Sustainability of Artificial Intelligence in Marketing

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Month and Year of Submission:

March 2022

Table of Contents

List of Figures

Executive Summary

AI has been here before. Its history abounds with booms and busts, extravagant promises and frustrating disappointments. Is it different this time? Studies suggests yes: AI is finally starting to deliver real-life business benefits. The ingredients for a breakthrough are in place. Computer power is growing significantly, algorithms are becoming more sophisticated, and, perhaps most important of all, the world is generating vast quantities of the fuel that powers AI—data. Billions of gigabytes of it every day.

Artificial intelligence is the study of how to make machines intelligent or capable of solving problems as well as people can. At its core, machine learning is a new way of creating those problem-solving systems. For decades, programmers manually coded computer programs to provide outputs when given a certain input. With machine learning, we teach computers to learn without having to program them with a rigid set of rules. We do this by showing a system several examples until it eventually starts to learn from them. AI is reinventing existing products, from Maps to YouTube, and it's powering new experiences.

Higher expectations, more personalized marketing opportunities. What does this mean for marketers? The further integration of technology into the physical world creates new consumer interactions that are even more simple and instantaneous. Put another way, high consumer expectations will be higher than ever. This will pose a challenge for brands—and a great opportunity.

A big part of the opportunity for marketers is how AI will help us fully realize

personalization—and relevance—at scale. With platforms like Search and YouTube reaching billions of people everyday, digital ad platforms finally can achieve communication at scale. This scale, combined with customization possible through AI, means we'll soon be able to tailor campaigns to consumer intent in the moment. It will be like having a million planners in your pocket.

Experimenting with machine learning help us reach and engage our target audience. it increases the likelihood that ads are served to the most relevant audience. Using AI to forecast demand also allows businesses to optimize their sourcing more broadly, including fully automating purchases and order processing.

AI is a black box - people have a hard time trusting a process or a decision they do not understand. Some consumers see magic and appreciate it without thinking too hard about it. Consumer distrust of smart AI-based systems is a big issue and it can undermine efforts to build an advanced, robust, efficient and effective analytics system. If consumers don't trust the organizations and systems that use their data, then marketers won't have quality data.

AI is here and here to stay. Despite the many unanswered questions, consumers across the globe are hopeful that AI's impact will be positive and society will progress as a result. Expanding our forms of human expression by expanding our intelligence the possibilities are endless.

Introduction to the Future

Marketing is ready for a change. There have been testimonies to the fact that Artificial Intelligence (AI) is already important to marketing and its importance is only going to grow in the future. It is not difficult to argue that AI is the future of marketing and any good marketing executive needs to be aware of the infinite possibilities that accompany this technological change.

The autonomic nervous controls all the processes in a human being, without the need of a deliberate thought. This is where marketing is headed. Personalisation, dynamic content selection and display styles with recommendations are all going to be commonplace. AI is a program that can figure things out for itself. Not unlike humans, it keeps accepting new input to formulate its judgement.

Over the years, we have gotten used to the fast pace of life. Occasionally, we need to pause for a while, catch a break, discover new paths and reset our course. The world that our ancestors saw was huge. They saw houses being built out of logs, with wooden pegs being used instead of nails. They had to travel by the means of boats, horses, bullock carts and did not go to the stores to buy things but grew what they needed themselves. Then they saw men walk on the moon. In the next few years, a new generation will see self-driving cars replacing manual transportation, robots running our every errand, 3D printers for instant delivery of goods. We will also see augmented reality becoming a normal routine in everyday life. We might also get to see a colony of people living on Mars.

The components of an AI-based approach is already in its place in the market. Traditional marketing is becoming more quantitative and targeted. Promotions and

advertisements directed at consumers have become personalised to cater to the real-time demands of individuals. Companies are also employing digital content to get hold of the masses and build brand awareness. According to a recent Gartner survey, today, nearly 25 percent of the companies' marketing budgets are dedicated to various digital channels, and almost 80 percent of marketing organisations make technology-oriented capital expenditures. It is natural to assume that AI is going to take up a chunk of that investment in the future.

Earlier, companies had to make a few major decisions at regular intervals. Now, there are simply too many complex, real-time decisions to be made with huge amounts of data, every day. Marketing activities are ever-increasing in number, some decisions even deploy some form of AI, and this trend is only going to increase. In the present day, AI in marketing supports only some particular kinds of decisions. These typically include repetitive decisions based on data, digital content and channels or online promotions. This set of AI-supported activities includes search engine optimisation, website operation and optimisation, lead filtering and scoring, digital advertising buys (or programmatic buying), A/B testing, outbound e-mail marketing, and many other marketing tasks.

AI is needed by the marketing manager who is facing a new educational learning curve and has to respond to the C-level insistence that the marketing department is keeping up with the times. The rest of us need to understand the wide brushstrokes of this new development in data processing to see business in a different light. AI will find its application in many ways that will improve customer satisfaction, increase organisational capacities, lead to rise in revenue and decrease costs.

1.1. What is Artificial Intelligence?

Artificial intelligence (AI) may be defined as the branch of computer science that is concerned with the automation of intelligent behaviour.[1]
According to Chris Smith, "*The term artificial intelligence was first coined by John McCarthy in 1956 when he held the first academic conference on the subject. But the journey to understand if machines can truly think began much before that. In Vannevar Bush's seminal work As We May Think (1945) he proposed a system which amplifies people's own knowledge and understanding. Five years later Alan Turing wrote a paper on the notion of machines being able to simulate human beings and the ability to do intelligent things, such as play Chess (1950).*"[2]

AI is an upcoming step in logical computing. It is basically a program that can figure things out for itself and reprogram itself according to the user's needs. It is capable of understanding context over time. Artificial Intelligence is designed to deal in gray areas and not statistics or graphs or charts.

There are three D's of Artificial Intelligence -

1. *Detect* - Artificial Intelligence can handle large amounts of data at a time. It can filter the most important points or characteristics from the vast variety and quantity of data. It chooses the most predictive kind of data and decides what can be chosen and what can be ignored.

[1] George F. Luger, William A. Stubblefield - Artificial Intelligence Structures And Strategies For Complex Problem Solving-Addison Wesley Publishing Company (1997)
[2] Chris Smith, The History of Artificial Intelligence

2. *Deliberate* - Artificial Intelligence can deduce order from the data, assess that data, compare the most foreboding traits against other data and then find the solution to a problem. It may also make a recommendation after consideration of relevance of the data.

3. *Develop* - AI adapts itself to the new information that it receives. It reprograms itself with each iteration. It can alter its way of functioning according to the inputs.

Artificial intelligence draws parallel with machine learning. Machine learning is said to have taken place when a computer uses the given data to perform specific functions using trial and error method. Avinash Kaushik, the digital marketing evangelist at Google compares the two by stating that "*AI is an intelligent machine and Machine Learning is the ability to learn without being explicitly programmed."* Machine learning is a machine that impersonates a statistical programmer while Artificial Intelligence is a machine passing itself off as a human.

1.2. The AI Umbrella

Artificial intelligence is wide subject with expansive horizons. AI deals with different techniques of solving ambiguity of data and knowledge, intelligent searches, knowledge representation schemes, automated learning, among others. It is a composition of diverse disciplines of knowledge such as Psychology, Science, Engineering, Mathematics, Computer Science. It also includes subjects of Philosophy and Cognitive Science. Artificial intelligence finds its application in robotics, expert systems, game-playing, visual and voice recognition affective

computing, natural language processing and many others. Figure 1 depicts these sciences as parent disciplines of AI and the application and subject areas of AI.

