Does Your Beer Taste Like Big Data?

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Abstract

Artificial Intelligence and Big Data has begun to influence marketing practices of all industries including beer. From generating a product from abstract ideas to fulfilling or exceeding a customer's requirement, future researchers should further examine the areas where Artificial Intelligence could play a major role. Building on case studies, this body of knowledge could be further expanded to integrate different subsets of marketing management. Craft beer is but one product which Artificial Intelligence could revolutionize customer-product relationship, yet there are many other products which could benefit from Artificial Intelligence intervention. For those who are willing to take that challenge this study would be a starting point.

Keywords: Artificial Intelligence, Advanced Analytics, Big Data, cognitive analytics

1. INTRODUCTION

The marketing industry is one of the constantly evolving industries due to emerging disruptive technologies. In the last decade, digital technology has reinvented the marketing industry along with several new platforms which redefined the way the industry looks at its customers (Bowers & Brereton, 2016). Today, with the excessive growth of data, marketers are both blessed and burdened at the same time. With 2.5 exabytes of data created every day and 90% of today's data being created in the last two years alone, the cost of not knowing your customer better could be very high (Nobel Prize, 2016). *As The Rime of the Ancient Mariner* –'water water everywhere, not a drop to drink' ("The Rime of the Ancient Mariner (text of 1834)", nod), today's marketers live in a pool of data, yet are deprived of answers too many problems. On the other hand, exponential growth of data presents greater complexity as the majority of this data is available in unstructured form. The mere volume and complexity of available data, make it difficult to use the same to create actionable outcomes (Nobel Prize, 2016). New trends such as changes in handling and management of vast big data, advance predictive analytics and a shift from social media aggregation to social media integration and analytics are paving the way for the next game changer in the industry (Bowers & Brereton, 2016).

Even though it is still at the early stage, Artificial Intelligence (AI) is potentially the next disruptive change in the marketing industry. From segmentation to positioning, AI could play a major role in this digital era, where social

networks could provide rich data platforms about customer's needs and desires. Due to the fact that commercial applications of AI in all spheres of marketing are yet in their early stages of development, the number of research articles written on the subject is somewhat limited. Although there are some fragmented case studies written on different aspects of marketing, this area is yet to be fully explored. This article seeks to examine three such case studies which use artificial intelligence in three different contexts. Respectively, the three case studies explore the application of AI in developing a physical product from abstract ideas, improving a product which is at its early stage from customer feedback and creating a crowd pulling experience. Even though there could be similar cases as in case two, case one and three could be somewhat rare. The other special aspect of this study is that all three cases have a common product – craft beer. This product alone has a special bearing on the study. That is, this particular product with its special attributes (which will be described later in this article) sets the stage to elaborate the innovative use of AI.

Per the structure this article dedicates the first few chapters to set the contextual framework of AI. In the following chapters, the article emphasizes the interrelation of market (predominantly millennials) product (craft beer) and technology (AI). Thereafter each case study contains a description about methodology, tools and applications of AI.

The objective of this study is to show and emphasize the use of AI in multiple contexts and in innovative ways in marketing. This application shouldn't be limited to craft beer; this should be taken as an example of the application of AI for other products which share attributes such as high personal opinion and psychographic factors which are common to craft beer.

History of AI and Contextual Framework

Every turn of a century typically presents humans a new kind of awareness and capabilities to expand their scope of wellbeing. Likewise, the twentieth century gave rise to the era of computing, creating a paradigm shift in how things were done by people. As a result, today we live in a world where technology grows at an exponential rate and humans and machines work hand in hand. As many believe, we are now in the era of the next generation of computers-computers that can think and reason as their human counterparts (Nobel Prize, 2016).

