AI for Marketing and Product Innovation

Powerful New Tools for Predicting Trends, Connecting with Customers, and Closing Sales

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INTRODUCTION

There is such a volume of information, speculation, hype, fear-mongering, and futuristic fantasies surrounding Artificial Intelligence. A simple description penned in 1968 by Stanley Kubrick and Arthur C. Clarke in *2001: A Space Odyssey*, with added comic relief from state-of-the-art systems, seems like a good place to start.

Dave Bowman: Hello, HAL. Do you read me, HAL?
Alexa: I cannot read you, would you like to buy a book?
Siri: Hello, HALLO – greetings.
HAL: Affirmative, Dave. I read you.

Dave Bowman: Open the pod bay doors, HAL.
Alexa: Coffee pods are on sale, $19.99/lb, shall I order one?
Siri: iPods once open will lose warranty.
HAL: I'm sorry, Dave. I'm afraid I can't do that.

Dave Bowman: What's the problem?
Alexa: There is no problem.
Siri: I am sorry, I don't understand that. Please try again.
HAL: I think you know what the problem is just as well as I do.

Dave Bowman: What are you talking about, HAL?
Alexa: What would you like to talk about?
Siri: Sorry for being obtuse.
HAL: This mission is too important for me to allow you to jeopardize it.

Dave Bowman: I don't know what you're talking about, HAL.
Alexa: I am sorry you don't know what you are talking about.
Siri: Don't worry about it.
HAL: I know that you and Frank were planning to disconnect me, and I'm afraid that's something I cannot allow to happen.

Dave Bowman: Where the hell'd you get that idea, HAL?
Alexa: Hell hot sauce available to order. Shall I place the order?
Siri: I am afraid I don't know the answer to that.
HAL: Dave, although you took very thorough precautions in the pod against my hearing you, I could see your lips move.

Dave Bowman: Alright, HAL. I'll go in through the emergency airlock.
Alexa: In case of emergency call 911.
Siri: . . .
HAL: Without your space helmet, Dave, you're going to find that rather difficult.

Dave Bowman: HAL, I won't argue with you anymore. Open the doors.
Alexa: Door openers available on sale.
Siri: Sorry, I wasn't able to find anything like that at this time.
HAL: Dave, this conversation can serve no purpose anymore. Goodbye.

Artificial Intelligence (AI) is a display of intelligence by a nonliving object, such as a machine, as opposed to Natural Intelligence, which is seen in living creatures, including humans. Artificial Intelligence itself is nothing new to the world of technology, having become officially recognized as an academic field way back in 1956.

What is new is the way people think about and actually experience Artificial Intelligence. We now recognize the virtually

limitless practical applications of intelligent machines, because we interact with them on a daily basis, often in the most mundane of ways. The Internet of Things seems to magically confer upon everyday common objects an uncanny ability to relate to us, and to adapt to human life, that makes them look intelligent. Indeed given the divisive global ideological climate, toasters seem to have more compassion and intelligence than political leaders.

The whole discipline of Artificial Intelligence was founded on the belief that human intelligence could be defined and articulated so precisely that a machine could be designed essentially to replicate it. In this case, *intelligence* is defined as the ability to continuously "learn," thereby improving at certain skills over time. Advanced computer programs called algorithms, which are at the heart of Artificial Intelligence and Machine Learning, are sets of instructions that set this "learning" process in motion.

Then there's this tongue-in-cheek definition:

Algorithm (noun): Word used by programmers when they do not want to explain what they did.

In 1998, an artificially intelligent device was described as any device that perceives its environment, then takes actions to optimize its chance of success at a given task. Artificial Intelligence algorithms are designed to make computers perform in such a way, leading to the appearance of intelligence.

Two key features of Artificial Intelligence are Natural Language Processing (NLP) and Natural Language Understanding (NLU).

Machine Learning (ML) involves natural language processing, as well as computer vision and image recognition. Machine Learning is a process by which a computer continually adjusts its output based on its own UX (user experience), like a chess algorithm that gets better at chess the more it continues to play, whether against a human chess player or a digital one.

