Enterprise Hybrid AI Use is Poised to Grow

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LISA MORGAN, TECHNOLOGY JOURNALIST

AI tools and systems that can learn to solve problems without human intervention have proven a useful development thus far, but in many cases, businesses can benefit from a hybrid approach -- aptly dubbed hybrid AI.

Hybrid AI is a nascent development that combines non-symbolic AI, such as machine learning and deep learning systems, with symbolic AI, or the embedding of human intelligence. Since digital transformation initiatives are fueling the mainstream growth of AI, it's best to choose the right AI tools or techniques for the right job. Oftentimes, a combination of them is needed, and that's where hybrid AI uses come into play.

"Hybrid AI is most commonly viewed as a combination of symbolic and non-symbolic AI, but the definition should include expert knowledge," said Goutham Belliappa, vice president of data and AI engineering at Capgemini Americas, a consulting and technology services firm. "Injecting context from experts into good algorithms makes these algorithms much more effective and powerful in solving real-world problems."

HYBRID AI USE CASES

A common use of hybrid AI is web searches. If a user types "1 GBP to USD," the search engine recognizes a currency conversion problem (symbolic AI) and provides a widget to do the conversion before running machine learning to retrieve, rank and present web results (non-symbolic AI).

"There are dozens of such classes of queries, including weather, travel and sports scores that get processed using both symbolic and non-symbolic AI," said Chirag Shah, an associate professor in the Information School at the University of Washington. "The big area of development now is self-driving cars because they need to understand basic rules and also make decisions in real time by processing environmental signals."

People who designed computer vision and language processing capabilities with deep learning are now rethinking their implementations with an eye toward hybrid AI, according to Shah. That's because some of those applications are picking up biases and discrimination signals from underlying data and knowledge bases. Insurance companies are also taking advantage of hybrid AI, as evidenced by Liberty Mutual.

"We might take a customer photo of an accident and use deep learning to 'see' if an airbag has deployed or which parts of the vehicles are damaged," said Scott Gorlin, senior director of data science and trusted AI at Liberty Mutual's Office of Data Science. "These data are not often available to us directly, so we use deep computer vision models to generate them. A traditional symbolic model -- which cannot directly use photos -- can then leverage the same symbols, as if someone had manually collected that data."

In hybrid AI uses such as this, deep learning models can learn to perform simpler tasks such as detecting airbags or people and leave complicated reasoning to a traditional model that humans have more control over.

In a home insurance use case, Liberty Mutual might have a model which alerts a customer about the most likely risks on their property or recommends how to process a claim based on how much damage the AI

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Strategic advisor, Blue Yonder

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sees in the photo. So far, the two largest benefits for Liberty Mutual have been more trustworthy and understandable models and more data for modeling, Gorlin said.

"Hybrid intelligent systems can solve many complex problems involving imprecision, uncertainty, vagueness and high dimensionality," said Michael Feindt, strategic advisor to supply chain platform provider Blue Yonder. "They combine both knowledge and data to solve problems instead of learning everything from the data automatically."

CHALLENGES WITH HYBRID AI

No technique, or combination of techniques, solves every problem equally well, so it's important to understand their respective capabilities and limitations. One of the biggest challenges is that expert knowledge and real-world context are rarely machine-readable. So, AI can predict the likelihood of rain, for instance, but there's no corresponding alert warning a laptop user to remove the device from the porch.

"This type of problem needs a human in the loop to take the weather prediction and combine it with real-world data, such as location, wind speed, wind direction and temperature to make a decision about moving indoors," said Belliappa. "The logic flow of such a decision is not complex. The missing piece is that real-world context."

Some people mistakenly believe that if they buy a graph database, it will inherently provide AI with context, Belliappa said. Most organizations fail to understand the intellectual, computational, carbon and financial challenges of converting the messiness of the real world into context and connections in ways that are usable for machine learning, he added.

WHY HYBRID AI USES WILL GROW

The interconnectedness of everything is generating an unprecedented amount of data. As organizations continue to become more digital, their use of AI tends to grow so they can accomplish more, at scale, in less time. That could be to deliver a better customer experience, lower operating costs or increase top-line revenue or profitability. However, success tends to boil down to a clear understanding of the problem and then using the right data and techniques to drive a desired outcome.

"Hybrid AI is a compromise. It turns out that deep learning, for all its power, is not universally better," said Liberty Mutual's Gorlin. "We often combine the techniques to leverage the strengths and weaknesses of each approach depending on the exact problem we want to solve and the constraints in which we need to solve it."