Artificial intelligence (AI) which gained popularity due to Hollywood's intervention has been a controversial theme in the future of computing. Portrayed from hero to villain this could be one of the most misunderstood concepts of human - machine interaction (Kelly, n.d). The term artificial intelligent was first introduced when a young assistant professor of mathematics J. McCarthy in 1955 (McCarthy, Minsky, Rochester & Shannon, 1955; Press, 2016)**.** That historical proposal outlined some of the aspects of artificial intelligence and provided the basic framework for intellectual dialogue and further study. Even though this could be taken as one of the earliest popular studies with the name "Artificial Intelligence" appearing on it, this provides a broad context of the subject stating that "Artificial Intelligence problem is taken to be that of making a machine behave in ways that would be called intelligent if a human were so behaving**"** (McCarthy, Minsky, Rochester & Shannon, 1955)**.** Ever since, AI has been there for a while and later on the industry found a new buzz word "cognitive computing". Even though both these terms appear frequently in academic writing, AI remains the most commonly used term.

AI is defined in many ways. According to the IBM White Paper authored by Kelly, "Cognitive computing refers to systems that learn at scale, reason with purpose and interact with humans naturally" (Kelly, n.d. p.2). Rather than being explicitly programmed, those systems learn and reason from their interactions with humans and from their experiences with their environment. A cognitive system works like a human brain by analyzing the context of all types of data both structured and unstructured data in the form of text, video, image, voice and sensors (Kelly, n.d). To get an idea of a cognitive system one should know how it works.

How Does a Cognitive System Work?

A cognitive system works based on three principals. First and foremost a cognitive system is able to learn by leveraging data. By leveraging data, it makes inferences about a domain, a topic, a person or an issue based on the training and observations of all varieties of data. This is a similar kind of learning that a human does. Secondly, it creates models. Those models represent the domain consisting of internal and external data and assumptions. The key to success of a cognitive system is its ability to understand how well the context falls within the model. Finally, it generates a hypothesis. A cognitive system is probabilistic, as it deals with probability and therefore assumes there is no single correct answer for a question. A cognitive system also uses its data to train, test or evaluate

a hypothesis (Hurwitz, Kaufman, & Bowles, 2015).

How Does a Cognitive System differ From Earlier Systems?

A cognitive system differs from its earlier systems in many ways. First, it learns from its experience and improves its own knowledge without having to be explicitly programmed. This is what the human brain does. When presented with a problem it comes up with an answer with a certain level of confidence. This takes a similar approach as does confidence intervals in probability. AI could also recognize patterns within data, without having to be given guidelines. The most important difference of the system is that it imitates processes or structures found in natural learning systems such as memory management, knowledge organization processes, or modeling the neuro-synaptic brain structures and processes. This is a complicated process which earlier systems couldn't imitate (Hurwitz, Kaufman, & Bowles, 2015).

Development of IBM Watson

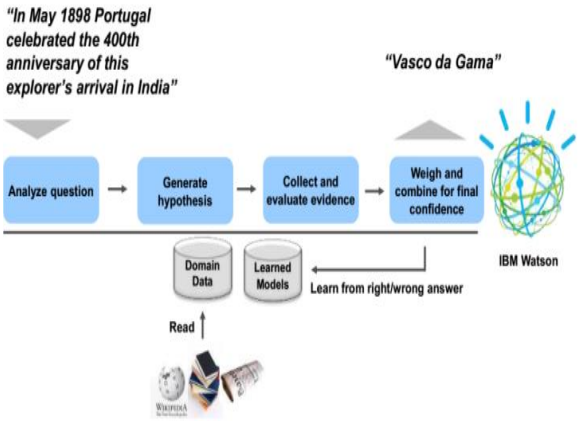
Cognitive systems gained popular acceptance when Watson, IBM's cognitive computing system, defeated Ken Jennings and Brad Rutter at the popular game 'Jeopardy' (Best, nod).

In the mid 2000 IBM was looking out for its next grand challenge when Charles Lickel, EVP of IBM software group, accidently came up with the idea of a 'quiz winning machine', while having dinner with a few of his friends. After watching Ken Jennings win once again that night, and still hold the longest unbeaten run on Jeopardy with 74 undefeated appearances, Lickel was inspired to launch his mission (Best, nod).

Watson's success at Jeopardy was the result of years of scientific research in AI and natural language processing (Kelly, John, & Hamm, 2013). As per the format of the game, Watson was required to make sense of messy unstructured data and answer subtle, complex, multi domain questions with confidence. That was the real challenge.

