The AI Stack – A Blueprint for Developing & Deploying AI

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COMPUTE: Setting the Stage for the AI Revolution

Source: Wired

GOOGLE DATACENTER

2008

1,000 CPU Servers
2,000 CPUs • 16,000 cores

600 kWatts

$5,000,000

$628,992 to Power 24/7 for 1 Year

STANFORD AI LAB

2013

3 GPU-Accelerated Servers
12 GPUs • 18,432 cores

4 kWatts

$33,000

$4,193 to Power 24/7 for 1 Year

Source: Wired
Pace of Innovation in Artificial Intelligence

- **F104 Starfighter** (1950)
- **F4 Phantom** (1960)
- **F15 Eagle** (1970)
- **F16 Falcon** (1980)
- **F18 Hornet** (1990)
- **F22 Raptor** (2000) - 5th Generation Fighter
- **F35 JSF** (2020) - 5th Generation Fighter

U.S. Air Force

Carnegie Mellon University
Pace of Innovation in Artificial Intelligence

USS Gerald Ford
USS Ronald Reagan (CVN-76)
USS John C. Stennis (CVN-74)
USS Theodore Roosevelt (CVN-74)
USS Nimitz (CVN-71)
USS America (CV-66)

3rd Generation Fighter
4th Generation Fighter
5th Generation Fighter

Each layer of the AI Stack is directly interconnected to the layers above and below it – so innovations in one layer have a direct impact on the others.

Each section of the AI Stack provides very distinctive functionality and purpose towards enabling Artificial Intelligence & Human-Machine Teaming.
Emerging Trends & Concepts in AI

Algorithmic Agility

- **October 2015:** AlphaGo Fan defeated the European champion Fan Hui.

- **March 2016:** AlphaGo Lee defeated the World’s Top Go player Lee Sedol – who had won the World Championship 18 times.

- **May 2017:** AlphaGo Master participated in the Future of Go summit. It won 60 straight online games, shut out Ke Jie in a three-game match, and beat a human team with five of the world’s top Go professionals

- **October 2017:** After just three days of reinforcement learning (i.e. the computer only playing games against itself), AlphaGo Zero emphatically defeated AlphaGo Lee by 100 games to 0.

- **December 2017:** After only 40 days of self-play training, AlphaGo Zero became even stronger, outperforming AlphaGo Master, which has defeated the world’s best players and world number one Ke Jie.
Emerging Trends & Concepts in AI

Algorithmic Agility

Source: deepmind.com; TechTalks
Humankind has accumulated Go knowledge from millions of games played over thousands of years, collectively distilled into patterns, proverbs and books.

In the space of a few days, starting *tabula rasa*, AlphaGo Zero was able to rediscover much of this Go knowledge, as well as novel strategies that provide new insights into the oldest of games.”

‘Mastering the Game of Go without Human Knowledge’

DeepMind
Thank You!

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