in the present scenario, is attracted towards emails, Chabot's, personalization, and recommendations owing to automation. Hence, it is time to reveal the black box secret, which is named as artificial intelligence (AI), and thoroughly understand its applications in marketing [1]. 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 [2]. 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 [3]. 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 [5]. 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).

1.1 ROLE OF ARTIFICIAL INTELLIGENCE IN BUSINESS

Artificial Intelligence (AI) is rapidly becoming more central to the day-to-day digital world, and the marketing and advertising world is no exception. From sarcastic and brilliant Siri to Tesla"s self-driving cars to Google AI that can learn video games in mere hours, Artificial Intelligence is revolutionizing industries one by one. The applications of Artificial Intelligence range from detecting trends in data to mitigate market risks, enhancing customer service through virtual personal assistants, or even analyzing millions of documents across a company's servers to find compliance failures [5]. But it is only recently that companies have been able to anticipate and envision the possibilities that Artificial Intelligence and robotics can bring to the future of the business world. Artificial Intelligence leverages self-

learning systems by using tools like data mining, pattern recognition and natural language processing. So, in terms of its key business advantages over human intelligence, Artificial Intelligence is highly scalable, resulting in phenomenal cost savings. Besides, Artificial Intelligence's consistency and rule-based programs allow enterprises to minimize their errors. Its longevity, coupled with continuous improvements and its ability to document processes, translates into rewarding business opportunities [9].

1.2 HOW AI WORKS IN RECENT BUSINESS TRANSACTIONS?

When someone use internet through browser and apps in that time his data is collected and manipulated with computer programs (application or apps) to create and send recommendations based on his interest and behaviors that are programmed in an application. This is the way machine learns. Another example when in someone's mobile, the data pack is finished it automatically starts sending you the notification and various offers to recharge again. In business, it's customer retention process. Companies have to focus on their values, brand position in market, goals and customer experience while trying to implement Artificial Intelligence in their business process and system. Artificial Intelligence applications and programs create different process and system of works with high speed and accuracy [5]. They need proper inputs (programs, code, class, function, and loops) from its users before performing any action. AI is also changing customer relationship management (CRM) systems. Many latest Software's like Sales force or Zoho require a heavy amount of human intervention to remain up to date and accurate. But by applying AI to these sorts of platforms, a normal CRM system is transformed into a self-updating, auto-correcting system that stays on top of your relationship management for you. Thanks to social media outreach and tons of data left behind knowingly and unknowingly during internet surfing, Artificial Intelligence holds a huge potential in the field of digital marketing. Using Artificial Intelligence in providing better customer experience, predictive analytics and targeted marketing will surely provide a great Returns On Investment to businesses [6].

1.3 CHANGING SCENARIO OF MARKETING

Change is the dominant fact of life in every business today. And the ability to master and exploit change has become one of the most sought-after management skills. Current global and competitive business environment constantly asks for innovation, existing knowledge base is getting obsolete, continuously thriving for advancement in process improvement. The learning curve is always put to test, and every company is striving to remain ahead of the curve. Due to this shift in the way business is getting conducted has thrown out new reality of ever shortening product and service life cycle. More and more companies are coming out with customized products and finding ways to differentiate from competition. In marketing, the very tempo of change is constantly quickening. The major change in marketing environment is the emergence of electronic data-processing equipment as a major tool of scientific marketing not only for reporting data but also, more importantly, for planning and control by management. Most companies are taking advantage of electronic data-processing analyses, online communications, and information-retrieval systems as tools to help make marketing more efficient. This has led to the emergence of real – time marketing [4]. Real-time marketing involves creating a marketing strategy focused on up-to-date events. Marketers are making use of current trends and customer feedback, while working to connect consumers with products and services they could use.

Real-time marketing is growing in popularity with the rise of social media because it provides businesses with access to real-time information on target audiences; marketers were able to tap into that information and transform it into messages and products that they thought the customer might like. Real-time marketing now makes use of all kinds of customer data to help companies understand exactly how customers behave. Done correctly, real time personalization ensures that you are always serving relevant and timely content to your website visitors, and it can make your website visitors feel like your entire website experience has been crafted specifically for them. That level of personalized attention makes any prospect feel valued, and valued consumers are far more likely to develop brand loyalty than those who feel like they're simply one more lead.

Today, there's real-time, always-available access to the data and tools that enable rapid analysis. This has propelled Artificial Intelligence and machine learning and allowed the transition to a data-first approach. In the past, AI"s growth was stunted due to limited data sets, representative samples of data rather than real-time, real-life data and the inability to analyze massive amounts of data in seconds [7].