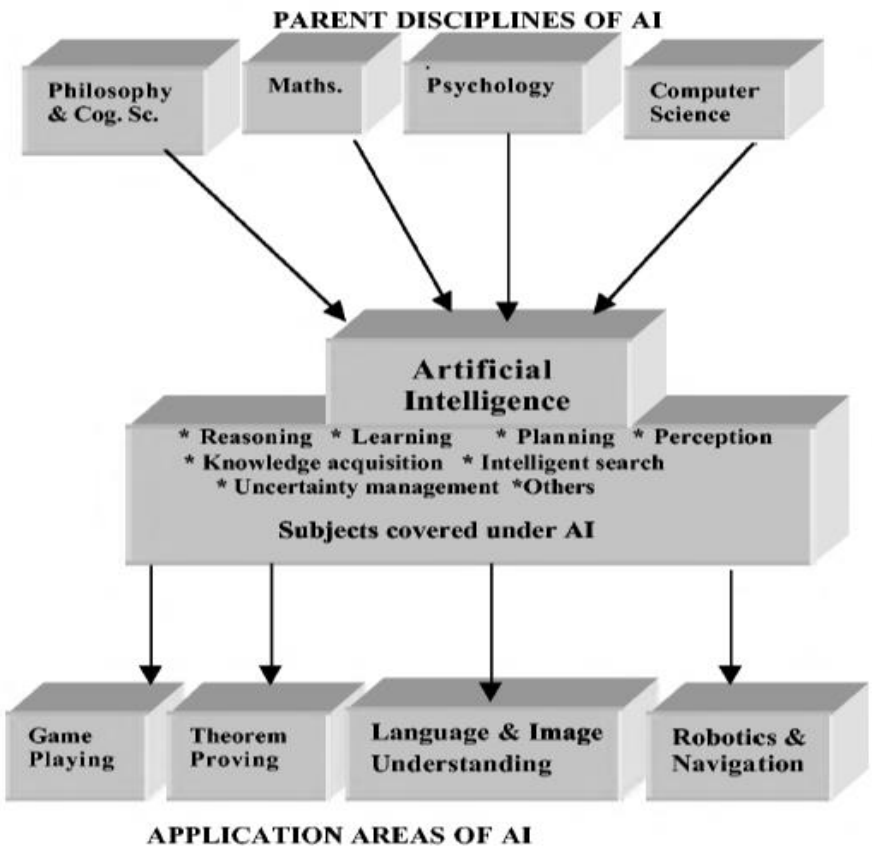

Figure 1.2 : AI and its parent disciplines and its application areas[3]

AI is an overarching term for mix of various technologies. “Weak AI” can do something specific really well. A “Strong AI” thinks like humans, draws information from surroundings, imitates common sense and has a potential of becoming self-aware. We have lived with weak AI until recently. Amazon and Pandora are

[3] Amit Konar - Artificial intelligence and soft computing behavioral and cognitive modeling of the human brain-CRC Press (2000)

examples of weak AI which ventures certain conjectures on your choices for the future. However, that is all. The systems cannot do anything apart from that.

1.3. The Subject of AI

AI was enriched with theories and experiments from a variety of parent disciplines. The subject of AI originated with game-playing and other programs. Since AI is relatively new, the significance of topics under the subject saw prominent changes over time. Currently, the topics which can be used to understand the concept of AI are as follows :

1. Learning Systems : This is one of the most important areas in understanding AI. For better understanding, it can be explained as follows - A system receives information from a source and tries to imitate it. An error signal is received by the system for any gaps and an actuation signal is generated for adjustment of the gap. Adaptation continues till the time the error is reduced to a minimum level. This is a classic example of *parametric learning* where the adaptive learning process adjusts the parameters of the system autonomously to ensure less variations in the pattern. Besides this, other common learning methods that take place without our knowledge are *inductive* and *analogy-based learning*. Inductive learning refers to the learner making generalisations from examples. For example, after realising that a sparrow flies and a parrot flies, the learner may assume that birds fly. In analogy-based learning, the learner connects two different knowledges. For

example, from the knowledge of motion of planets in the solar system, the learner may learn the motion of electrons in an atom.[4]

2. Knowledge Representation and Reasoning : There is a requirement for an organised and complete knowledge base for effective attainment of pre-defined goals. When there are lesser transitions for reaching the goal, the reasoning system becomes highly efficient. Less intermediate stages happen when there is knowledge. An organised and thorough knowledge requires minimum search to identify solutions for a problem. Thus, this gains paramount importance in knowledge engineering. Knowledge representation techniques like production rules, semantic nets, predicate logic and filler slots and others are used. The use of a type of representational scheme depends on the users and the nature of application.

3. Planning : Automated planning finds its application in the fields of robotics and navigational problems. Planning deals with the determination of methodology for the attainment of a pre-determined goal. The initial data is used sometimes to form the basis of a plan.

4. Knowledge Acquisition : Acquisition of knowledge includes generation of new knowledge and information from the given knowledge base. There is a scope for machines to gain knowledge from their environment and refine the acquired knowledge. Dynamic data structures are also set up for existing knowledge.

[4] Amit Konar-Artificial intelligence and soft computing_ behavioral and cognitive modeling of the human brain-CRC Press (2000)

5. Intelligent Search : Search problems, like in Computer Science, are largely deterministic in nature. The order of finding and acquiring elements of the search space is known. However, in AI, the search problems are non-deterministic. The variables are completely dependent on data sets that it is fed.

6. Logic Programming : History is a testimony to the fact that many mathematicians and logicians have tried to design tools for representation of logical statements by symbolic operators. Logic programming has been identified as one of the prime research areas in AI. The logic of propositions or binary statements has been enriched over time to deal with more complex real-life situations.

7. Management of Imprecision and Uncertainty : The incompleteness of data is called imprecision and the incompleteness of knowledge is called uncertainty. Data and knowledge bases faces different forms of incompleteness in many AI problems. Reasoning in the presence of imprecision of data and uncertainty of knowledge is complex. Various tools have been devised for the same like Stochastic, fuzzy and belief network models.

8. Soft Computing : According to Professor Zadeh, soft computing is “an emerging approach to computing, which parallels the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision.” A collection of computing tools are used singularly or in a combination depending on the type of domain of applications. The scope of a few tools in AI are outline as under :

- Fuzzy logic : It deals with the logical connectives and fuzzy sets for human-like reasoning skills modeling in the real world. It includes all the elements of the universal domain set with varying values in intervals.
- Artificial Neural Nets (ANN) : These are electrical analogues of biological neural nets. The artificial neural net is a collection of electrical neurons (quite like the neurons in a human body) in a different topology. The most common application of artificial neural net is in machine learning. The ANN supports supervised and unsupervised types of machine learning. The supervised learning algorithms have been implemented with ANN in robotics, computer vision, control, automation. The unsupervised learning algorithms with ANN have been applied in knowledge acquisition, analog to digital conversion of data and planning among others.
- Genetic Algorithms (GA) : It is a stochastic algorithms which imitates the natural process of biological evolution. GA follows the principle of *Darwinism,* on the belief of "survival of the fittest". GAs finds use in intelligent search, machine learning and optimisation problems.

