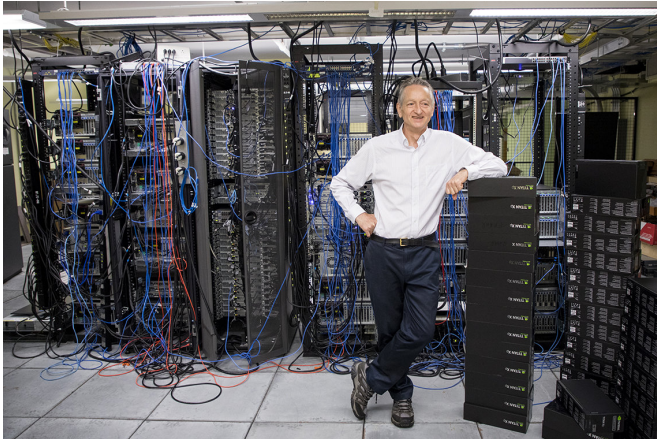


# 'Godfather' of deep learning is reimagining AI

3 November 2017, by Chris Sorensen



Geoffrey Hinton, a University Professor Emeritus at U of T and a research fellow at Google, recently published two papers that may help correct one of deep learning's key shortcomings. Credit: Johnny Guatto

Geoffrey Hinton may be the "godfather" of deep learning, a suddenly hot field of artificial intelligence, or AI – but that doesn't mean he's resting on his algorithms.

Hinton, a University Professor Emeritus at the University of Toronto, recently released two new papers that promise to improve the way machines understand the world through images or video – a technology with applications ranging from self-driving cars to making medical diagnoses.

"This is a much more robust way to detect objects than what we have at present," Hinton, who is also a fellow at Google's AI research arm, said today at a tech conference in Toronto.

"If you've been in the field for a long time like I have, you know that the neural nets that we use now – there's nothing special about them. We just sort of made them up."

Hinton's latest approach, detailed in a recent story in *Wired* magazine, relies on something he calls "capsule networks." Here's how it works: At present, [deep learning](#) algorithms must be trained on millions of images before they can reliably distinguish a picture of, say, a cat from something else. In part, that's because the software isn't very good at applying what it's already learned to brand new situations – for example, recognizing a cat that's being viewed from a slightly different angle. Capsule networks, by contrast, can help track the relationship between various parts of an object – in the case of a cat, one example might be the relative distance between its nose and mouth.

Hinton talked about his research, co-authored with Sara Sabour and Nicholas Frosst, at Google's Go North conference, held at Toronto's Evergreen Brick Works.

With his new research, there's little doubt Hinton is doing his part to move the AI ball forward – even if it draws on ideas he's been contemplating for the past 40 years.

In one of his recently published papers, Hinton's capsule networks matched the accuracy of the best previous techniques when it comes to recognizing hand-written digits, according to *Wired*. The second paper cut in half the previous error rate on a test that challenges software to recognize objects like toys from different angles, the magazine said.

"What we showed is early days," Hinton cautioned attendees at Go North.

"It works quite impressively on small datasets. But until it works on large datasets, you shouldn't believe it."

Even so, other researchers are lauding Hinton's efforts.

"It's too early to tell how far this particular

architecture will go," Gary Marcus, a professor of psychology at New York University, told Wired. "But it's great to see Hinton out of the rut that the field has seemed fixated on."

**More information:** Dynamic Routing Between Capsules, arXiv:1710.09829 [cs.CV]  
[arxiv.org/abs/1710.09829](https://arxiv.org/abs/1710.09829)

Matrix capsules with EM routing,  
[openreview.net/forum?id=HJWLFGWRb&notId=HJWLFGWRb](https://openreview.net/forum?id=HJWLFGWRb&notId=HJWLFGWRb)

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