1.4 THE RELATIONSHIP BETWEEN ARTIFICIAL INTELLIGENCE AND DIGITAL MARKETING

Artificial intelligence is a hot topic in marketing. It is considered as the next frontier of marketing. Artificial Intelligence is a broad term which has covered a wide range of different technologies. The concept of Artificial Intelligence refers to technology that is seeking to mimic human intelligence. Artificial Intelligence includes a broad variety of capabilities such as voice, image recognition, machine learning and semantic searching. Marketers like to wax lyrical about new exciting updated technologies. They bang on Artificial Intelligence for image recognition and speech recognition. It also prevents data leaks in marketing and helps in targeting drones at remote communities. Traditional marketing or outbound marketing campaigns are far less efficient in winning and retaining a customer than once they were. Artificial Intelligence is important to gain sustainable competitive advantage in this always connected, real time world where marketers are required to deliver continuous, customized, insight driven interactions with customers on an individual basis. Brands that have understood the significance of Artificial Intelligence and putting the right system in place to scale are successful in creating a competitive advantage which is very difficult to replicate. Because artificial intelligence is not about technology, it is about delivering the perfect combination of content with context. Today, there are numerous applications of artificial intelligence in the consumer and business spaces, from Apple's Siri to Google's Deep Mind [10]. Siri, for example, uses natural language processing (NLP) to interpret voice commands and respond accordingly. Google's Deep Mind, on the other hand, uses deep learning. It is capable of making connections and reaching meanings without relying on predefined behavioral algorithms, instead learning from experience and using raw data as its inputs. In fact, by applying findings from Deep Mind, Google was able to improve the efficiency of its own

power centers, reducing the energy used for cooling by 40%. The graph below depicts clear picture of the way artificial intelligence has made slow but steady progress in global markets. Artificial Intelligence has evolved into that "can't do without" technology in the modern business landscape. Small to large enterprises are leveraging this technology to improve the efficiency of business processes and deliver smarter, more specialized customer experiences.

During previous years, marketers were hesitant to incorporate artificial intelligence into their strategies. But last year has witnessed considerable confidence amongst marketers with regards to its application [15]. It is because of the reduced ambiguity regarding results as more and more sectors have already reaped significant benefits. There are copious amounts of data available everywhere, which is, in fact, making the processes more cumbersome, if done manually. This makes human behavior to abandon data and go by intuition. This is the kind of scenario where

Artificial Intelligence emerges as a powered tool as intuition won't lead one to astute results. A digital marketer constantly goes through these questions – Who should I reach out to? What should I send? When should I schedule my posts? Over what channel will my posts have greater reach? Comprehensive answers to these questions are looked with an aim to create engagement amongst customers and further lead to growth, fostering sales and finally build a brand. Artificial intelligence is bringing transformation to every aspect of our day to day professions. This will change the way marketers carry out their campaigns to the way the campaigns themselves are measured and run. Artificial intelligence will define how digital marketing will be conducted now and in the future. The following are the ways that has transformed artificial intelligence technology in changing the world of digital marketing.

1.5 OBJECTIVES

1. To know the concept of computational marketing intelligence system for machine learning techniques.
2. To draw and suggest appropriate suggestions and model for effective use of artificial intelligence for Marketing.

2. REVIEW AND BACKGROUND OF PAPER

Geng Cui et al. Machine learning methods are powerful tools for data mining with large noisy databases and give researchers the opportunity to gain new insights into consumer behavior and to improve the performance of marketing operations. To model consumer responses to direct marketing, this study proposes Bayesian networks learned by evolutionary programming. Using a large direct marketing data set, we tested the endogeneity bias in the regency, frequency, monetary value (RFM) variables using the control function approach; compared the results of Bayesian networks with those of neural networks, classification and regression tree (CART), and latent class regression; and applied a tenfold cross-validation. The results suggest that Bayesian networks have distinct advantages over the other methods in accuracy of prediction, transparency of procedures, interpretability of results, and explanatory insight. Our findings lend strong support to Bayesian networks as a robust tool for modeling consumer response and other marketing problems and for assisting management decision making.

Evan Hurwitz et al. Computational techniques have shown much promise in the field of Finance, owing to their ability to extract sense out of dauntingly complex systems. This paper reviews the most promising of these techniques, from traditional computational intelligence methods to their machine learning siblings, with particular view to their application in optimizing the management of a portfolio of financial instruments. The current state of the art is assessed, and prospective further work is assessed and recommended.

