

Understanding consumers' habits thanks to artificial intelligence

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Abstract:

The advances made in artificial intelligence, especially in deep learning, are being used to invent new applications in business and sales. AI can analyze big volumes of disparate data, such as text, images, behavior patterns and time series. In the era we are now entering, its analysis of consumer data is going to be of special importance. AI has already been used to target recommendations and advertisements, but some services are going to fall under restrictions from regulations about personal data. Tomorrow, AI will process myriads of data to endow firms and their brands with the capacity for a systematic, data-driven analysis of market trends. This process, which does not imply storing or selling personal data, will underlie every marketing decision. While keeping an eye on ethical issues related to the uses of personal data, companies and their brands are going to have to take account of AI when making decisions about procurement, sales and marketing — if they want to remain competitive.

The phrase “artificial intelligence” (AI) is overused in sales. For now and the coming years, AI is synonymous with new statistical approaches, which are deeply affecting sales and marketing. AI can be used to analyze, for example, a large number of prices or consumer behavior patterns.¹

AI applications in sales

AI's principal applications in sales are:

- to recommend products and target advertisements. By analyzing consumers' previous purchases or opinions, a prediction can be made about whether a new consumer will prefer product *A* or *B*, and the product that best suits the customer can be proposed.
- to improve customer services (chatbots, etc.). In many firms, customer services are a major cost. Their efficiency can strongly affect the image of the firm and its brands. Services such as chatbots have a virtual assistant to whom questions can be addressed or who can guide users making purchases.
- to obtain information on the market for product analysis. AI can unlock new capacities for automatically analyzing on a large scale products, consumption patterns and trends. This use, quite recent, is often much less mentioned; but it will strongly grow as AI advances.

With regard to these applications, data analytics (the advances made in learning from statistics) is opening new uses as it reaches a level of performance that is altering the ecosystem in sales. The digital giants (Amazon, Facebook, Google, etc.) are all betting on AI as a significant source of value owing to recommendation services and targeted advertizing.² In the past few

¹ This article has been translated from French by Noal Mellott (Omaha Beach, France). The translation into English has, with the editor's approval, completed bibliographical references.

² SMITH B. & LINDEN G. (2017) “Two decades of recommender systems at Amazon.com”, *IEEE Internet Computing*, 21(3), pp. 12-18. doi:10.1109/MIC.2017.72. Available via: <https://www.computer.org/csdl/mags/ic/2017/03/mic2017030012-abs.html>.

years, a new field has opened for start-ups in advertisement recommender systems (Criteo, Databerries or TinyClues in France). As for the two other applications, they are more recent, and there is no major player in the field, but several start-ups are emerging.

Nonetheless, established brand names and industries are not yet equipped to cope with these changes. They still lack the mind-set and skills needed to use the advances made in AI. They are going to have to rely on the services offered by the digital giants and start-ups.

I would now like to focus on the third, least known, of these three applications: trend analysis.

Trend analysis: Data-driven marketing

The environment of established brand names and industries is ever more competitive. This forces firms to accurately position their products, brands and image as a function of consumers and competitors. The fashion business, for example, relies on market studies, polls and consumer panels as well as consultants and experts who study trends by analyzing statistics from past sales. Zara, for instance, devotes huge efforts to detecting ever more rapidly trends in order to design and market new products in record time.³³

In response, smart tools are now being used for trend analysis and the study of consumer behaviors. This approach is driven by consumer data. By thus becoming proactive in product development and market strategies, a brand can pass ahead of its competitors. All this is even more important since the cycles of product development, marketing and sales are being made as short as possible. Eventually, no large industry is likely to do without this strategic tool.

AI and big data

This new need comes along with the growing availability of information provided by consumers about the products they like. People are sharing styles and advice, and showing off products and purchases. All this adds to the stock of data a gigantic quantity of freely shared information. It also creates the networks of influence that set market trends.