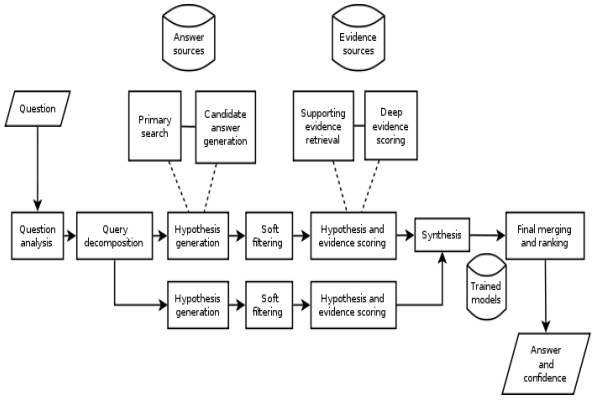
Jeopardy challenge enabled IBM researchers develop DeepQA architecture for Watson. After several failures and improvements, the team was the able to develop this parallel probabilistic evidence-based architecture. For the game, they used more than 100 different techniques of analyzing natural language, identifying sources, finding and generating hypotheses, finding and scoring evidence, and merging and ranking hypotheses. The important aspect of this whole exercise was that the IBM team was able to connect the dots using the integration of varying techniques.

Figure 1. DeepQA High-Level Architecture



This led to the tremendous improvement of accuracy, confidence, and speed. For anyone who is interested in knowing how cognitive computing works DeepQA architecture provides a better understanding about the underlying process. The figures below show DeepQA high level architecture and a diagrammatic example of how Watson works ("The AI behind the Watson-The technical article", nod).

Figure 2. How Does Watson Work?



As per figures 1 and 2 the DeepQA application process consists of multiple stages. As per the IBM research article "Building Watson: An Overview of the DeepQA Project", the process starts with content acquisition. In this step, possible questions are identified and possible answers are mined from multiple sources such as prior research, dictionaries, encyclopedias, newsletters and so on. At content acquisition, analyzing possible example questions tend to be a manual task while domain analysis could be

statistical or automated. When Watson is asked a question, it first analyses it. It classifies the question on the basis of whether it is a math question, a puzzle, or a definition question. Further, it tries to find relations within the entities of the question. It also tries to simplify the process by decomposing the question to smaller sub units ("The AI behind Watson-The technical article", nod).

Next, it generates hypotheses. At the hypothesis generation stage the system produces possible answers according to the outcome of the question analysis. In primary search, it searches its sources for the potential answer bearing content and also for conflicting or appealing evidence to improve its accuracy. Then at the candidate answer generation stage, it develops many answers. Thereafter, those answers are sent through a process called "soft filtering" which reduces the number of possible answers. The selected answers then go through a detailed evaluation stage which collects further evidence to support or refute the hypothesis. At the final merging and ranking the system tries to find the best, robust hypothesis and establishes the level of confidence for that particular answer ("The AI behind the Watson-The technical article", nod).

Even though all the above processes called for many hours of tremendous scientific research Watson's appearance in Jeopardy marked a turning point in history. Since then, Watson's come a long way and has started revolutionizing multiple disciplines such as healthcare, retailing and banking. The technology sectors interest in cognitive computing has boomed significantly over the last couple of years. Just about every player in the sector - network companies, semiconductor manufacturers, IT providers, software players and cloud players - all try to carve a chunk out of this newly formed cognitive market (Pereira, Schatsky, Sallomi, & Dalton 2015). The race to invest in artificial intelligence has been described as the "latest Silicon Valley arms race" (Pereira, Schatsky, Sallomi, & Dalton 2015). Since 2012, there have been 100 mergers and acquisitions (M&A) within the technology sector involving cognitive technology companies, products, and services (Pereira, Schatsky, Sallomi,& Dalton2015). In the midst of all these initiatives, it would be unfair not to mention similar other platforms such as Microsoft Cortana and Amazons Alexa. Yet IBM Watson stands strong due to its capabilities and privileges such as access to compelling unstructured data sets .Further it acts as the hub for many IOT solutions specialized for industries such as automobile, Insurance and electronics.