Emmanuel Sam et al. In this short paper, we evaluate the performance of three well-known Machine Learning techniques for predicting the impact of a post in Facebook. Social Medias have a huge influence in the social behavior. Therefore to develop an automatic model for predicting the impact of posts in social Medias can be useful to the society. In this article, we analyze the efficiency for predicting the post impact of three popular techniques: Support Vector Regression (SVR), Echo State Network (ESN) and Adaptive Network Fuzzy Inject System (ANFIS). The evaluation was done over a public and well-known benchmark dataset.

Bhavin Patel et al. Predictive Analytics is the underlying technology that can simply be described as an approach to scientifically utilize the past to predict the future to help coveted results. It is the branch of cutting edge analytics which is utilized to make predictions about unfamiliar events. Predictive analytics utilizes different procedures from information mining, insights, modeling, machine learning and artificial Intelligence. It includes extraction of data from information and is utilized to predict patterns and behavior patterns. It can be connected to an unfamiliar event or interest whether past, present or future. It helps being used of statistical algorithms information and machine learning strategies to distinguish the probability of future results in light of chronicled information. Income Determination is an important application of predictive analytics where customer segmentation takes place based on different demographical data. In this paper, we attempt to identify this purpose with a novel approach using different classification techniques to minimize the risk and cost involved to predict certain income levels. Here we have demonstrated the performance of each algorithm particularly on identification of customers using classification techniques. In addition, we provide an investigation analysis on true positives, false negatives, scored labels and scored probabilities.

Alessandro Vinciarelli et al. In the last decade, new ways of shopping online have increased the possibility of buying products and services more easily and faster than ever. In this new context, personality is a key determinant in the decision making of the consumer when shopping. A person's buying choices are influenced by psychological factors like impulsiveness; indeed some consumers may be more susceptible to making impulse purchases than others. Since affective metadata are more closely related to the user's experience than generic parameters, accurate predictions reveal important aspects of user's attitudes, social life, including attitude of others and social identity. This work proposes a highly innovative research that uses a personality perspective to determine the unique associations among the consumer's buying tendency and advert recommendations. In fact, the lacks of a publicly available benchmark for computational advertising do not allow both

the exploration of this intriguing research direction and the evaluation of recent algorithms. We present the ADS Dataset, a publicly available benchmark consisting of 300 real advertisements (i.e., Rich Media Ads, Image Ads, Text Ads) rated by 120 unacquainted individuals, enriched with Big-Five users' personality factors and 1,200 personal users' pictures.

Preeti Malakar et al. Performance modeling is an important and active area of research in high-performance computing (HPC). It helps in better job scheduling and also improves overall performance of coupled applications. Sufficiently rich analytical models are challenging to develop, however, because of interactions between different node components, network topologies, job interference, and application complexity. When analytical performance models become restrictive because of application dynamics and/or multicomponent interactions, machine-learning-based performance models can be helpful. While machine learning (ML) methods do not require underlying system or application knowledge, they are efficient in learning the unknown interactions of the application and system parameters empirically using application runs. We present a benchmark study in which we evaluate eleven machine learning methods for modeling the performance of four representative scientific applications that are irregular and with skewed domain configurations on four leadership-class HPC platforms. We assess the impact of feature engineering, size of training set, modern hardware platforms, transfer learning, extrapolation on the prediction accuracy, and training and inference times. We find that bagging, boosting and deep neural network ML methods are promising approaches with median R2 values greater than 0:95 and these methods do not require feature engineering. We demonstrate that cross-platform performance prediction can be improved significantly using transfer learning with deep neural networks.

Giorgio Roffo et al. In the last decade new ways of shopping online have increased the possibility of buying products and services more easily and faster than ever. In this new context, personality is a key determinant in the decision making of the consumer when shopping. The two main reasons are: firstly, a person's buying choices are influenced by psychological factors like impulsiveness, and secondly, some consumers may be more susceptible to making impulse purchases than others. To the best of our knowledge, the impact of personality factors on advertisements has been largely neglected at the level of recommender systems. This work proposes a highly innovative research which uses a personality perspective to determine the unique associations among the consumer's buying tendency and advert recommendations. As a matter of fact, the lacks of a publicly available benchmark for computational advertising do not allow both the exploration of this intriguing research direction and the evaluation of state-of-the-art algorithms. We present the ADS Dataset, a publicly available benchmark for computational advertising enriched with Big-Five users' personality factors and 1,200 personal users' pictures. The proposed benchmark allows two main tasks: rating prediction over 300 real advertisements (i.e., Rich Media Ads, Image Ads, Text Ads) and click-through rate prediction. Moreover, this work carries out experiments, reviews various evaluation criteria used in the literature, and provides a library for each one of them within one integrated toolbox.