At this point, the recent advances in AI come into play. Deep learning can be used to analyze signals that are much more complicated and numerous than those detected by older techniques. For example, disparate data (such as images, videos, sound clips or texts) can be processed to extract relevant information.

Data collection and analysis are often seen as separate processes. In the case of AI however, the system learns from data and heavily depends on them. The AI system reshapes possibilities and retrieves data (video, speech, etc.) that could not previously be processed.

By combining millions (and soon billions) of data, we can start constructing new values that used to be inaccessible: knowledge about needs, the intelligence of products, habits and markets.

³ PETRO G. (25 October 2012) "The future of fashion retailing: The Zara approach", *Forbes*. Available via: <https://www.forbes.com/sites/gregpetro/2012/10/25/the-future-of-fashion-retailing-the-zara-approach-part-2-of-3/#1b0d2fd7aa4b>.

Deep-learning algorithms for analyzing images: An example from the fashion business

When talking about the advances made in artificial intelligence, deep-learning algorithms are most frequently mentioned. Deep learning is a statistical learning method that underlies the recent progress made in AI.⁴ Its principle is not much different from the techniques of supervised statistical learning, which have been developed over the past decades. A network of “neurons” is gradually trained by using a set of annotated data (e.g., a million e-mail messages, each annotated as to whether or not it is spam). If this training has gone well, an algorithm will then be able to predict whether or not a new e-mail is a spam.

Let us take note however of the major differences in uses between deep learning and these older machine-learning techniques. Used to develop new products, they have drawn the spotlight on AI. The major difference has to do with analyzing complex data that have a large number of dimensions, such as images (each pixel in an image corresponding to a single dimension or to three dimensions for a colored image), sound (sampled at high frequency), videos, and text (the dimension depends on the size of the vocabulary). Another difference is the capacity for making complex predictions and learning by using gigantic volumes of data. In the future, we can imagine systems being built that will be able to classify images, sounds and texts more accurately than people.

Let us take an example from the fashion business. Nowadays, experts analyze hundreds of photographs of fashion shows and from magazines in order to detect rising trends. Deep-learning algorithms can help detect habits, styles, traits and characteristics by automatically and systematically analyzing millions of images (Figure 1). Beyond the analysis of each piece of data (in this example, an image), artificial intelligence can, thanks to an accumulation of historical data, both predict market trends and detect fashion trends from among a large number of weak signals.