It is like teaching machines to think like humans through neural networks. These systems are designed to enhance human knowledge and capabilities. Roetzer says that AI is the future of personalised consumer experiences for increasingly complex content campaigns.

1.4. Applications of AI

Artificial intelligence and machine learning are creating new cognitive tools that enhance our ability to think at scale and that capacity will produce rewards for every

person on the planet.

-Vint Cerf, Chief Internet Evangelist Google, one of the Fathers of the Internet

Companies want to customise customer experience which requires machine learning or some other form of AI. AI can help in delivering value across omnichannel customer relationships, and to ensure effective communications at all customer touchpoints. A few typical applications where AI plays a significant and decisive role in engineering automation :

1. Expert Systems : Expert systems are designed to solve complex problems by reasoning through bodies of knowledge. An expert system is sub-categorised into two systems namely, the inference engine and knowledge base. The inference engine uses rules to deduce facts while the knowledge base represents the facts and rules.[5] In artificial intelligence, an expert system is a system that mimics a human expert while making decisions.

2. Speech and Natural Language Processing : Systems can now understand the natural language spoken by humans. The most telling problem in speech analysis is interpretation of words in the sentence. In more recent times, artificial neural networks have been deployed to classify words from their features. This development in AI is of great importance because a system capable of understanding speech is able to execute any task that is communicated to it verbally.

3. Scheduling : In scheduling, one plans ahead of time and sets a schedule for s set of events. This is done to increase the efficiency.Determination of optimal

[5] Wikipedia

scheduling requires an exponential order of time. Artificial neural sets and genetic algorithms have been employed to solve all scheduling issues.

4. Game Playing : Most games operate on a well-defined set of rules. Thus, complexities and ambiguities are removed. AI uses interaction interface with the user to personalise the gaming experience.

5. Theorem Proving : Theorem proving is one of the most fruitful branches of the field. It was responsible for formalising search algorithms. It also helped in the formulation of formal representation languages such as predicate calculus and the logic programming language.

6. Image Understanding and Vision Systems : These systems understand, interpret and comprehend visual input on the computer. Recognition of objects from its image can be carried out through a supervised learning algorithm. It passes through a process of pattern classification. There are three basic processes. The low level vision system pre-processes the image by filtering from noise. The medium level vision system enhances details and segmentation. The high level vision system recognises objects from segmented image, labels the image and interprets the scene.

7. Navigational Planning for Mobile Robots : A mobile robot has generally single or multiple visual or sensory receptors which help in identifying obstacles on its trajectory. The future may see mobile robots being extensively used in fire-fighting, mine clearing, factory automation, automatic diagnosis and replacement of defective parts of instruments.

Today, we are in the pseudo AI phase where we interact with machines in the machine-learning phase of AI. Artificial Intelligence might seem like a fiction or a fragment of science experiments but it already has a huge effect on our lives. If it already does not have a huge impact in our lives, it is very likely to do so in the near future.

1.5. Application of artificial intelligence in daily lives

Technology is still in its infancy. What many companies call AI is not necessarily so. A piece of software with AI responds on the basis of pre-defined multi-faceted input or user behaviour. While companies like Apple, Facebook, and Tesla are rolling out revolutionary updates and changes with the machine-learning technologies, many are just clueless as to how AI is being used by businesses.[6] Examples of AI that we use in daily life :

1. Virtual Personal Assistants : Intelligent digital personal assistants on platforms like iOS, Android and Windows OS help users to find useful information when they search for it. Siri, Google Now, and Cortana are all examples of digital assistants. AI uses the information it receives from the users' end and utilises it to create a personalised experience with tailored results for the queries. Virtual assistants process large amounts of data from a myriad of sources to learn about the users and helps them to organise and track data. These assistants continually learns about the user and gradually develop the ability to predict user needs.

[6] Forbes

2. Video Games : AI has been used in video games since a very long time. In the recent times, the complexity and effectiveness of AI has increased whence the video game characters learn the user behaviour and respond to stimuli and react. Video games are simple applications of AI. However, with the increasing competition and huge market potential, efforts and money is invested for this application of AI by game providers all over the globe.

3. Surveillance : Security algorithms can identify potential warnings from the security cameras. In case of any warning, the system might alert the security officials. Training computers with supervised training exercises makes sense. Currently, the technology is not very advanced to be fool-proof. This might, however, debut in the future.

4. Smart Home Devices: Smart home devices learn the user's behavioural pattern and adjusts their settings accordingly. It can help users save money, increase convenience and save energy. Lighting in many people's homes see artificial intelligence where by setting defaults and preferences, one can adjust lights in and around the house. A thermostat can adjust the temperature according to user needs to conserve energy and money.

5. Music and Movie Recommendation Services : This field is relatively simple and not futuristically advanced. Apps like Netflix, Spotify, Pandora makes recommendations to the users according to their usage pattern. A learning algorithm is fed with the users choices and the recommendations crop up. It is majorly dependent on human-assigned factors.

6. Purchase Predictions : Retailers like Amazon use a predictive analytics algorithm to customise user experience of online shopping. Recommendations of alternate services and goods are offered and displayed according to the behaviour of the user. Sometimes, these systems identify specific behaviour and use it to target advertisements or sending offers and discounts.

7. Smart Cars : Self-driving cars are becoming a reality. Tesla's autopilot feature in their test drives are a testimony to the fact that this kind of technology is not far away even though they are not so advanced at this stage. Google's self-driving car project is also an example. Algorithms developed by Google can let these self-driving cars to learn driving through experience.

8. Online Customer Support : Online services now offer the facility of chatting with customer support. In many cases, users are talking to a rudimentary AI and they do not amount to more than automated responders. Many automated chat support bots are able to extract knowledge and present it to the users when they ask for it. Adjusting to the understanding of language and its related barriers may be difficult but these bots are getting better at that.

9. Fraud detection : Artificial intelligence is often used to monitor and detect frauds. Systems are trained to detect fraudulent and non-fraudulent activities through exercises. After enough training, systems become adept in identifying signs. Many banks send confirmation emails if they detect any unusual behaviour.

10. News Generation : Artificial intelligence can write articles that do not require a lot of synthesis. It can develop generic news pieces instead of in-depth

analysis. Many e-commerce businesses are utilising this. Granted it needs a lot of work before it becomes fully and unmistakably operational, the concept is finding its place with a starting groundwork already prepared.

AI can help companies to make similar decisions with same criterions across digital and analog worlds.

Artificial Intelligence for Marketing

Artificial intelligence revolves around the concept of understanding and building up intelligent entities with the ability of automating various processes. It is evident that artificial intelligence is making a mark in various fields of specialisation and has reached a wider society. Literature in the field of application of AI in marketing is scarce.

2.1. Marketing and Artificial Intelligence

Major leaps of advancements have taken place in artificial intelligence and a range of disciplines have led to successful development of AI systems. This has proven to be useful for marketers. These systems help in the areas like market forecasting, automated processes and decision making, thereby increasing efficiency of tasks. AI systems can be used to understand social networks on the web. Analysis can help marketers to determine influential nodes within networks and then be applied towards a societal marketing approach. Even though AI has gained much recognition in the marketing field, ethical issues surrounding the system and their potential to impact the workforce gives rise to controversies.