Peter Martey Addo et al. Due to the advanced technology associated with Big Data, data availability and computing power, most banks or lending institutions are renewing their business models. Credit risk predictions, monitoring, model reliability and effective loan processing are key to decision-making and transparency. In this work, we build binary classifiers based on machine and deep learning models on real data in predicting loan default probability. The top 10 important features from these models are selected and then used in the modeling process to test the stability of binary classifiers by comparing their performance on separate data. We observe that the tree-based models are more stable than the models based on multilayer artificial neural networks. This opens several questions relative to the intensive use of deep learning systems in enterprises.

Iqbal Muhammad et al. One of the core objectives of machine learning is to instruct computers to use data or past experience to solve a given problem. A good number of successful applications of machine learning exist already, including classifier to be trained on email messages to learn in order to distinguish between spam and non-spam messages, systems that analyze past sales data to predict customer buying behavior, fraud detection etc. Machine learning can be applied as association analysis through Supervised learning, Unsupervised learning and Reinforcement Learning but in this study we will focus on strength and weakness of supervised learning classification algorithms. The goal of supervised learning is to build a concise model of the distribution of class labels in terms of predictor features. The resulting classifier is then used to assign class labels to the testing instances where the values of the predictor features are known, but the value of the class label is unknown. We are optimistic that this study will help new researchers to guiding new research areas and to compare the effectiveness and impuissance of supervised learning algorithms.

Jacob Abernethy et al. We propose a framework for designing adaptive choice-based conjoint questionnaires that are robust to response error. It is developed based on a combination of experimental design and statistical learning theory principles. We implement and test a specific case of this framework using Regularization Networks. We also formalize within this framework the polyhedral methods recently proposed in marketing. We use simulations, as well as an online market research experiment with 500 participants, to compare the proposed method to benchmark methods. Both experiments show that the proposed adaptive questionnaires outperform the existing ones in most cases. This work also indicates the potential of using machine-learning methods in marketing.

3. WAYS OF DIGITAL BENCHMARKING

1. Marketing Increasingly Focused on Consumer Behavior

Artificial intelligence is all about data-driven approaches to marketing and decision making and to this extent is being used to integrate data from different platforms. Users leave crumbs of personal data when they interact online. Whether they shop, post or browse, data is collected at every step.

Now, Artificial intelligence applications are crunching these vast numbers and learning „online behavior" and „digital identity" of the users. Platforms collect and store all kinds of analytics these days as a part of analyzing customer patterns in order to develop automated systems and customer profiles to target certain markets. It looks like, in the near future, computers will be able to analyze behavior and customer profiles even more closely, thus being able to essentially perform their "own" outreach strategy, building copy that meets the voice of the customers who they are observing online.

2. Predictive Marketing

Social media plays a vital role in gathering more personal information about the potential customer, which in makes it easy for marketers to have a focused campaign. With each click whenever a user is browsing the internet, new data is being generated and compiled for the Artificial intelligence analysis. This data is valuable for the marketer to optimize the information and provide the most relevant information.

3. Lead Generation

Artificial intelligence actually sift through piles of data to find the ideal customers, clients and even colleagues based on information that it already has and the program that it's using. Even more fascinating, it can also predict or rate how hot a given lead is. So, for B2B or even recruiting purposes, this can save a lot of time and energy on just basic searching, leaving the marketer more time for things like pitching and sales calls.

4. Catboats

Catboats are Artificial intelligence -driven programs that interact with users in a natural-language environment. These programs are rapidly becoming a major area of interest for marketers, as an increasing amount of social media traffic takes place on private messaging services like what's App and Facebook Messenger. That's an engagement opportunity that's hard to ignore. Most digital marketers see catboats as a way to provide personalized customer service at scale – which is tangentially related to marketing, but not directly a marketing function. However, catboats also help guide users through a customer journey to a sale.

5. Automated Content Creation

Many brands are using Artificial Intelligence to automate content creation. Thanks to this technology, content creation is quicker, and easier. For example, global beverage major Coca Cola uses Artificial Intelligence to automate its advertising narratives. Creation of logos and music scripts is done in tandem with the context automatically.

