ARTIFICIAL INTELLIGENCE FOR MARKETING

PRACTICAL APPLICATIONS

Jim Sterne

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Artificial Intelligence for Marketing

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Practical Applications

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This book is dedicated to Colleen.

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Foreword

Thomas H. Davenport

Distinguished Professor, Babson College and Research Fellow, MIT
Author of Competing on Analytics and Only Humans Need Apply

Forewords to books can play a variety of roles. One is to describe in more general terms what the book is about. That's not really necessary, since Jim Sterne is a master at communicating complex topics in relatively simple terms.

Another common purpose is to describe how the book fits into the broader literature on the topic. That doesn't seem necessary in this case, either, since there isn't much literature on artificial intelligence (AI) for marketing, and even if there were, you've probably turned to this book to get one easy-to-consume source.

A third possible objective for forewords is to persuade you of the importance and relevance of the book, with the short-term goal of having you actually buy it or read onward if you already bought it. I'll adopt that goal, and provide external testimony that AI already is important to marketing, that it will become much more so in the future, and that any good marketing executive needs to know what it can do.

It's not that difficult to argue that marketing in the future will make increasing use of AI. Even today, the components of an AI-based approach are largely in place. Contemporary marketing is increasingly quantitative, targeted, and tied to business outcomes. Ads and promotions are increasingly customized to individual consumers in real time. Companies employ multiple channels to get to customers, but all of them increasingly employ digital content. Company marketers still work with agencies, many of which have developed analytical capabilities of their own.

As Sterne points out, data is the primary asset for AI-based marketing approaches. Data for marketing comes from a company's own systems, agencies, third-party syndicators, customer online behaviors, and many other sources—and certainly comprises "big data" in the aggregate. About 25 percent of today's marketing budgets are devoted to digital channels, and almost 80 percent of marketing organizations make technology-oriented capital expenditures—typically hardware and software—according to a recent Gartner survey. Clearly some of that capital will be spent on AI.

Companies still try to maintain a consistent brand image, but the annual marketing strategy is increasingly a relic of the past. Instead of making a few major decisions each year, companies or their agencies make literally thousands of real-time decisions a day about which ads to run on which sites, which search terms to buy, which version of a website to adopt, and so forth. Even the choice of what service providers and marketing software vendors to work with is complex enough to deserve a decision-making algorithm.

Already there are simply too many decisions involving too many complex variables and too much data for humans to make all of them. Marketing activities and decisions are increasing far more rapidly than marketing budgets or the numbers and capabilities of human marketers. An increasing number of marketing decisions employ some sort of AI, and this trend will only increase.

Companies are typically trying to define and target specific customers or segments, and if there are thousands or millions of customers, AI is needed to get to that level of detail. Companies also want to customize the experience of the customer, and that also requires machine learning or some other form of AI. AI can also help to deliver value across omnichannel customer relationships, and to ensure effective communications at all customer touchpoints. Finally, AI can help companies make decisions with similar criteria across the digital and analog marketing worlds.

Today, AI in marketing supports only certain kinds of decisions. They are typically repetitive decisions based on data, and each decision has low monetary value (though in total they add up to large numbers). AI-based decisions today primarily involve digital content and channels or online promotions. Of course, almost all content is becoming digitized, so it makes for a pretty big category. This set of AI-supported activities includes digital advertising buys (called *programmatic buying*), website operation and optimization, search engine optimization, A/B testing, outbound e-mail marketing, lead filtering and scoring, and many other marketing tasks.

And it seems highly likely that this list will continue to grow. Television advertising—the mainstay of large companies' marketing activities for many years—is moving toward a programmatic buying model. Creative brand development activities are still largely done by humans, but the decisions about which images and copy will be adopted are now sometimes made through AI-based testing. High-level decisions about marketing mix and resource allocation are still ultimately made by marketing executives, but they are usually done with software and are often performed more frequently than annually.

