

Rise of the machines

Over the next decade, successful airlines will be directing strategic thought and hard cash into machine-learning initiatives. But such a significant shift in focus need not be a fraught one, writes Azim Barodawala, chief executive of Volantio

“ Growing up I was fascinated by the *Terminator* franchise. The concept of human-created machines that were capable of learning, adapting, and improving was both awe-inspiring and terrifying for me.

While we're thankfully still a longways away from needing Arnold Schwarzenegger to save the world from a roving T-1000, leading digital innovators globally are increasingly turning to machine learning as an important tool to drive higher top-line revenue and reduce costs.

Familiar household names represented the first movers in the machine-learning revolution: think Amazon, Netflix and Spotify. The global aviation industry has largely been consumed by other priorities over the past 15 years, including consolidation, gaining financial stability, and basic digitisation. Only today are some leading carriers scratching the surface on machine learning's potential.

But what exactly is machine learning?

At its core, machine learning involves the use of algorithms and statistics to perform a pattern of repeatable tasks leveraging the inference of data rather than explicitly coded instructions. Machine learning can be broadly broken down into two main categories: supervised learning tasks and unsupervised learning tasks.

Supervised learning attempts to predict an outcome given specific inputs, using mathematical and statistical models that determine a relationship between the inputs and the outcome. Training data is necessary for the models to be built, as they are engineered to best fit the known outcome.

A very basic example of how supervised learning could be used in real life for an airline is predicting which passengers have the highest likelihood of accepting an airline's offer to move to an alternative flight during a voluntary denied boarding situation.



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Volantio has done this exercise and found that one key predictor for “success” (in this case the acceptance of an offer to move) was simply the number of passengers on the PNR. Two-passenger PNRs were much more likely to accept an offer than one-passenger or three-plus passenger PNRs. Knowing this information, an airline could be significantly more targeted in how it approaches customers in a potential denied-boarding situation, approaching only those who have the highest likelihood of accepting an offer, without bothering everyone else.

The other main category of machine learning is unsupervised learning, which attempts to find the structure and relationships in data sets without explicit categories or labels. One common type of unsupervised learning is cluster analysis.

This process may sound oddly similar to general customer segmentation. The key difference is the arbitrary imposition of structure at the start of the analysis. For example, rather than creating explicit customer segments at the start, by using clustering algorithms such as k-means clustering airlines can

analyse their customers across tens of thousands of dimensions and then let the machine-learning models determine which combination of attributes determines customer behaviour the best. This may seem like a subtle shift, but it is extremely powerful.

Here are a few tips for airlines aiming to begin this journey:

First, start small and build momentum. In our experience, airlines can feel overwhelmed by the quantity of data they possess, and by the fragmentation of it. This leads to analysis paralysis. But airlines do not have to wait for a perfect scenario – they can and should pick one small use case for improvement, and then test, iterate and improve. With machine learning, building momentum and showing real results as quickly as possible is critical.

Second, foster an acceptance of failure. Not every machine-learning initiative will succeed. Failure is an acceptable outcome, and will encourage your data science teams to push the boundaries of innovation.

Finally, maintain strict standards of data privacy and protection. Airline legal teams will be an important stakeholder in this process. One key upside is that significant gains from machine learning can be achieved using data sets with no personally identifiable data.

Given the decreased cost of computing, and the exponential increase in data availability, the potential for machine learning is only going to accelerate in the coming years. The successful airlines of the 2020s will both take the time to appropriately chart their machine learning strategies, and make the appropriate investments to ensure success. ■

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