6. Refining Advertisements

Artificial Intelligence is also used to refine ads and their delivery. According to marketing experts, Google and Facebook control over 60 percent of all PPC campaigns in the United States. Artificial intelligence can help advertisers find new advertising channels for their PPC campaigns. These channels may not be used by competitors and thus Artificial intelligence offers a competitive advantage to advertisers.

7. Image recognition

One of the most exciting and possibly most important developments in Artificial intelligence is image recognition. If someone want machines to be able to „think" like us and mimic our ability to respond to our environment, such as in the case of self-driving cars, it is of vital importance that they are also able to „see" like us. Computers are now able to identify and recognize simple objects and scenarios. Although these abilities are negligible compared to human vision and perception, these building blocks of computer vision have enabled some important technological developments, and continue to do so. Image Recognition helps marketers to find visuals on social media, even if they are not accompanied by the relevant caption.

8. Email Marketing

Artificial intelligence is making email marketing even better, both for the marketer and their customer. Personalization at scale is every marketer's dream – and Artificial intelligence makes it possible. Artificial intelligence can use data to create personalized emails to every one of the company subscribers, based on their previous interactions with the brand. It can customize based on what content they've consumed, what's on their wish list, what pages they have spent the most time on, and more. For example, if one user always visits links to product pages in the company's email, but another skips those links and goes straight for content, the Artificial intelligence can send different messaging with the most relevant links for each user.

9. Augmented Reality

One another aspect of the Artificial intelligence which has the potential to provide better customer satisfaction is Augmented Reality (AR). AR can provide the customer with the option of seeing and feeling the production before the online purchase, one example of this technology of course on its initial stage is Lenskart"s 3D trial, which allows customers to try the frame they are interested in buying through their webcams sitting at home. Incorporation of such technology can definitely stimulate better and faster response from the customer which ultimately will reflect in the revenues.

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.

4.1. 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

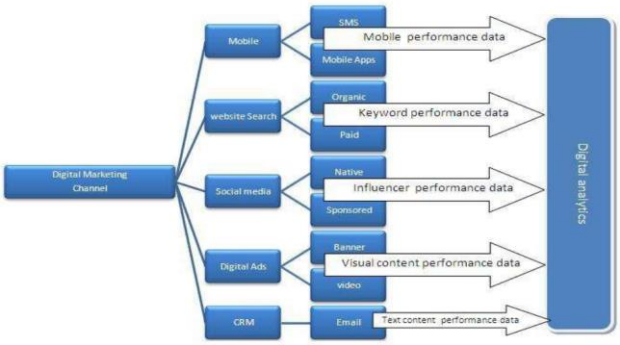


Figure 1: Digital marketing channels. (Source: www.slideshare.net/Gayatri_choda/digital-marketing-25585750)

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).

4.2 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.

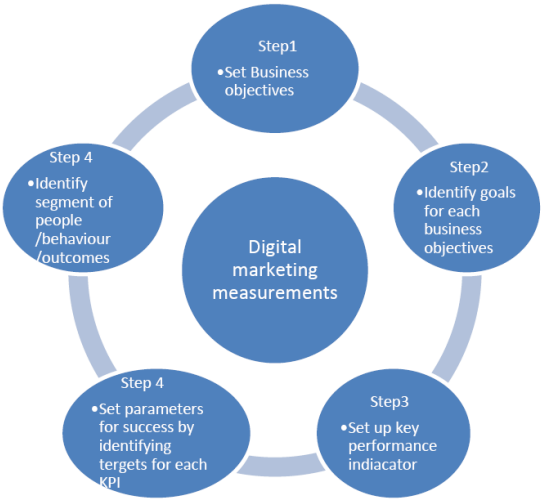


Figure 2. Steps involved in digital marketing measurement ©K.S.Mahajan, S. S. Jamsandekar, and Dr. A. M. Gurav.)

4.3 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.

4.4 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.

4.5 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.

4.6 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.

