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DeepSeek's AI Breakthrough Shakes Silicon Valley and Reignites U.S.-China Tech Rivalry

Unless you are a chatbot lacking real-time data sources or were trained with outdated training data (sorry for the pun!), you have likely heard of the release of DeepSeek's open-source reasoning model. This announcement continues to reverberate through Silicon Valley and Washington, D.C., challenging the dominance of industry giants like OpenAI, Meta, and Google and reigniting tensions in the U.S.-China rivalry. In short, the breakthrough has sparked a fresh wave of competition in the global artificial intelligence ("AI") arms race, particularly as DeepSeek's models, including the V3 and R1, offer striking performance at a fraction of the cost of existing models. As these innovations unfold, they could reshape the AI landscape, creating new opportunities for market access and competition— something we

should not shy away from as investors in innovation.

Recap of the Headlines

The DeepSeek team pre-trained its V3 model using just 2,000 dated Nvidia H800 graphics processing units ("GPUs")—a fraction of the computational resources required by "traditional" AI models, which rely on tens of thousands of GPUs.[1] Further, DeepSeek's team trained its AI model in just 55 days for $5.58 million, a potential game-changer in efficiency.[2] In contrast to the classical approach of attempting to solve a computational challenge by throwing more hardware at it—or, more accurately, a data center—DeepSeek focused on software optimizations. This innovative software also bypasses Nvidia's standard CUDA framework.[3] Instead, it relies on assembly-like PTX programming, allowing for fine-grained control over GPU operations and significant optimization without enormous computational power.

As a result, we believe the market (overreacted as many hardware companies recorded a material decline in market value (e.g., Nvidia, ASML, Broadcom, Marvell). Given that DeepSeek developed a foundation model competitive with the incumbents' state-of-the-art models, like Google's Gemini, at about 1/40 of the estimated $200 million in capital expenditure, the market assumed that the current demand for truckloads of GPUs has ceased.[4] It is worth mentioning that there is much debate over the reliability of DeepSeek's V3 model cost estimates; some challengers argue that the calculus only factors hardware training costs and not people, development, and other infrastructure costs. However, rather than quibble, let us discount the 40x claims and assume that cost efficiency was improved by at least a factor of ten.

The Significance

DeepSeek had a moment in the computing world that may be analogous to supercomputing's acceleration in the early 1990s. At the time, high-performance computing was a capitally intensive game, costing millions and locking out most researchers. Then, in 1994, Thomas Sterling and Don Becker set out to challenge the exclusive cohort of companies dominating supercomputers like Cray, IBM, and SGI.[5] With just $50,000 from NASA, the computational scientist and systems software developer sought to link multiple low-cost PCs to create a parallel computing system capable of competing with supercomputers.[6] Sure enough, they ditched the proprietary hardware, used off-the-shelf PCs, connected them with Ethernet, and ran the Linux operating system to create Beowulf. The revolutionary cluster of 16 Intel DX4 processors worked in parallel with Becker's networking software to coordinate tasks across machines, creating a scalable system.[7] Further, Beowulf's hardware-based clusters, which were both open-source and modular, democratized supercomputing and laid the foundation for researchers developing modern parallel computing, cloud computing, and large-scale data processing. Commodity-based High-performance computing ("HPC") reduced the barrier to entry and boosted hardware sales by offering raw computational capacity at a fraction of the price.

DeepSeek's models have caused a stir not only because of their cost efficiency but also because of their performance. Its reliance on reinforcement learning ("RL") provides a clear advantage in terms of adaptability and efficiency compared to traditional machine learning approaches, especially supervised learning.[8] In supervised learning, models are trained using large, labeled datasets, where every input comes with a predefined correct output. The model learns to map inputs to outputs based on this labeled data, and its performance is directly tied to the quality and quantity of the provided data. This method requires substantial human effort in labeling data and may struggle in environments where data is incomplete,

unstructured, or too complex to label effectively.