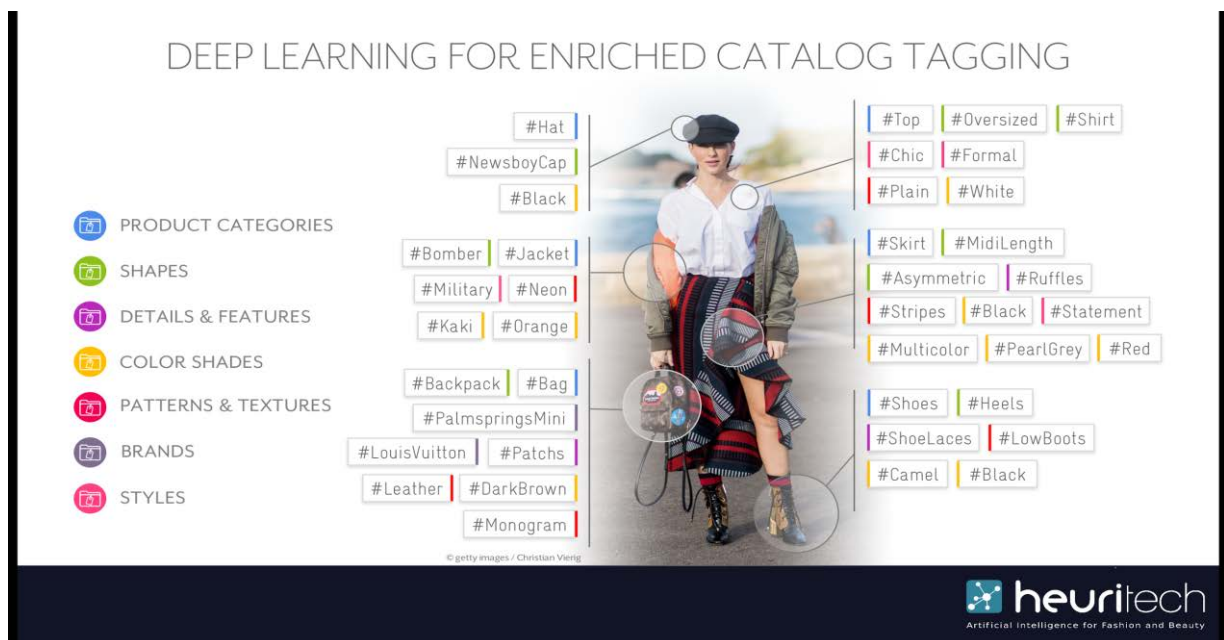


Figure 1: Automatic detection for analyzing fashion trends
Source: Heuritech.

⁴ LECUN Y., BENGIO Y. & HINTON G. (2015) “Deep learning”, *Nature* 512(7553), pp.436-444. Available via: https://www.researchgate.net/publication/277411157_Deep_Learning.

Let us be careful, however, not to overanticipate the advances made by AI. These algorithms quantify trends but are not intended to take the place of creativity or artistic sensitivity. What is now evident is that AI is going to be used to analyze the behaviors and uses of millions of consumers and to considerably modify how brand names create and sell products better suited to the market.

Regulations and ethical issues: Targeted advertisements but forthcoming regulations

Besides the analysis of general behavior patterns in consumption, AI is being used to precisely target individual consumers. To do this, a maximum of personal information is necessary about the individual. The individual will then be targeted by an advertising campaign that seeks to maximize the probability of a purchase. In this case, AI makes predictions about individuals, products and the optimal conditions for the advertising campaign.

The danger related to this widespread processing of personal data for the purpose of sales or surveillance is a major ethical concern. It has fueled a lively debate. Nowadays, EU regulations (in particular the GDPR)⁵ establish a framework for the uses of personal data. They require, for instance, that a firm, for each service provided, has to expressly request the user's consent for processing his/her personal information.

Beyond the implications of these regulations, what is worth noticing is the trend toward more regulatory oversight of personal data. For this reason, services centered on products — rather than users — are going to prosper. Take the example on-line advertising. Advertisements for targeting individual users as such are going to gradually yield to advertisements based on the products and contents that users consult (thus independently of the user's profile). Likewise, the future is open for product analyses that are not based on the data pertaining to individual users but, instead, on an aggregation of anonymous data.

AI is a tool that facilitates data processing. Regulatory and ethical questions arise about the use of personal data; and regulations should be set at this level. Regulating the algorithms themselves could be counterproductive, since it would hinder the creation of new, more efficient tools and might even restrict innovation or the creation of new sources of value. In brief, personal data, not artificial intelligence, should be regulated.

Conclusion

In the era we are entering, it will be essential to analyze consumption data with the help of AI. Analyses of this sort have already served to develop recommendation systems and target advertising. However some of these methods are going to be restricted by regulations on the use of personal data.

AI will soon allow for analyzing millions of data. Companies will thus be endowed with the capacity for a systematic, data-driven analysis of market trends. This process, which does not entail storing or selling personal data, will be part of each decision made for a brand. While being attentive to the ethical issues related to personal data, firms and brand names will have to include AI in their processes for making decisions about purchases, sales and marketing — if they want to stay competitive.

⁵ The GDPR (General Data Protection Regulation): "Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data". Available via: <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1478961410763&uri=CELEX:32016R0679>. See too; <https://www.cnil.fr/fr/reglement-europeen-sur-la-protection-des-donnees-ce-qui-change-pour-les-professionnels>