Artificial Neural Networks : From a marketing perspective, neural network software tools help in decision making. These networks can gather and process relevant data to provide generalisations for a variety of situations.

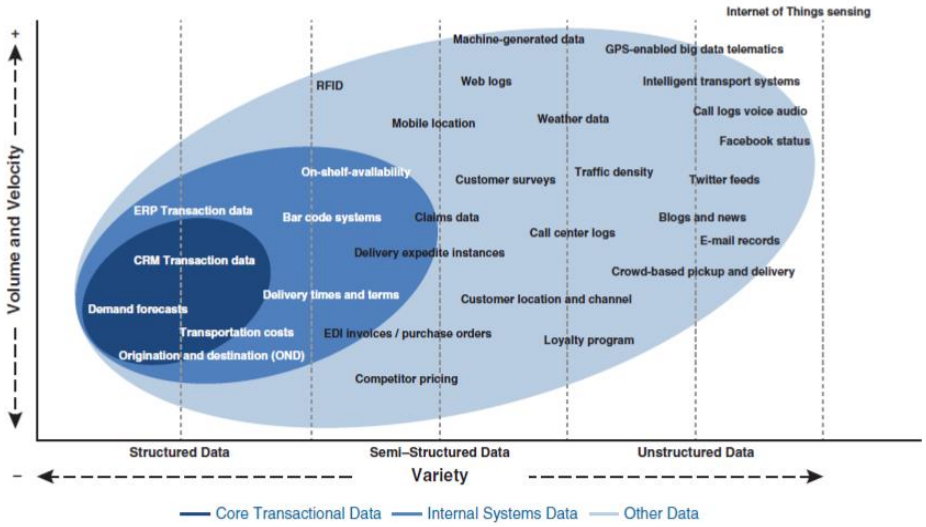

Figure 2.1 : So many data, so little time[7]

The combination of all available data with the power of machine learning is a cause for learning, opportunities and competitive advantage (Figure 2).

Neural networks help to fulfil role of marketing companies effectively in aiding in marketing segmentation and measurement of performance while reducing costs and improving accuracy. Traditional models do not offer advantages of flexibility, adaptation, learning ability and knowledge discovery like neural networks. Neural networks can be used in pattern classification, forecasting and marketing analysis.

- Pattern classification : Neural network approach allows companies to classify customers for making informed marketing decisions. Companies like Spiegel Inc., used software by NeuralWare Inc., to identify the demographics of the customers who make varying number of purchases, i.e., single or repeat purchase. Neural networks were able to identify patterns. As a result, they

[7] Jim Sterne-Artificial Intelligence for Marketing_ Practical Applications-Wiley (2017)

were able to identify customers who are more likely to make repeat purchases. Consequently, there was streamlining of marketing efforts and reduced costs.

- Forecasting : Sales forecasting "is the process of estimating future events with the goal of providing benchmarks for monitoring actual performance and reducing uncertainty."[8] Accuracy has been improved in the areas of demand for products, distribution, inventory control, performance management and employee turnover through the usage of artificial intelligence techniques.

- Marketing Analysis : Neural networks provide a useful alternative to traditional statistical models due to their reliability, time-saving characteristics and ability to recognise patterns from incomplete or noisy data.[9] During marketing analysis, neural networks can help to gather and process information. The information may range from consumer demographics and credit history to buying behaviour of consumers.

The in-depth integration of the technology with the physical world creates simpler and quicker customer interactions. Consumer expectations are bound to increase with the realisation of personalisation and relevance dawning on everybody.

2.2. Marketing Automation

Marketing automation refers to the use of softwares to computerise the marketing process which would have been alternatively performed manually. Processes like

[8] Hall, O. P. (2002). Artificial Intelligence Techniques Enhance Business Forecasts: Computer-Based Analysis Increases Accuracy. Graziado Business Review, 5(2).
[9] Woelfel, J. (1992). Artificial Neural Networks for Advertising and Marketing Research: A Current Assessment. University at Buffalo.

customer segmentation, campaign management and products promotions can be undertaken effectively. Marketing automation is a key component of Customer Relationship Management (CRM). A major challenge for a marketing automation system is to store and manage a significant amount of information and empower the users to identify and act on relevant, actionable information.[10]

Application of marketing automation

Marketing automation is employed to create platforms for effective marketing to drive the business. Companies are deploying systems that use data-mining algorithms to analyse customer database. The information may refer to socio-economic characteristics, previous interactions with customers and purchase history.[11] Marketing investments are also analysed to highlight successful and unsuccessful efforts and for optimum allocation of resources.

Through the application of analytics, non-responsive groups within an existing target audience can be identified and removed to cut unnecessary costs. Analytics can be used to identify smaller audience for effective targeting like cross-sell and up-sell promotions and other ad-hoc opportunities. Marketing automation will also lead to improvement in productivity by providing marketers the chance to identify and exploit opportunities for new and existing customers alike.

Marketing automation applications can make a significant contribution toward customer life cycle marketing. These applications can be used to proactively establish customer communications by targeting specific points in the customer life

[10] LeSueur L. - Marketing Automation_ Practical Steps to More Effective Direct Marketing (2007)
[11] Sharma, S., Goval, R. K., & Mittal, R. K. (2010). Imperative relationship between data quality & performance of data mining tools for CRM. International Journal of Business Competition & Growth, 1 (1), 45-61.

cycle. Effective establishment of these communications improves the timing of delivery and leads to an increase in response rates. Establishing a concept of the customer life cycle and crafting appropriate promotions is expected to lengthen the relationship and increase sales and profit per customer.

Automation of Distribution

Marketers require accurate data to respond to fluctuating trends in product demand for effective distribution of products. Automation processes provide real-time monitoring and and intelligent control. Amazon acquired Kiva Systems, makers of warehouse robots for $775 million in 2012. Before the purchase of the automated system, human employees worked in the warehouses. The Kiva robots were able to perform many duties such as order fulfilment, product replenishment, heavy lifting among others. Thus, overall efficiency of the delivery services provided by the giant increased.[12]

2.3. Artificial Intelligence for Marketing Decisions

Exploiting customer information for marketing is vitally important but involves significant resources and management challenges in its collection, maintenance, security, and access for marketers.[13] Marketing is a complex field of decision-making. It involves good and many judgments and intuitions on behalf of the marketer. The complexity of the decision making process can make it infuriating but marketing decision systems can still help to filter the noise. Decision Support System has been applied as a technique in application of artificial intelligence. This

[12] Murray, P. (2012, March 21). Amazon Goes Robotic, Acquires Kiva Systems, Makers of Warehouse Robot. Retrieved April 18, 2012 from Singularity Hub: http://singularityhub.com/2012/03/21/amazon-goes-robotic-acquires-kiva-systems-makers-of-the-warehouse-robot/

[13] LeSueur L. - Marketing Automation - Practical Steps to More Effective Direct Marketing (2007)

system provides the ability to assist marketers in dealing with uncertainty in decision problems. Artificial intelligence techniques are increasingly extending decision support through analysis of trends, forecasts and predictions, reduction in information overload, enabling of communication required for collaborative decisions, and allowing for up-to-date information.[14]

The main objective of the organisations is customer satisfaction. The production of goods and services should be aligned for a wholesome consumer-oriented approach. Understanding consumer behaviour aids the marketer in making appropriate decisions. Hence, decision making is dependent on marketing problem, the decision maker and the decision environment. [15]

Expert System

An Expert System is a software program that combines the knowledge of experts to solve problems through emulation of knowledge and reasoning procedures of the experts. Each expert system processes data, converts it into judgements, evaluations and opinions through reasoning, thereby advising on specialised areas of problems. An expert system in the field of marketing is MARKEX (Market Expert). These intelligent decision support systems help the marketers by acting as consultants, supporting the decision maker through various processes, specifically, the new product development process. The expert system gives uses different methods like forecasting, data analysis, multi-criteria decision making to provide a systematic analysis and select the most appropriate penetration strategy.

