Meet the Algorithms Planning Your Next Online Purchase

By Pavel Kireyev , INSEAD

AI and machine learning are changing global consumption habits, and companies are playing catch-up.

Good salespersonship is a species of street smarts. It's about quickly sizing up your customers and pitching your wares in terms that reverberate with their unspoken needs and desires. As AI and machine learning increasingly intersect with e-commerce, these priceless human skills are finding algorithmic analogues – not just at point of sale, but throughout the customer journey.

The results will be familiar to online shoppers everywhere. Netflix and Amazon's algorithms leverage the data from each customer click to fine-tune their recommendations and drive consumption. The tech behemoths also deploy consumer activity data to sharpen their email and social media marketing, etc. This is likely only the beginning, as the technology's predictive prowess is improving all the time.

For leading online travel agencies (OTAs), such as **Expedia Group** and Booking.com, algorithm-driven personalisation is a rising priority. Digital

natives increasingly want a travel booking experience that maximises both customisation and convenience. Moreover, the balance of power between OTAs and inventory suppliers may be shifting in favour of the latter, due to trends towards **greater consolidation in the hospitality industry**. Facing the prospect of shrinking commissions as deals are renegotiated, OTAs are racing to come up with ever more granular projections of individual travellers' willingness to pay.

Jack Chua, Director of Data Science at the travel site **Hotwire** (owned by Expedia Group), typifies the talent driving the personalisation of online marketing through AI. On the sidelines of **AI Everything** in Dubai earlier this year, Chua and I discussed the profound strategic implications of this technological revolution.

AI and economic theory

Chua previously worked on pricing models at Amazon. Estimating price elasticities for a global online marketplace that comprises millions of products can be a messy project. The purchasing patterns for some products can defy basic economic intuition, e.g. when the price is lowered, demand sometimes goes down instead of up. This is usually driven by variables that affect demand and are correlated with price but not observed in the data. These variables may be unstructured and user-generated, such as customer reviews or product photos.

For Chua and his team at Amazon, getting the model to run with, not against, the grain of economic intuition required overlaying an "optimisation layer, or regularisation function of sorts" that made sure their machine-learning model was consistent with economic theory. One of my recent papers, "**Markets for Ideas: Prize Structure, Entry Limits, and the Design of Ideation Contests**", follows a similar paradigm. It combines decades of economics research on game theory with data from large-scale crowdsourcing contests to estimate the parameters guiding participant behaviour and provide a framework for optimising incentives.

Chua advises leaders to understand the economic structure of the problem when applying AI to business. Instead of simply plugging the data into a general-purpose machine-learning algorithm, they should recognise how additional information such as text and images may also contribute.

Three tips for deploying AI

According to Chua, there are three pillars for the successful implementation of algorithmic business solutions.

First, unsurprisingly, you need qualified quants on board. "You need to hire the relevant experts to be able to build out this capability," he said. "Think of data scientists, statisticians, economists, even business managers and operators to manage the programme. You need to have those personnel in place."

Second, hard skills must be complemented by the right focus on soft skills. It is essential to cultivate a culture that understands and appreciates what AI and machine learning can bring to the organisation. Chua bemoaned that all too often, he hears managers say things like "Data science is just basic analytics." "When you have leaders thinking that data science is not much more than a simple SQL query, I think that leads to a lack of brainstorming and figuring out where data science can actually impact various parts of the value chain," Chua said.

Third, Chua urges business leaders to remember that data science and AI are essentially an "optimisation technology" that works better at scale. Companies should phase in data science solutions gradually in order to bolster and amplify processes that are already creating value. "If you're a start-up and you don't yet have a product that's generating millions of dollars in sales, it's harder to justify building out this 20-person data science team that's going to cost you $10 million per year," he said.

Identifying opportunities

At the moment, Chua sees abundant opportunity for a growing crop of start-ups that are trying to "democratise AI, get it in the hands of business operators without the domain knowledge" instead of going the more familiar route of selling AI as a service.

Many companies are working on AI enhancements for commonly used equipment that have looked essentially the same for decades. Chua mentioned the example of **weed-killing robots** with computer vision systems that can distinguish weeds from crops as they roll through fields. The machines reportedly use up to 20 times less herbicide than standard methods that typically involve blanketing entire fields with chemicals linked to negative health outcomes. The logical extension of this innovation would be to integrate it into machinery farmers already use, such as tractors.

"Use cases like that where we merge the AI high-tech space with brick and mortar or traditionally non-AI fields are a really interesting next step," Chua said.

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