4.7 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

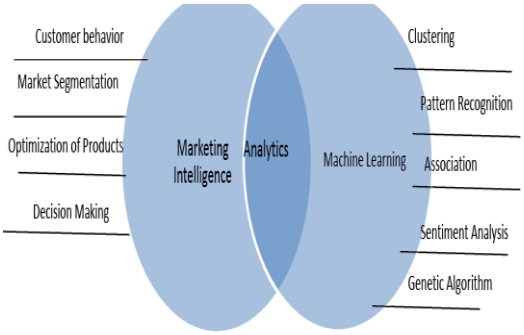
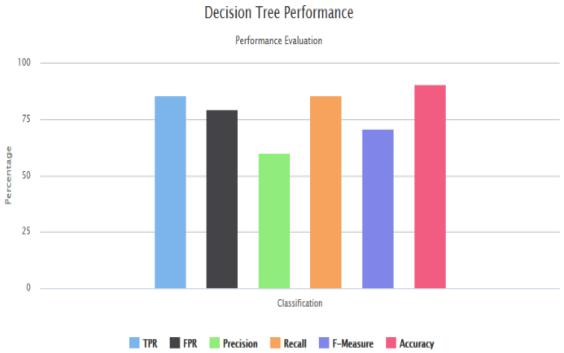


Figure: 3 Machine Learning based Marketing Intelligence.**(©K. S. Mahajan, S.S.Jamsandekar and Dr.A. M. Gurav.)**

5. EXPERIMENTAL SET UP

A tree is utilitarian in real life for Computational Benchmarking in Digital Marketing and it turns out it has influenced broad area of Machine Learning. In Decision Tree Machine Learning, a decision tree can be used to represent decision and decision making, visually and explicitly. Though it is a frequently used tool in Data mining for obtaining a strategy to reach a particular goal, it is also widely used in machine learning these days which will be our main focus of this article.

Firstly, we are going to learn how to represent and create decision trees. Computational Benchmarking in Digital Marketing Followed by that, we will take a look at the background process or decision tree learning including some mathematical aspects of the algorithm and decision tree machine learning example. Before ending this article, we shall discuss the advantages, disadvantages of the algorithm. Let's get started with the representation.



The experimental result evaluation, we have notation as follows:

TP: True positive (correctly predicted number of instance)

FP: False positive (incorrectly predicted number of instance),

TN: True negative (correctly predicted the number of instances as not required)

FN false negative (incorrectly predicted the number of instances as not required),

On the basis of this parameter, we can calculate four measurements

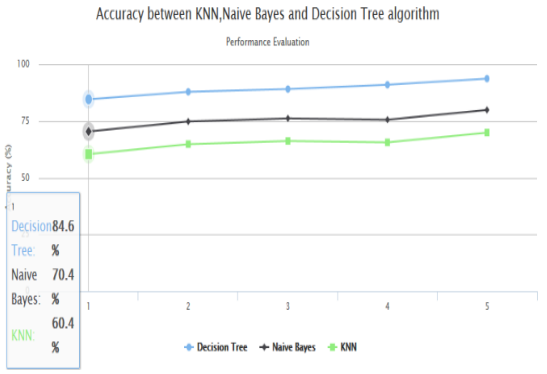
Accuracy = TP+TN÷TP+FP+TN+FN

Precision = TP ÷TP+FP

Recall= TP÷TP+FN

F1-Measure = 2×Precision×Recall ÷Precision+ Recall.

TPR	FPR	Precision	Recall	F-Measure	Accuracy
78%	76%	54%	80%	69%	84%



CONCLUSION

For the past few years, artificial intelligence has stepped into marketing, helping marketers to enhance marketing strategies, product planning, and customer experience in a considerable manner. It has an amazing potential in gaining competitive advantage and strengthening customer relationships. Technological advancements have always helped businesses by creating new opportunities for reaching customers. One of greatest technologies of our time is Artificial Intelligence (AI) which is creating quite the buzz in the digital space. Given its potential for storytelling and marketing, Artificial Intelligence in B2B sales and marketing is here to transform the way people interact with brands, information and services. The world of B2B marketing and its future is poised to be touched by Artificial Intelligence. A good handful of enterprise giants dread the idea of full automation of marketing movements through smart Artificial intelligence technology, however, measuring the effect of AI-powered robots in many customer service industries, one can affirm that understanding customer nuance will not be entirely manual or managed by human power alone. Artificial intelligence made its presence felt this year through its supplementary processes such as big data, Internet of Things and Machine Learning. But these are only components that will eventually contribute towards unleashing the full potential of AI. The coming years, especially 2018 would see visible changes and impact due to the application of AI. Artificial intelligence is continually becoming an empowering tool for digital marketers and works on the tricks to get the information from an individual or the group of people to and make your brand a huge one. It is safe to say that Artificial intelligence is a secured investment, which is sure to get dividends.

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