[14] Phillips-Wren, G., Jain, L. C., & Ichalkaranje, N. (2008). Intelligent Decision Making: An AI Approach. Spring Publishing Company.

[15] Matsatsinis, N. F., & Siskos, Y. (2002). Intelligent Support Systems for Marketing Decisions. Norwell, MA, USA: Kulwer Academic Publishers.

BRANDFRAME is another such example of a system developed to assist marketers in doing their work efficiently. This system supports a brand manager by identifying the brand's attributes, retail channels, competing brands, targets and budgets. BRANDFRAME analyses the marketing input that is fed to it and then recommendations for marketing mix instruments like lowering the price or initiating a sales promotion campaign are made.

2.4. Solving the marketing problem

With no understanding of the technology, the marketing department has a tough time figuring out how to apply a new capability. With no clear description of the problem that the marketers face, the technologists can only shrug their shoulders. There is a "cold start" problem for any technology. For AI, a lot of data is required to chew on. The machine can do what it is told to do but it needs to be told.

What keeps a marketing professional awake?

Product, place, price and promotion are old workhorses of the marketing world. That is just the start. Sending a message out into the universe and tracking its impact requires maintainence of tabs on a multitude of stages.

- Product : Does it live upto the promise? Does it provide the expected value? Quality? Image? Status?
- Price : Is the product priced intelligently for the target audience? Affordability? Value for money?
- Promotion : Promotion and advertising is not just about plastering one's brand on all empty spaces; it is about getting the right person at the right time.

- Placement : Is the product available through the right channels? Inventory control? Channel length? Ease of access of business?
- Distribution : Did the message actually go out? Timing of distribution? Alternate distribution platforms?
- Exposure : How many people actually received the message? Was the message actually displayed? Did the message cut through?
- Impression : Did the message have any impact? Did it tip the balance in the company's favour?
- Recall : Do the customers remember about the brand? Do they remember about the features of the product/service?
- Attitude Shift : Did the customers change their view about the company and its offerings?
- Response : Did the customers respond? How quickly did they respond?
- Engagement : Did the customers reach out for additional information? Did they return?
- Lead Qualification : Did the target audience respond? Were the qualified or potential buyers reached? Are they willing to purchase the offerings?
- Sales : Did sales actually take place?
- Channel : How did the customers purchase? Phone, in-house, online? Website or mobile apps?
- Profits : Did the sales lead to any positive income?
- Loyalty : Did the customers buy again?
- Customer lifetime value : Were the customers profitable in the long run? Did they become more or less profitable over time? Their reaction towards the company?
- Advocacy : Did the customers review the products/services positively/ Were they a good difference?

- Influence : Were the people around the customer influenced? Did they show interest, engage, purchase or advocate?

Marketers came up with the idea of customer journey to understand what the potential customers might be thinking at any given point of time. The prospect goes from ignorance to interest to purchase. The exciting part is matching the functional side of marketing to the reality of the journey.
Getting the right message to the right audience at the right time means knowing what the specific person might need or want to know at the moment. However, reaching people has turned into a fractured fairytale. Figuring out the method of communication to reach different segments at different phases of the buying cycle requires serious attention and robust rigour. This is especially true given the multitude the options of reaching a target.

The real problem may lie in the fact that marketers want to raise profitability by customer, product, or distribution channel in a specific time frame with minimal budget. That’s a problem that one can sink their teeth into. The real action takes place when marketers gain enough domain knowledge to tackle problems themselves instead of other people.

2.5. Use of AI to get Attention

Market research began as a means of identifying the size of the market for a new invention or service. Demographics like age, gender, education were the first tools. The national census started and companies started conducting more detailed surveys.

Over time, one could estimate whether the brand was trending up or down with the target audience or predict the success or failure of a newly launched offering.

In 2004, the AMA defined marketing research as "the function that links the consumer, customer, and public to the marketer through information—information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor marketing performance; and improve understanding of marketing as a process." AMA is now exploring ways to add artificial intelligence to the data collection process, analysis and communication of the findings. AMA CEO Russ Klein envisions a tool where AMA's research combines with all kinds of other data as a "cognitive companion for marketers."

AMA's Lucy

AMA entered into an exclusive partnership with Equals3's. They are the founders and developers of a cognitive intelligence tool, Lucy, the born of IBM's Watson. Lucy taps the artificial intelligence computing power of Watson to address common challenges across research, segmentation and media planning. AMA was selected as one of the few super users to beta test Lucy.[16] In return, AMA shared its 80 years worth of extensive library of marketing content. The abundance of data, as required by AI, will provide the users with detailed, sophisticated answers to marketing challenges.

IDC's whitepaper, 'Machine Learning Will Revolutionize Market Segmentation Practices,'[17] describes how AI can generate market segments. Machine learning collects personal profiles for different segmentation bases which are automatically

[16] www.ama.org

[17] https://www.qubit.com/research/machine-learning-revolutionizes-segmentation-practices/

generated. Dynamic market segments are grouped and prioritised according to untapped potential. It can also identify customer sets to identify new segments.

Social Media Monitoring

Creating a list of prospects who might be one's best customers is a fine old tradition. Segmenting the marketplace and customers based on sales is tested-and-true. Keeping one's finger on the pulse of public opinion is trickier, especially with so much noise being made on social media. Measuring public opinion was always about deducing from surveys and hoping that the small sample generated represents the general public. Today, individual public opinion is ripe for harvesting on Facebook, YouTube, Instagram, Twitter, WhatsApp and whatever new product review or augmented-reality platform pops up next.

- Relevancy : The first task is to figure out if the review, photo, blog or tweet is even relevant to the company. What kind of data is generating the most interest? Context is something AI is good at, given enough data. After the machine has collected the data, it weighs the different posts depending on how many people it reaches or how much attention they attract.
- Authority : Influencer marketing is gaining prominence. This is basically getting the people with influential power say something about the brand. Influence relates to a combination of how many people could have seen it or how many people actually saw it, how many people repeated, mentioned, retweeted, how many were persuaded. By identifying the desired results, the machine will find, with a clear definition of success, the influential individuals . **Amplero, an AI marketing platform** company, suggests in its report that the social connections of targeted customers influenced their consumption

even when the campaigns were not directed at them or gave them any direct benefit.[18]

- Sentiment : Customer reviews help in building credibility or simply tracking ratings. Social media is reliable for quantity of mentions. Sentiment analysis try to imitate humans. Teaching a machine to do this is serious challenge because humans agree only 80% of the time. Opinion mining is very useful for tracking the volume or tone of shared posts.

Competitive Analysis

Companies like Quid, Start-up MetaMind, acquired by Salesforce.com help the marketers in understanding the environment that their customers inhabit. MetaMind's visual recognition system gives an insight of the customer's life by looking at their photos. Salesforce Social Studio allows one to visually listen to prospects to see if the company's brand logo or the competitor's logo is present in the photos. Competitive analysis helps in product identification and evaluation of advertisement exposure, among others.