Machine Learning uses statistics to develop self-learning algorithms that work by way of trial and error, but Machine Learning is nothing new to Artificial Intelligence. In fact, it's the standard approach. Machine Learning–powered algorithms are used for marketing, manufacturing, medical research, speech recognition, and many other fields. Machine Learning basically recognizes *patterns* in enormous batches of existing data (a.k.a. Big Data), and uses this information to identify *similar* patterns in future data.

To put it simply, Artificial Intelligence sets up the initial set of rules to maximize the performance of a task, while Machine Learning constantly adjusts its own actions to improve at said task.

A more recent form of Machine Learning is called Deep Learning (DL). Deep Learning typically involves multilayered neural networks to perform a variety of input–output modeling tasks. Deep Learning networks typically deal with Big Data – hundreds of billions of data points, enough to yield useful information about human behaviors.

Deep Learning typically involves an artificial "neural network," which is a digital network that supposedly mimics a biological nervous system. Neurons are basic brain cells, the building blocks of our brains that enable us to do everything that we do, from breathing to composing symphonies.

Deep Learning techniques have led to amazing progress in signal processing, voice understanding, text understanding, and image recognition, to name a few. These are complex problems that have challenged programmers for decades. In these fields and others, more progress has been made in three years using Deep Learning techniques than was made in 25 years of old-style, rule-based Artificial Intelligence.

Deep Learning has been more successful at "modeling the mind" than its predecessors, with the downside being the "physics" of the problem is obscured in the black box. Other than validation through

data sets, the humongous "curve fit" which is Deep Learning rarely lends itself to further inquiry regarding the physics of the problem.

Natural Language Processing is an Artificial Intelligence capability in which computers interact with humans using natural-sounding human language, either in written or spoken form. This feat is accomplished by way of analyzing Big Data in order to process written or spoken "keywords" to formulate an answer. Many companies that deal in customer service these days incorporate some sort of NLP Chatbot component into their business practices. Some of these bots sound eerily human. How many of us have started talking to a caller, only to realize we were talking to a machine?

Yet, for all their seemingly magical powers, a machine is still just a machine. That vacuum cleaner can't really *see* (and doesn't really care about) your cat. And a car that drives itself has no idea where it is going. In fact, it has no ideas at all. It has only a series of sophisticated algorithms, which the car's computer has been programmed to follow.

A machine merely *mimics* certain cognitive functions that human beings recognize in themselves and in other human beings, such as seeing, hearing, learning, and problem solving. Not that this isn't hugely important and truly amazing – it is! It's just that machines do not (and cannot) think fully and independently on their own.

Yet. Some public figures proclaim that the greatest danger to humanity from Artificial Intelligence (or any other technological advance) is that these technologies may advance to the point where they supersede humans in the power and speed of their processing, ultimately rendering us irrelevant or even extinct. Experts disagree on the threat, but it merits acknowledgement.

The latest capabilities of Artificial Intelligence include speech comprehension, autonomous vehicles, smart content curation, interpretation of complex data (including images), world class proficiency in strategic games, and bots, to name just a few among a host of impressive accomplishments. In this book we will reveal

how Artificial Intelligence and Machine Learning capabilities can be applied to marketing strategies and executions, and new product innovations. Artificial Intelligence is now not just an indispensable and ubiquitous feature of today's overall technological landscape; it is increasingly a core driver behind business success at every level of the enterprise.

The goal of this book is not only to inform you about Artificial Intelligence and Machine Learning. It is also to encourage and enable you to draw inspiration from the commercial success stories of other companies who have already put these powerful tools to work in the marketplace. Use these ideas to create new ideas of your own, and apply them directly to your marketing and product innovation practices.

> *Artificial Intelligence will probably most likely lead to the end of the world, but in the meantime, there'll be great companies.*
>
> – Sam Altman, Quoted in "20 Great Quotes on Artificial Intelligence," *Psychology Today*, May 18, 2018

Human creativity is unmatched, and will remain unmatched. Machines augment, support, and facilitate the expression of human genius. Augmenting human decision-making by making data accessible and by validating decisions through experiential rules collected over time, truly enable humanity to build learning capacity across generations. Physics memorializes human knowledge through the formulae accumulated and validated over time. Machine Learning and Artificial Intelligence attempt to do the same for the disciplines of marketing and product innovation.