2. RELEVANCE OF AI IN CURRENT MARKETING INDUSTRY

Emergence of cognitive computing, machine learning and artificial intelligence means that customers will have a different experience and a deeper level of engagement with the product. For example, today when a customer wants to buy a product online or read about one he or she has to basically click on the link to get to what they want on the internet. In an interview Caroline Ong, Cognitive and Analytics Lead for Global Business Services, IBM Canada stated that "In the future – because we now have the ability to have natural language dialogue with our web and mobile applications through chat or speech recognition – it means customers could be guided through a type of conversation that is human-like in natural language. Here the customer will be able to ask questions and get the answers in a chat form and it will point you to the right information instead of having to make numerous clicks through the web pages" ("6 Questions on the impact of artificial Intelligence on the Marketing industry," 2016). This is just one example. For someone who wishes to exploit the use of unstructured data content in social media in the context of knowing what the customer needs, it is best to focus on a product which enhances the social involvement.

The Marketing industry is currently experiencing some major trends in a few of the customer segments. "Millennials", the current generation aged between 18 and 34, are stealing the lime light as lot of businesses have begun to cater to this unique market. According to a Nielsen's report, millennials make up for one fourth of the world's population which is 1.7 billion. Millennials are considered to have unique trends which differentiate them from other segments. Their buying behavior is different and they are tech-savvy and well informed. They typically identify themselves with the brands they purchase and also like to interact with the same. According to Neilsen's report, this generation is fully immersed in their digital and physical lives. They want their voices to be heard and they endorse transparency. They are social and share their product experience in social media such as Facebook, Snapchat and Twitter. Millennials are also a demanding generation that wants a more balanced, healthy lifestyle, and they want to be more informed about companies, their products and their business practices. They also expect products to do more for them and their communities ("The keys to unlocking the millennial mindset", 2016). Due to their high interaction in digital space, conventional marketing research techniques has its limitations

when it comes to capturing the consumer responses embedded in varying forms of digital media such as of Facebook messages, Snapchat or blogs. Monitoring these social media channels are increasingly challenging and gauging the perception in the proper context is even harder. On the other hand, social media is a powerful channel to develop or tarnish a brand image. This means if the businesses aren't prudent to measure and evaluate this level of unstructured data they could fail to see the real market picture. Millennials are the biggest users of social media. Therefore, the cognitive platform is the best tool to serve this emerging trend as it could analyze the unstructured data more efficiently than the conventional systems.

Millennials and Craft Beer

When discussing the application of AI in the marketing industry, it needs to consider two key aspects of marketing – the consumer and the product – to understand the application in context. The product and the consumer should complement each other. Generally, any product could be complimented by its customer because they purchase it due to some need or a desire. The point is craft beer and millennials have unique attributes which complement each other, perhaps beyond the basic relationship such as a housewife and a detergent have. To elaborate, detergent does the laundry – fulfill the need of the housewife - but it doesn't define the housewife, her likings and her personality. So, there is a lesser chance that the busy housewife would go online and right a review on the product's blog, 'like it' on the Facebook or share her laundry experience with her friend on Snapchat. On the other hand, the detergent that a housewife buys could always be the same. So therefore 'daily laundry' doesn't create a new 'excitement', which is worth sharing with friends on Snapchat or make her go online and comment on a product's webpage. Therefore, the interaction with the product is virtually one-way.

The relationship between millennials and craft beer is different in this context. As millennials like to build their own identity, they prefer not to go with the masses and say that they like main stream brands such as Bud Light, instead they like craft beer. As they are well informed and curious, they love to know about the beer they drink, new brewing processes and discuss its flavor and character (Bryant, 2015). They like variety. As this social group of people gather in the pub, they talk about the various flavors and its brewing process, which is very unlikely with mainstream brands of beer. They take photos with their friends holding their beers aloft and post photos and comments on social media. This kind of free advertising can't be measured through conventional marketing research. Further, they interact with brewers, comment and give feedback on social media. Therefore, millennials mostly feed the vast majority of data in unstructured form on multiple platforms. This is where the link between AI, millennials, and craft beer is made.