Raising Awareness

After a clear view of the marketplace, the talk around the offerings and evaluation of the competition, marketers need to send the message across. This involves making more people aware of the offerings.

Public Relations

With the multitude of publications for the public, it is impertinent that the task be automated. Tracking how much attention was garnered requires more than setting

[18] http://journals.ama.org/doi/abs/10.1509/jmr.15.0442?code=amma-site

up of a Google Alert. **Nerve Centre from Bottlenose** "continuously aggregates and analyses data across 2M+ digital and traditional data sources to construct timely, usable business insights."[19] San Francisco-based **Quid** complies and analyses massive amounts of text-based data. AirPR's Analyst product feature called **NEO** gives the "organisations powerful insights into how the media, influencers and ultimately customers are responding to and amplifying sticky messages."[20] These messages can be used to drive future marketing and PR activities, campaigns and others.

Database Marketing

Storing thousands of records with product and promotion information allowed marketers to track sales and predict potential sales. Keeping that data clean has been a major thorn in marketing's paw. Today, with so many layers of data along with additional information , only AI can sort and sift through it in a meaningful way.

Advertising

When people discovered that there was a gap between the buyer and the seller, they tried to leverage the arbitrage and that gave birth to programmatic advertising. The volatile combination of loose investment money and new attractive technology has created an explosion of start-ups.

AppNexus created a seamless feedback loop between a brand's decisioning logic and its consumer touchpoints. It combines data and machine learning to create campaigns that can learn and adapt over time. As a result, there is hyper-

[19] www.bottlenose.com

[20] BEYOND SEARCH:Introducing NEO - White Paper- Rajagopal Sathyamurthi, Patrick Liang

personalisation on a large scale where the marketers deliver targeted ads at millions of people on various platforms all over the globe.[21]

Skylads, an R&D lab specialising in the field of machine learning and artificial intelligence, leverages on fundamental mathematical research. It creates powerful and easy-to-use product suite for digital advertisers. It helps the advertisers to stay on the top for buying platforms and also helps in maximising effectiveness of programmatic media buying.[22] Skylads revolutionises the digital advertising by introducing AI as a service in the cloud.

Skott is a framework of products that are heavily based on next-gen machine learning algorithms.

IntelliAds are personalised real-time ads for individual customers. They determine the best performing ad, branding, messaging and product selections in negligible time. They help to convert customer insights into performance results.[23]

Merchenta uses behavioural analytics to get insights from seemingly different and random consumer behaviour.

Microsoft Research is using AI to look minutely at a photo and describe what is occurring in it. It started by humans writing tons of descriptions for various photos as training data. The scientists created a system to evaluate the effectiveness of the myriad of stories generated by the machine.

Content Marketing

In the content marketing movement, marketers have become publishers themselves. They have to post lots of information about the product, answer the frequently asked questions and be *the* place on the internet that Google lists on the top. **Safecont** is a

[21] https://www.appnexus.com
[22] https://www.skylads.com
[23] https://www.intelliads.com

learning algorithm which offers a crawler to review the marketer's site. It also assigns score on each page, looks at the content generation, duplication, shares and others.

Technologies that help with pictures or user-generated content includes **Curalate, Infinigraph, Somantic, Pinterest**. **Olapic** helps the user to find pictures of their product on the web that might be useful for ads or for publishing on the website. They offer **Photorank** which evaluates multiple data points to accurately forecast engagement and conversion per image/video.

Social Media Engagement

Engaging with social media includes reaching out - reactively or proactively - to engage people. eMarketer interviewed AJ Mazza, director of Marketing Communications, and Dedra DeLilli, director, Social Media Marketing and Corporate Sponsorships at TD Ameritrade, in an article in February 2017[24] about their use of AI. They developed a social media promotion with Havas Cognitive. The tone and words used by the customers in their social posts were read and evaluated.

The goal was to drive engagement by giving the users an opportunity to increase their confidence through specific actions.

Social bots

Ever since the inception of ELIZA in the mid-1960s, computers have been trying to imitate human communication. Simple email autoresponders replies on behalf of the user. Google's Smart Reply suggests a few extra options to respond with. A full-

[24] TD Ameritrade Uses Artificial Intelligence to Put a Marketing Twist on Risk Assessment," February 2017, https://www.emarketer.com/Interview/TD-Ameritrade-Uses-Artificial-Intelligence-Put-Marketing-Twist-on-Risk-Assessment/6002141.

fledged AI assistant like **Amy Ingram** is a personal assistant who schedules meetings for the user via e-mail. A mail CC'ed to amy@x.ai keeps a track of the user's schedule after consulting the calendar for free slots till a date is set.
For now, social bots are only as useful as voice response systems that have answers for most of the questions they usually get.

Social Posting

AI can help to find people, find their interests and what they do and help to communicate. AI can also help to post of the marketers behalf. **Echobox's Larry** "analyzes your historical and real-time data to create an entire social media strategy."[25] Larry tracks what's trending among social media, suggests messages to share, adds appropriate hashtags, A/B testing of headlines and images, resurfaces green content, monitor time of more activity and optimises sharing frequency.

AI is also used at face-to-face gatherings. **SummitSync** acts as a matchmaker at conferences. It finds the best matches for introductions across multiple attributes. **Ampsy** uses hyper-local geofencing to catch publically shared content at a given location at a given time. Activity is monitored with sentiment analysis and then analysed against personality traits.

2.6. Using AI to persuade

After using AI to find the elusive and prospective customers, marketers need to lead them along and persuade them to buy. According to Christopher Berry, Director of Product Intelligence at the Canadian Broadcasting Corporation, "We're talking

[25] https://www.echobox.com

about humans and they are all different. If we can find some low-level tasks that are predictive, we're ahead of the game. Machine learning is much better at that than trying to forecast behavior based on the sum total of an individual's psyche."

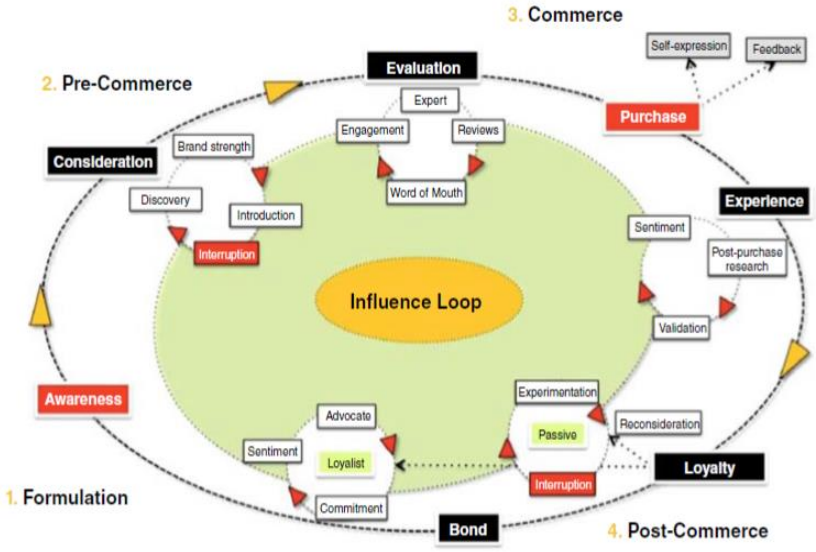

Figure 2.6 : Dynamic Customer Decision Journey[26]

Shopping Assistance

Satisfi Labs created a location-based intelligent engagement platform to capture customer intentions, sentiments, questions and the need to drive sales. Responses are real-time and can route requests to the best-suited human. The system learns when there is a direct feedback with some buttons. The location-based feature makes the answers specific and not generic. The system also learns how the same question may be asked in different ways.

