

SUCCESS STORY Artificial Intelligence



CAMBRIDGE CONSULTANTS | PROBLEM SOLVED

Cambridge Consultants exceeds expectations for AI and deep learning with NetApp[®] data management solutions.

Cambridge Consultants Breaks Artificial Intelligence Limits

New deep learning approaches are changing the boundaries of what's possible with artificial intelligence (AI) systems. Breakthrough innovation specialists and AI powerhouse, Cambridge Consultants is at the forefront of advances in deep learning. Their product development innovations are revolutionizing a range of industries and disrupting the status quo in the process. Another NetApp solution delivered by:





of compute power processing data



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"One of the key reasons our deep learning storage is based on NetApp technology is the positive experience we have had with the technology in the past. We view it as tried and tested in what can be highly demanding conditions for storage."

Monty Barlow
 Head of Artificial Intelligence, Cambridge Consultants

The breakneck pace of innovation today makes it harder than ever for organizations to gain and maintain a competitive edge. Organizations must constantly evolve or risk being left behind. That's why the world's most ambitious companies are turning to Cambridge Consultants to gain a competitive edge, which in today's market includes leveraging the latest AI and deep learning techniques.

"Deep learning is revolutionizing almost every market we work in," says Monty Barlow, head of Artificial Intelligence at Cambridge Consultants. "We're applying deep learning in diverse markets, driving forward the art of the possible."

Until recently, technology was a limiting factor. In the traditional approach to AI, teams of programmers and experts worked together to develop explicit algorithms that solved specific problems. Today, a machine learns by experience and creates its own algorithms by using state-of-theart deep learning techniques. With these algorithms, machines are outperforming humans in activities such as games of strategy and complex pattern recognition. To get ahead of the trends in Al, several years ago Cambridge Consultants built its own research lab and development facilities, known as the Digital Greenhouse. There the company is discovering, developing, and testing new approaches to machine learning. Algorithmic models developed in the Digital Greenhouse are continually assessed to understand how they can best be used across diverse fields such as medical diagnostics, security and intrusion detection, industrial automation, and more.

To showcase the possibilities of deep learning, Cambridge Consultants developed Vincent, an Al technology demonstration that can complete a drawing that has been started with a human sketch. Completed "works of art" combine a user's sketch with the digested sum of art since the renaissance, as if Van Gogh, Cézanne, and Picasso were inside the machine, producing art to order. Teaching Vincent to paint took seven neural networks working nonstop for 14 hours and generated millions of practice files.

APPLICATIONS

- User interface design
- Security and intrusion detection
- Marketing analytics
- Medical diagnostics
- Financial trading





A DEMANDING SCENARIO FOR STORAGE

While Vincent may seem to represent unique challenges, what is required to solve those challenges is not unique. According to Barlow, all Al depends on three key elements: algorithms, compute, and data. And data is just as important as the other two elements.

"People never have enough data," explains Barlow. "There are always duplications and holes and other such problems. We often need to patch holes and synthesize data to work around these problems."

The process they use is known as generative AI, evolved from the 2014 breakthrough of generative adversarial networks (GANs). It uses different neural networks to compete with each other during training. Although this process is faster and more cost effective than collecting the perfect dataset, it can create challenges of its own. "We usually end up needing access to all of the data at once," savs Barlow. "That can be tens of terabytes, which is more than you can easily fit into RAM." In addition to requiring large datasets, a generative AI approach must randomly read every file in those datasets hundreds of times. Every random read request means waiting for the server to acknowledge it. With multiple teams working simultaneously on the same dataset, processing and storage can guickly become a bottleneck. To fuel its deep learning machines, Cambridge Consultants needs fast access to every file with high throughput for millions of random reads.

EXTREME DEMANDS EXTREME PERFORMANCE

To keep pace with the demands of AI in its Digital Greenhouse, Cambridge Consultants worked with Scan Computers in the UK to deploy NVIDIA DGX-1 compute servers. To provide a sense of the servers' power, one DGX-1 system replaces 400 traditional servers and provides more than 40,000 parallel compute cores.

To feed these servers, Scan Computers recommended highperformance NetApp storage to complement petaflop-scale compute on site. This choice was built on the great experience Cambridge already had with NetApp for other applications, including their continuous integration servers and on-premises project clouds.



NetApp's solution provides flexibility for a variety of workloads. For example, Digital Greenhouse data engineers use NetApp ONTAP[®] cloning capabilities for continuous integration. They easily handle a steady stream of setting up and tearing down thousands of virtual machines daily in their test environment. Based on this experience, Cambridge Consultants chose NetApp exclusively for their Digital Greenhouse on-premises storage. "One of the key reasons our deep learning storage is based on NetApp technology is the positive experience we have had with the technology in the past. We view it as tried and tested in what can be highly demanding conditions for storage. Today with neural networks and deep learning, AI can exceed our wildest imagination," says Barlow. "We're at the beginning of a new era—fuelled by data and enabled by new technologies—and we are writing the story as we go."

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