It would not surprise me to see tasks such as selecting agency partners and making employee hiring decisions made through the use of AI in the future.

These AI-based marketing activities have yet to displace large numbers of human marketers, in part because AI supports individual tasks, rather than entire jobs. But they are likely to have a substantial impact on marketing roles in the future. At a minimum, most marketers will need to understand how these systems work, to identify whether they are doing a good job, and to determine how they can add value to the work of smart machines. Leaders of marketing organizations will need to strategize effectively about the division of labor between humans and machines. They'll have to redesign marketing processes to take advantage of the speed and precision that AI-based decision making offers.

In short, we face a marketing future in which artificial intelligence will play a very important role. I hope that these introductory comments have provided you with the motivation to commit to this book—to buying it, to reading it, and to putting its ideas to work within your organization. I believe there is a bright future for human marketers, but only if they take the initiative to learn about AI and how it can affect and improve their work. This book is the easiest and best way you will find to achieve that objective.

Preface

If you're in marketing, AI is a powerful ally.
If you're in data science, marketing is a rich problem set.

> *Artificial Intelligence (AI) had a breakthrough year in 2016, not only with machine learning, but with public awareness as well. And it's only going to continue. This year, most marketers believe consumers are ready for the technology.*
>
> "*Artificial Intelligence Roundup," eMarketer, February 2017*

AI IN A NUTSHELL

Artificial intelligence (AI) is the next, logical step in computing: a program that can figure out things for itself. It's a program that can reprogram itself.

The Three *D*s of Artificial Intelligence

The shorthand for remembering what's special about AI is that it can *detect*, *deliberate*, and *develop*—all on its own.

Detect

Artificial intelligence can discover which elements or attributes in a bunch of data are the most predictive. Even when there is a massive amount of data made up of lots of different *kinds* of data, AI can identify the most revealing characteristics, figuring out which to pay attention to and which to ignore.

Deliberate

AI can infer rules about the data, *from* that data, and weigh the most predictive attributes against each other to answer a question or make a recommendation. It can ponder the relevance of each and reach a conclusion.

Develop

AI can grow and mature with each iteration. It can alter its opinion about the environment as well as how it evaluates that environment based on new information or the results of experimentation. It can program itself.

An individual's search terms are more important than her location, which is more important than her age (detect). When people use six or more words in a search, their propensity to purchase is so high that a discount is counterproductive (deliberate). Once it is noted that women under the age of 24 are not likely to purchase, regardless of words in a search, an experiment can be run to offer them free shipping (develop).

THIS IS YOUR MARKETING ON AI

The tools are not supernatural. They are not beyond the understanding of mortals. You owe it to yourself to understand how they are about to rock your world.

> *Intelligence is the ability to adapt to change.*
>
> —*Stephen Hawking*

The companion website for *Artificial Intelligence for Marketing: Practical Applications* can be found at: AI4Marketing.com.

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And, as always, Matt Cutler.

Artificial Intelligence for Marketing

CHAPTER 1

Welcome to the Future

The shovel is a tool, and so is a bulldozer. Neither works on its own, "automating" the task of digging. But both tools augment our ability to dig.

Dr. Douglas Engelbart, "Improving Our Ability to Improve"[1]

Marketing is about to get weird. We've become used to an ever-increasing rate of change. But occasionally, we have to catch our breath, take a new sighting, and reset our course.

Between the time my grandfather was born in 1899 and his seventh birthday:

- Theodore Roosevelt took over as president from William McKinley.
- Dr. Henry A. Rowland of Johns Hopkins University announced a theory about the cause of the Earth's magnetism.
- L. Frank Baum's *The Wonderful Wizard of Oz* was published in Chicago.
- The first zeppelin flight was carried out over Lake Constance near Friedrichshafen, Germany.
- Karl Landsteiner developed a system of blood typing.