Shane Mac, CEO & Co-founder of Assi.st coined **Random Access Navigation (RAN)** which gives "people the ability to navigate without a defined path, while also being able to change their mind at any time."[27] The idea of RAN has four aspects :

[26] Brian Solis
[27] "There Are a DozenWays to Order a Coffee: Why Do Dumb Bots Only Allow One?"

detect all parameters required to perform an intent, allow users to change their mind without going back, work seamlessly with web views, writing copy in different ways. Assi.st worked Sephora on an app to book makeup appointments.

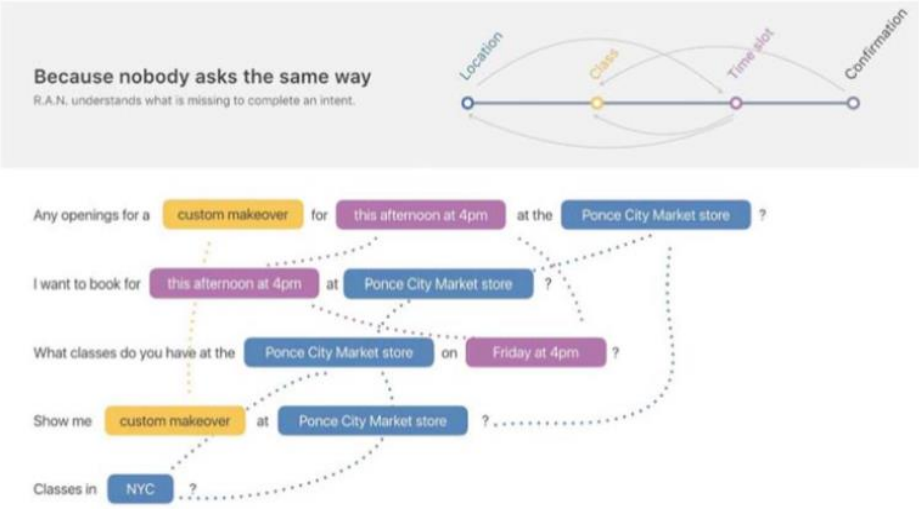

Figure 2.6.1: Mapping Contextual intelligence into an app

Restaurants

Honest Café in UK operates unmanned food kiosks to sell healthy snacks and beverages. They use AI to serve customers they can not see. Based on customer choices, time of the day, day of the week, the company discovered that people using credit cards for payments were more likely to hang out in the place.

On the Phone

Through a combination of voice-to-text, natural language processing, and machine learning, it is now possible to glean meaning from telephone calls. Invoca can correlate calls to web pages visited, keywords searched, and previous digital marketing engagements, all while the phone is still ringing. The system continuously

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https://medium.com/assist/theres-a-dozen-ways-to-order-a-coffee-why-dodumb-bots-only-allow-one-27230542636d#.umf5a6inj.

learns to score lead quality or risk to route calls to proper representatives. The system can be used to identify the caller and offer a propensity-to-buy rating, correlate outbound promotions with inbound calls, and help guide marketing expenditure, even to the point of triggering a marketing automation workflow.

Landing Page Optimisation

Customer experience is hard to monitor and manage in the wild. They might be scrolling, tweeting, watching or clicking somewhere on the web but when it comes to the marketer's website landing page, the marketer is in possession of a lot of levers to influence behaviour. Landing pages can be tested and tunes through graphics, copy, interactivity. It is a matter of A/B and multivariate testing to influence the consumer will. Making sure that the right message reaches the right person at the right time is also important in customer journey.

A/B and Multivariate Testing

A/B testing is a web manager's dream and the results are treated as the gospel. 90% of the web traffic is directed to the usual page and 10% to a variation. Then, one can see which version is better after enough people have come through to reach statistical significance.

Multivariate testing is similar but it predominantly seeks to discover which combination of elements works best. Given enough traffic, this test quickly determines the best combination for statistical significance.

Sentient Ascend uses a genetic algorithm to generate web-page candidates to be tested. Marketers come up with suggestions for changes to be implemented beyond one page to a hole site visit. Ascend then promotes the most successful idea. This approach can test millions of design faster than humans ever could but it needs to test only thousands to find which combination will be the most effective.

Onsite User Experience

Customers might resort to a call-for-action in case of complaints but it is hard to tell why they are actually unhappy. **Session** reply records each mouse movement and click to reveal what went wrong where or if the website went wrong. Human's cannot watch hours of sitefailures. SessionCam captures and analyses recorded visits to the website to highlight primary value issues using a Customer Struggle score. These areas are screened through heatmaps and funnel reports, pointing out sessions that should be reviewed by humans.

Recommendation Engines

Amazon was the pioneer in bringing the **1-Click® button**. They also popularised the online recommendation system. The collaborative cross-sell and upsell has worked well for Amazon.

The North Face created a dialog-based recommendation engine to suggest outerwear. One needs to enter a choice of jacket or the outdoor activity planned or the location one is headed to.

Personalisation

Personalising experience for anonymous visitors has always been tricky. While segmentation is useful, it is not granular. AI plays its strengths here like finding predictive attributes, making decisions based on real data and not conjecture, continuous updation of data.

Adobe Target Premium "aggregates customer data from a variety of online and offline sources, including web and app analytics, customer relationship management (CRM) databases, and internal-facing enterprise resource planning (ERP) and data warehouse (DWH) systems." Target's machine learning algorithms determine

predictive conversions and eliminates customers' profile clutter. Target's collaboration with Audience Manager means that one can leverage similar modeling to find new market segments automatically.

Godiva.com looks after "each click, site search and page view to present the most relevant products to each website visitor right away, mimicking their skilled salespeople that present options based on what a customer is looking at in the store. This luxury shopping experience has resonated with shoppers: Godiva.com conversion rates have jumped nearly 25 percent since implementing **Reflektion**."[28]

Home Shopping Network (HSN) uses **IBM's Watson** to personalise across platforms. This translates to consumer convenience and higher loyalty.

Merchandising

Rather than a static mixture of store layout and product assortment, digital merchandising is a dynamic display, moving ever closer to one-to-one, per-person persuasion. Algorithms decides which items should be on the landing page, the colour choices, incentives, the layout.

Pricing

Dynamic pricing has not been well-received by customers. Travel sites often hike prices for Mac users over PC users. Airline tickets' prices are less after deleting the cookies. Mohammad Islam, principal science consultant at Aiimi/Anglian Water created a machine learning algorithm that varies price based on the historical purchases of individual products and data-mining methods to make individual pricing decisions based on price elasticity. It is not advisable to automate dynamic

[28] http://reflektion.com/resources/godiva.

pricing and toy with people's perception of value. It is, however, advisable to use today's technology to help in setting the prices.