Case 1: World's First Beet Brewed by Data-Creating a Physical Product from Abstract Ideas

Havas helia, an international marketing consultation firm in UK came up with an idea to brew the world's first beer brewed by data. Acclaimed as a breakthrough by the centuries' old brewing industry, this effort spurred the interest of a data savvy generation and beer enthusiasts. The beauty of this story is that Havas helia used data, creativity, and technology to interpret something abstract and turn it into something physical: a beer that lets people drink-in the positive emotions of the New Year! (Havashelia, 2016). The team's approach was both unique and creative (Havashelia, 2016).

The first step of brewing data was to analyze thousands of New Year related messages on social media i.e. Twitter and Facebook. The team started its venture by pulling emotional keywords associated with the start of the New Year from social media and scoring thousands of messages against a set of 24 predefined emotional states (known as the Adoreboard methodology) ("Brewed by data", 2016; Havas helia, 2016). Adoreboard is an innovative platform that measures how consumers feel about a brand. It uses algorithms to analyze text and reflect on how people communicate in everyday life. To achieve this, it applies an approach known as common sense reasoning. This creates an evolving knowledge graph, connecting facts about the world to the emotions they commonly evoke. So, feelings such as love, hate, anger, surprise, annoyance and trust can be identified and compared in context. This technology takes the latest research from psychology, namely that the "message is just a tiny reference to a vast and presumed shared meaning." ("How it works", nod). Its common-sense knowledge graph provides that shared meaning allowing them to pick up hidden but implied emotion in text like "I'm eating my birthday cake at Windrush Cafe" ("How it works", nod), since they infer that birthday cake is 'commonly' associated with ecstasy. The providers of this platform have combined extensive research in psychology and AI to

map relatively complex human emotions ("How it works", nod).

Scoring the messages against the Adoreboard created 38 separate emotions with a clear tie to New Year, ranging from optimism and excitement and resolutions to joy and dread. Then the agency used IBM's Watson program Alchemy to analyze 2800 beer recipes, pulling out the frequency of ingredients, their recipes and tasting notes – and how people reviewed the beers ("Brewed by data",2016).

Alchemy language offers advance text analysis and it could be used to monitor social media for trends and public opinion. It also helps the users understand topics mentioned in text using tools such as key word extraction, context tagging and taxonomy classification. With entity extraction, it can extract people, places and organizations mentioned in the text. It could also track the sentiment people express towards a specific entity, key word or a phase. Further, a step ahead it can use sentiment analysis to derive emotional analysis about what people write. This is quite useful in situations where, just knowing whether the text is positive or negative is just not going to be enough ("AlchemyLanguage overview", nod).

As per the next stage, the agency used Watson Personality Insights to analyze each recipe and characterize it according to values, needs and emotional states – essentially profiling each beer as assertive, friendly, intelligent, and so on. Watson's Personality Insights software is a cognitive tool. Instead of guessing to predict someone's personality, it uses test groups of individuals, who's personalities, have been established and related to their writing samples according to what they wrote, certain words they use and the structure it was written. Using the test group results along with machine learning, Personality Insight tool tries to determine the personality type of the particular person, who is being tested, according to that person's writing (IBM research,2016). The same analogy was used to decide "beer personalities". ("Brewed by data", 2016).

They then correlated the frequency of ingredients against corresponding emotional scores for the beers, identifying the flavors most commonly associated with the New Year ("Brewed by data", 2016).

The team decided that the "beer that tastes like New Year optimism should contain honey, Nelson Sauvin and Hallertauer: honey for love and cheerfulness - Nelson Sauvin for optimism, imagination and resolution - and Hallertauer for excitement and emotion" ("Brewed by data", 2016).

According to their research the most frequently occurring personality attribute of 2800 recipes of beer were 'imaginative' and 'intellect' ("Brewed by data", 2016). These attributes are quite close to the millennials. The case points out an important aspect. According to Joe Harrod, global client partner at Havas helia "creativity will migrate further toward data to influence the way we use it, while data will migrate toward creativity to find the cultural points that touch emotions. Which means that both creative and data scientists will need to start thinking differently" ("Brewed by data", 2016).