- The Ford Motor Company produced its first car—the Ford Model A.
- Thomas Edison invented the nickel-alkaline storage battery.
- The first electric typewriter was invented by George Canfield Blickensderfer of Erie, Pennsylvania.
- The first radio that successfully received a radio transmission was developed by Guglielmo Marconi.
- The Wright brothers flew at Kitty Hawk.
- The Panama Canal was under construction.
- Benjamin Holt invented one of the first practical continuous tracks for use in tractors and tanks.
- The Victor Talking Machine Company released the Victrola.
- The Autochrome Lumière, patented in 1903, became the first commercial color photography process.

My grandfather then lived to see men walk on the moon.

In the next few decades, we will see:

- Self-driving cars replace personally owned transportation.
- Doctors routinely operate remote, robotic surgery devices.
- Implantable communication devices replace mobile phones.
- In-eye augmented reality become normalized.
- Maglev elevators travel sideways and transform building shapes.
- Every surface consume light for energy and act as a display.
- Mind-controlled prosthetics with tactile skin interfaces become mainstream.
- Quantum computing make today's systems microscopic.
- 3-D printers allow for instant delivery of goods.
- Style-selective, nanotech clothing continuously clean itself.

And today's youngsters will live to see a colony on Mars.

It's no surprise that computational systems will manage more tasks in advertising and marketing. Yes, we have lots of technology for marketing, but the next step into artificial intelligence and machine learning will be different. Rather than being an ever-larger confusion of rules-based programs, operating faster than the eye can see, AI systems will operate more inscrutably than the human mind can fathom.

WELCOME TO AUTONOMIC MARKETING

The autonomic nervous system controls everything you don't have to think about: your heart, your breathing, your digestion. All of these things can happen while you're asleep or unconscious. These tasks are complex, interrelated, and vital. They are so necessary they must function continuously without the need for deliberate thought.

That's where marketing is headed. We are on the verge of the need for autonomic responses just to stay afloat. Personalization, recommendations, dynamic content selection, and dynamic display styles are all going to be table stakes.

The technologies seeing the light of day in the second decade of the twenty-first century will be made available as services and any company *not* using them will suffer the same fate as those that decided not to avail themselves of word processing, database management, or Internet marketing. And so, it's time to open up that black box full of mumbo-jumbo called artificial intelligence and understand it just well enough to make the most of it for marketing. Ignorance is no excuse. You should be comfortable enough with artificial intelligence to put it to practical use without having to get a degree in data science.

WELCOME TO ARTIFICIAL INTELLIGENCE FOR MARKETERS

> *It is of the highest importance in the art of detection to be able to recognize, out of a number of facts, which are incidental and which vital.*
>
> *Sherlock Holmes*, The Reigate Squires

This book looks at some current buzzwords to make just enough sense for regular marketing folk to understand what's going on.

- This is no deep exposé on the dark arts of artificial intelligence.
- This is no textbook for learning a new type of programming.
- This is no exhaustive catalog of cutting-edge technologies.

This book is not for those with advanced math degrees or those who wish to become data scientists. If, however, you are inspired to delve into the bottomless realm of modern systems building, I'll point you to "How to Get the Best Deep Learning Education for Free"[2] and be happy to take the credit for inspiring you. But that is not my intent.

You *will not* find passages like the following in this book:

> Monte-Carlo simulations are used in many contexts: to produce high quality pseudo-random numbers, in complex settings such as multi-layer spatio-temporal hierarchical Bayesian models, to estimate parameters, to compute statistics associated with very rare events, or even to generate large amount of data (for instance cross and auto-correlated time series) to test and compare various algorithms, especially for stock trading or in engineering.
>
> **"24 Uses of Statistical Modeling" (Part II)**[3]

You *will* find explanations such as: Artificial intelligence is valuable because it was designed to deal in gray areas rather than crank out statistical charts and graphs. It is capable, over time, of understanding context.

The purpose of this tome is to be a primer, an introduction, a statement of understanding for those who have regular jobs in marketing—and would like to keep them in the foreseeable future.