Market Basket Analysis

Here, online buying behaviour of the customers are judged. **Adobe Systems** took out a patent for a model of online shopping cart analysis in 2016. The likelihood of a customer coming back to the unpurchased items in the cart is built. "To build the model, historical data that describes online store interactions and attributes of unpurchased items in online shopping carts is collected for other customers that have abandoned online shopping carts. Using the model, data collected for a subsequent customer that has abandoned an online shopping cart is input and the likelihood of that customer to return to purchase unpurchased items is returned as output."[29] The likelihood generated is computed and the customers are associated with advertising segments corresponding to different marketing strategies. Marketing activities directed to the subsequent customer are thus controllable using the model.

Closing the deal

Individuals' interests wax and wane. Sometimes, the reason that the customers finally pull the trigger may have to do more with unforseeable future events rather than traversing a well-travelled customer journey. As a part of the Google Analytics suite, Google offers **Smart Goals**. Smart Goals uses machine learning to examine signals about a website session to determine which of those are more likely to result in a conversion.

[29] https://www.google.com/patents/US20160239867

Remarketing

The intent of purchase in a customer's search and behaviour triggers relentless dogs of commerce to chase them constantly. This type of advertising is becoming common because it works really well. For the people that this annoys, there are enough who make a purchase to make remarketing profitable. If the efforts do not result in a sale, Google has a **Smart Lists** for remarketing.

E-mail Marketing

E-mail is the workhorse of internet advertising. The ability to test a variety of messages, formats, pictures and others provides AI many ways to evaluate and leverage results. **Conversica** aims to help salespersons by engaging prospects through e-mail. Conversica engages in real conversations with leads and shares their actual responses instead of relying on website activity and click-through rates. It immediately alerts a sales rep when there is a potential for sales process.

Integrating with marketing automation platforms like **Marketo, Pardot, and Eloqua** is table stakes for these tools.

Boomtrain intelligently automates the content and quantity of the e-mails according to the user.Their client Chowhound claims a 28% increase in e-mail open rates and 150% click-through rates.

One of the biggest problems with turning all the data into a true cross-channel optimisation quest is the need to integrate marketing functions and operations. There are a list of companies employing machine learning to tackle this sticky-wicket :

- Amplero—Digital campaign intelligence and optimisation platform based on predictive analytics and machine learning
- Optimove—Multichannel campaign automation solution, combining predictive modeling, hypertargeting, and optimization
- Kahuna—Mobile-focused marketing automation and optimisation solution

- IgnitionOne—Digital marketing platform featuring scorebased message optimization; ability to activate across multiple channels
- BrightFunnel—Marketing analytics platform focusing on attribution modeling
- ConversionLogic—Cross-channel marketing attribution analytics platform, using a proprietary ML-based approach

Only an active machine learning system can watch and respond to so many people in such a high-dimensionality space. Companies like C3 Metrics, Visual IQ, and CUBED.ai are dedicating themselves to solving this problem.

2.7. Using AI for retention

In order to keep up with growing expectations of findability, ease of use, and great customer service, marketers must keep up with their competitors who use AI to surface desirable goods and services, anticipate customer desires, and respond quickly to customer problems.

Customer churn analysis by Vincent Granville helps to "identify and focus on higher value customers, determine what actions typically precede a lost customer or sale, and better understand what factors influence customer retention."[30]

Appuri, an AI start-up, "understand and model profitable behaviors that turn average users into power users."[31] It tracks customers, features and products of the

[30] "24 Uses of Statistical Modeling (Part II)," http://www.datasciencecentral.com/profiles/blogs/24-uses-of-statistical-modeling-part-ii.
[31] https://www.appuri.com

website and also predicts which users and account are at a risk of cancellation and why.

Gainsight allows marketers to "proactively identify signs of customer risk and collaborate cross-functionally to resolve issues."[32]

Preact's Ptero correlates customer behaviour based on potential predictive signals from different sources.

Unhappy Returns

Companies that set up their systems to sell more and more to people who buy more and more without factoring in the cost of returns are automating their own demise. Some customers generate a negative lifetime value. **Clear Returns** turns heavy-duty analytics on the problem of people returning the items they have purchased.

Customer Sentiment

Even with the numerous ways of collecting data about online customer behaviour, most companies blithely ignore one set of metrics : the customer's feelings. Asking for customers' opinions reveals why they add things to their cart. It also allows segmentation by attitude. **Foresee**, developed in 2001, taps the customer expectations, perceived quality and perceived value to customer satisfaction. They have 15 years of structured, benchmark data and 200 data analysts with domain knowledge to assess trends.

Customer Service - Call Centre Support

Rules-based systems are better suited for mass segmentation. An AI system can take into account many facts about the caller and the customer service representative.

[32] "Manage Customer Risk," http://www.gainsight.com/customer-success-products/manage-risk.

IVR systems are now using speech recognition, natural language processing and tone analysis to determine the mood of the caller. AI systems can coach a representative after each call to give instant feedback and positive reinforcement and suggestions.

Customer Service - Bots

In regular interactions with customers, bots are relegated to routine tasks. Bots are getting more personal and Siri, Alexa, Google are just a start. They use natural language processing and sentiment analysis. They can also recognise and categorise entities and can be wired for statefulness. Bots are hard at work providing valuable services, one small step at a time. Mark Zuckerberg has stated a goal of creating a working version of Jarvis from Iron Man. Amy@x.ai is a sophisticated, narrow AI. Giving Amy or Andrew access to calendar or cc'ing on the next mail involves AI in the communication. It is only a matter of time before Amy starts scheduling your sales calls, demos, and webinars. Microsoft keeps adding bots to Skype. **SkyScanner** finds cheap flights, and have **Stubhub** finds cheap event tickets. Others include **CaptionBot, Cardea, UPS Bot, Taco Bell's Tacobot.**

Saffron, a division of Intel, is testing a project using AI which mimics the randomness of connections made by the human brain. MIT's Technology Review described it as "By combining 7,000 different factors, the technology can match broad patterns of customer behavior to that of specific members, and 88 percent of the time it can correctly predict things like how certain people might next contact and what products they will be looking for when they do. Without the AI, USAA's systems were guessing right 50 percent of the time. That test is now being expanded."[33]

[33] "AI Hits the Mainstream," https://www.technologyreview.com/s/600986/ai-hitsthe-mainstream.

Artificial Intelligence Meets Marketing Reality

3.1. The AI Platform

When artificial intelligence and machine learning were first used for marketing (Netflix, Google, Facebook), there was no frothy startup bubble, no point-solution AI apps, and no large corporations offering AI Inside. They had to build it themselves. There are marketing technology firms adding AI to underpin their current offerings—some who are building AI-based systems from the ground up, and those who are building generic AI systems and inviting takeovers. This is not an exhaustive catalog of cutting-edge technologies, but it's very useful for understanding the possibilities.

IBM Watson & Salesforce
Amazon Web Services
Adobe Marketing Cloud
Slice
Resonance
Hutoma
Neurence
Etsy
DigitalGenius
Propulse Analytics
Msg.AI
Aquifi
Twiggle
Afiniti

3.2 AI-Pocalypse

Unintended Consequences

Will robots take human jobs?

3.3. The Path to The Future

Questionnaire

Knowledge of AI – likert scale 1-7

Will society benefit from increased automation

Trust autonomous cars

Jobs AI does better than humans

Biggest benefit of AI

Biggest drawback

Likely to affect daily lives

How long before AI has a noticeable impact on life

Google scholar. Science Direct.