Finally, the actual physical product - the fine tasting cream ale - was brewed at an expert independent micro-brewery called High Peak Brew Co. in Peak district UK. Havas helia selected this brewery because their products are 'unfinned' and unfiltered so that they could get closer to the actual data brewed beer. The cream ale consisted of 10 ingredients: "Nelson Sauvin – correlates to 'Imagination' , Citra – correlates to 'Intellect' (a citrus flavor), Honey – correlates to cheerful, agreeable and harmonious (and it's a common flavor), A variety of hops called Galaxy – correlates to 'Curiosity' (an Australian circus/fruit flavor), Corn sugar – correlates to 'Love', Styriangoldings – correlates to 'Hedonism' (a mild, but bitter hops), Hallertaur – correlates to 'excitement seeking' (a very commonly used hops with a bitter taste), Yeast – correlates to 'altruism'" (Havashelia, 2016) . The limited edition carried only 500 bottles (Havashelia, 2016).

Case 2: World's First beet brewed by AI-Product Improvement with Customer's Feedback

UK based startup InteligentX Brewing Company claims to be the world's first firm to brew beer with the help of artificial intelligence (Cuthbertson & Chapelle, 2016). Awarded the 7 greatest software innovations of the year awarded in 2016 by the Popular Science magazine, IntelligentX Brewing Company is a collaborative effort between machine learning company Intelligent Layer and creative agency 10x (Gershgorn & Kratochwill, 2016; Steele, 2016). The company was co-founded by Rob McInerney, who recently completed a PhD in machine learning at Oxford University. This micro-brewery produces four styles of craft beer under AI label: Golden, Amber, Pale and Dark.

The brewery is still in its infancy and the recipes are constantly evolving with customers' feedback (Cuthbertson & Chapelle, 2016).

IntelligentX's approach to brewing is somewhat different. IntelligentX takes all the choices, ingredients and brewing methods into a data structure that AI understands. They start with working closely with the brewers so that they can encode a brewer's intuition to their algorithms ("IntelligentX: The world's first beer brewed by AI", nod). This gives them a great platform to build upon. The system also has a bank of wildcard ingredients to push the limits of craft brewing. Once their beer, 'AI ABI' is out on the shelves, their customers can give feedback. The name ABI comes from the algorithm which the system uses called Automated Brewing Intelligence (ABI). The overall idea of the algorithm is to be churning out beer recipes (that they eventually make) and to collect feedback of those recipes from professional brewers, tasting panels and customers (Newsweek Europe, 2016). Each bottle of beer comes with a code on the bottom. When the consumer types this on his or her phone it opens up Facebook messenger. Then the Facebook messenger-bot asks serious questions from the customers about the beer that they just tasted. For example, it could ask questions such as "whether they want the beer to be more or less hoppy?" (Reptly TV, 2016). The questions are differently structured with 1 to 10 rating, yes or no questions and multiple-choice answers. Those answers about taste and preferences are then integrated into the algorithm which gives the brewer feedback on what changes he must make in the recipe for the next batch. The algorithm also 'talks' to many different brewers, tasting panels and beer experts when they come up with a recommendation (Reptly TV, 2016; Steele, 2016). This enables brewers to do something immediately as they are producing beer in small batches.

Though there is a tremendous demand for this new product, the firm has a long way to go. The co-founders vision clearly states the potential future of AI in the field of marketing and customer interaction. Rob McInerney states that "We are doing something exciting. Really the message that we are getting here is moving products away from being forced on people so that all the money and energy spent on advertising to try and convince people to drink it can be saved. So, what AI is really allowing us to do here is to have a real conversation with our customers and actually allow their feedback not just to determine which adverts we show them, but also to show what product they are getting and how that changes". They believe that beer is just the start of how we could use machine learning to improve physical products (Newsweek Europe, 2016).