Let's start with a super-simple comparison between artificial intelligence and machine learning from Avinash Kaushik, digital marketing evangelist at Google: "AI is an *intelligent machine* and ML is the *ability to learn without being explicitly programmed*."

Artificial intelligence is a machine pretending to be a human. Machine learning is a machine pretending to be a statistical programmer. Managing either one requires a data scientist.

An ever-so-slightly deeper definition comes from E. Fredkin University professor at the Carnegie Mellon University Tom Mitchell:[4]

> The field of Machine Learning seeks to answer the question, "How can we build computer systems that automatically improve with experience, and what are the fundamental laws that govern all learning processes?"
>
> A machine learns with respect to a particular task T, performance metric P, and type of experience E, if the system reliably improves its performance P at task T, following experience E. Depending on how we specify T, P, and E, the learning task might also be called by names such as data mining, autonomous discovery, database updating, programming by example, etc.

Machine learning is a computer's way of using a given data set to figure out how to perform a specific function through trial and error.

What is a specific function? A simple example is deciding the best e-mail subject line for people who used certain search terms to find your website, their behavior on your website, and their subsequent responses (or lack thereof) to your e-mails.

The machine looks at previous results, formulates a conclusion, and then waits for the results of a test of its hypothesis. The machine next consumes those test results and updates its weighting factors from which it suggests alternative subject lines—over and over.

There is no final answer because reality is messy and ever changing. So, just like humans, the machine is always accepting new input to formulate its judgments. It's learning.

The "three *D*s" of artificial intelligence are that it can *detect*, *decide*, and *develop*.

Detect

AI can discover which elements or attributes in a subject matter domain are the most predictive. Even with a great deal of noisy data and a large variety of data types, it can identify the most revealing characteristics, figuring out which to heed to and which to ignore.

Decide

AI can infer rules about data, from the data, and weigh the most predictive attributes against each other to make a decision. It can take an enormous number of characteristics into consideration, ponder the relevance of each, and reach a conclusion.

Develop

AI can grow and mature with each iteration. Whether it is considering new information or the results of experimentation, it can alter its opinion about the environment as well as how it evaluates that environment. It can program itself.

WHOM IS THIS BOOK FOR?

This is the sort of book data scientists should buy for their marketing colleagues to help them understand what goes on in the data science department.

This is the sort of book marketing professionals should buy for their data scientists to help them understand what goes on in the marketing department.

This book is for the marketing manager who has to respond to the C-level insistence that the marketing department "get with the times" (management by *in-flight* magazine).

This book is for the marketing manager who has finally become comfortable with analytics as a concept, and learned how to become a dexterous consumer of analytics outputs, but must now face a new educational learning curve.

This book is for the rest of us who need to understand the big, broad brushstrokes of this new type of data processing in order to understand where we are headed in business.

This book is for those of us who need to survive even though we are not data scientists, algorithm magicians, or predictive analytics statisticians.

We must get a firm grasp on artificial intelligence because it will be our jobs to make use of it in ways that raise revenue, lower costs, increase customer satisfaction, and improve organizational capabilities.

THE BRIGHT, BRIGHT FUTURE

Artificial intelligence will give you the ability to match information about your product with the information your prospective buyers need at the moment and in a format they are most likely to consume it most effectively.

I came across my first seemingly self-learning computer system when I was selling Apple II computers in a retail store in Santa Barbara in 1980. Since then, I've been fascinated by how computers can be useful in life and work. I was so interested, in fact, that I ended up explaining (and selling) computers to companies that had never had one before, and programming tools to software engineers, and consulting to the world's largest corporations on how to improve their digital relationships with customers through analytics.

Machine learning offers so much power and so much opportunity that we're in the same place we were with personal computers in 1980, the Internet in 1993, and e-commerce when Amazon.com began taking over e-commerce.

In each case, the promise was enormous and the possibilities were endless. Those who understood the impact could take advantage of it before their competitors. But the advantage was fuzzy, the implications were diverse, and speculations were off the chart.