On the other hand, reinforcement learning works through a fundamentally different approach. Rather than relying on labeled examples, RL models learn by interacting with their environment and receiving feedback through rewards or penalties based on their actions.[9] This feedback loop is what drives the model's learning process. The key difference is that RL enables agents to explore, experiment, and discover the best strategies or behaviors autonomously. The models are not told precisely what to do or how to do it but are guided by the consequences of their actions. Over time, the agent refines its decision-making policy to maximize long-term rewards, improving its performance incrementally.

If others can replicate it, the DeepSeek news could serve as a Beowulf moment for the GenAI market. The many organizations that were previously barred by cost can now join the market. In addition, RL models can be designed to deliver the specific performance users need. For example, this approach may empower enterprises to fully leverage AI at the edge, facilitating quicker and more informed decision-making. It may also enhance the agility and resilience of organizational cloud and data center infrastructures, enabling them to adjust to shifting conditions and demands, as well as emphasizing hybrid and distributed models.

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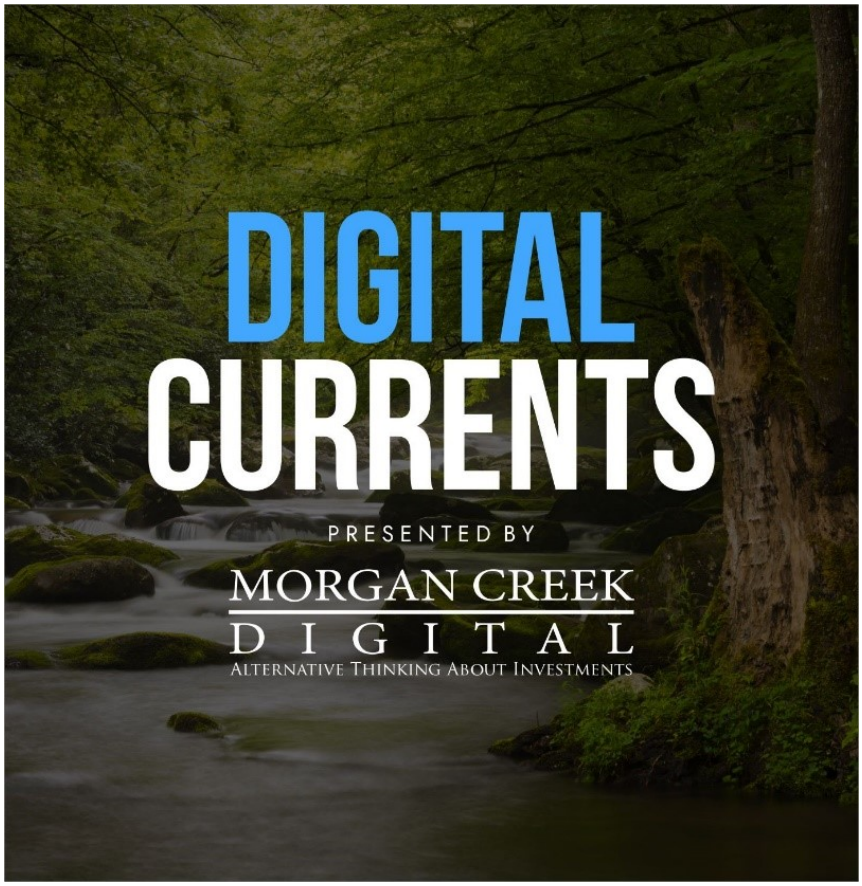

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[1] https://www.reuters.com/technology/nvidia-says-deepseek-advances-prove-need-more-its-chips-2025-01-27/

[2] https://www.yahoo.com/tech/deepseek-everything-know-171548974.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAJMa

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[3] https://github.com/deepseek-ai

[4] https://fortune.com/2024/04/18/google-gemini-cost-191-million-to-train-stanford-university-report-estimates/?utm_source=chatgpt.com

[5] https://spinoff.nasa.gov/Spinoff2020/it_1.html

[6] https://spinoff.nasa.gov/Spinoff2020/it_1.html

[7] http://www.ai.mit.edu/projects/aries/papers/distributed/beowulf_intro.pdf

[8] https://victorysquarepartners.com/training-ai-with-pure-reinforcement-learning-insights-from-deepseek-r1/?utm_source=chatgpt.com

[9] https://github.com/deepseek-ai/DeepSeek-R1

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