Case 3: IBM Beer Tasting experiment at SXSW- Creating a Crowd Pulling Experience

IBM's Mobile innovation lab and design studio ventured in to creating a fun and memorable experience at SXSW (South by Southwest) – a most sought after annual conglomerate of film, interactive media, and music festivals and conferences that takes place in mid-March in Austin, Texas. As an attempt to show IBM's relevance to millennials, they came up with an idea to run a beer tasting boutique to draw crowds in ("SXSW Beer Tasting Experience," nod).

Trying to bring a bit of a local flavor and an element which is closer to locals' hearts IBM's team decided to use craft beer as a crowd puller. The experiment at SXSW, started with IBM Watson asking the visitor three usual questions about their food preferences: "which is your favorite beer?", "when do you enjoy a beer the most" and "which dessert would you prefer?" As per the seed data the IBM team has used results from an internal survey of IBM which asked 20 questions, which is predictive of what beer the participants would like. The questionnaire also asked the beer preference of each participant. Their sample set consisted of 500 people. After collecting their research data, the team ran some machine learning algorithms to figure out which questions are most predictive. The three questions they asked at SXSW was a result of that selection (developerWorks TV, 2016).

At the venue, when the visitors came to the booth the three questions were asked. Then the algorithm selects three beers for the visitor (according to their answers for the three questions) and the visitor blind-tastes the beers and ranks them on a scale of 1-5. As the final reveal, the name and details of the top beers are unveiled to the visitor along with similar local craft brews they may like. In this experiment the IBM team used k-nearest neighbor's algorithm to classify the visitor to one of the groups (developerWorks TV, 2016). Watson used confidence level approach for its recommendations. In the meantime, the visitors' rankings were automatically captured so that it could provide a feedback to Watson to improve its recommendations over time ("SXSW Beer Tasting Experience," nod).

Challenges for AI- Is AI a Threat or an Opportunity?

Even though AI signifies a remarkable step in technology, it is not always favored by the academic community. World renowned British physicist Stephen Hawking warns that AI could develop to an extent that they could evolve by themselves, without human intervention. According to him, at that point humans may not have control over them and they could act on conflicting interests, posing a threat to humanity (Beall, 2016).

Although AI could be used for the benefit of the marketing community, not all marketers buy in to this idea. Some are wary about the technology due to a few reasons. Given that AI could identify human emotions such as anger and disappointment, the marketers fear that it will eventually steal their jobs. This has a basis as if a machine could do what a person does, at a much faster rate and a higher accuracy, this could make the human input obsolete. On the other hand, some marketers' feel it is a too complicated a system to understand and try to avoid it claiming it is 'too novel'. Up to a certain extent, there is a practical aspect which fuels this. For example, AI needs expertise and the organization may not have a proper IT structure or personnel to implement an AI based platform. On the other hand, it could also be a costly affair and organic development of such system takes time and needs experienced personnel *(O'Brien, 2016).* However, the reality is, sooner or later the marketers will have to adopt this technology, whether they like it or not. With the massive influx of social media content, marketers need ways and means to capture the sentiments embedded in those expressions to know the customer engagement. As pointed out earlier due to volume and velocity, it is humanly impossible to capture the same otherwise.

6. CONCLUSION

According to the case studies mentioned earlier in this article, it is quite evident that AI could redefine the boundaries of the marketing industry. From generating a product from abstract ideas to fulfilling or exceeding a customer's requirement, future researchers should further examine the areas where AI could play a major role. Building on similar fragmented case studies, this body of knowledge could be further expanded to integrate different subsets of marketing management. Craft beer is but one product which AI could revolutionize customer - product relationship, yet there are many other products which could benefit from AI intervention. For those who are willing to take that challenge this study would be a starting point.

Even though the industry seems to start embracing AI, the rapidly evolving data environment calls for quick adaptation. The key players should take all necessary action to create awareness and ensure marketers that AI is a tool that assists them to perform better, but not a tool that threatens their existence. To overcome the high costs of implementing such systems in marketing, as a pioneer of technology, IBM should further develop their capabilities and enhance cloud-based AI applications for its clients. While everybody has to play their role to reap the fullest potential of this amazing technology, for marketers this is the best time to shine!

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