



Artificial Intelligence Opportunities

Artificial Intelligence (“AI”) is reshaping healthcare, finance, e-commerce, energy, and just about every other industry in the global economy. AI has the potential to be amongst the most transformative technologies in human history.

As an investable theme, AI is improving a wide array of services and products with many players and points of entry. Below is a brief guide attempting to summarize the components and opportunities of AI.

Generally

AI is the process of enabling machines to perform tasks that typically require human intelligence, increasingly, in a far superior manner.

Some of the primary forms of AI currently include Deep Learning (aka Neural Networks), Natural Language Processing (including Generative AI), Computer Vision, and Machine Learning.

Some daily well-known interactions with AI include:

Facebook (Meta)	analyzes past interactions to personalize content
Amazon	product suggestions based on browsing/purchase history
Outlook (Microsoft)	filters spam based on prior email behavior and patterns
Siri (Apple)	processes language to respond to requests
Netflix/Spotify	compares viewing history from millions of users to personalize suggestions
IBM	AI-powered chatbot handles customer service requests
Google Maps (Alphabet)	predicts fastest routes and arrival times

The AI stack consists of multiple subspaces and players, summarized as follows:

1. **Hardware Layer:** This layer includes the physical devices and components that provide the computational power needed for AI tasks.

- NVIDIA, Intel, AMD, Qualcomm, Google, Taiwan Semiconductor
- 2. **Framework and Libraries Layer:** These are software tools that provide pre-built functions and models for AI development.
 - TensorFlow (Google), PyTorch (Meta), Keras (Google), MXNet (Amazon), CNTK (Microsoft)
- 3. **Model and Algorithm Layer:** This includes the actual AI models and algorithms that perform specific tasks, like image recognition or natural language processing.
 - OpenAI, DeepMind (Alphabet), DALL-E (Meta), T5 (Microsoft), Bixby (Samsung), Pyro (Uber)
- 4. **Application Layer:** AI-powered applications that serve end-users or businesses directly.
 - Alphabet, Facebook, Amazon, Apple, IBM, Salesforce, Tesla, Adobe

Likewise, the Data Center stack consists of several components and technologies that are used to power large scale AI data training.

1. **Physical Infrastructure Layer:** This includes the physical hardware such as servers, storage devices, and networking equipment.
 - Dell Technologies, Hewlett Packard Enterprise, Cisco, Equinix, Arista, NetApp, SuperMicro, Juniper, IBM
2. **Virtualization and Abstraction Layer:** Software that creates virtual versions of hardware, enabling efficient resource management and utilization.
 - VMware, Microsoft, Red Hat, HashiCorp, Citrix, Nutanix
3. **Management and Orchestration Layer:** Tools and software that manage and automate data center operations.
 - Cisco, Microsoft, Red Hat, Google, Amazon, Kubernetes, HashiCorp, VMware
4. **Service Layer:** This includes the services provided by data centers such as cloud computing, storage, and networking.
 - Amazon, Microsoft Azure, IBM, Oracle, Salesforce, ServiceNow, Cisco, Datadog

Our View

Continued spending by companies on AI will increasingly require a Tangible Return on Investment.

Many Top Companies emerging in this space are private and not yet available to investors.

Long-term winners will include:

Visionary Leaders who understand the long-term direction and paths of AI

Technical Experts who possess best of breed talent with deep knowledge in AI theory, research, development, and implementation

Data Asset Holders who have access to high-quality data sets, which they leverage to train AI models, creating a virtuous self-propagating cycle

Continuous Innovators who explore a wide range of emerging technologies and methodologies and embrace significant R&D investments to anticipate and react to merging market trends

Cautions

History is littered with examples of dominant industry stalwarts that were seemingly blindsided by little-known new entrants.

Examples:

Netflix vs. Blockbuster
Google vs. AltaVista and Yahoo search engines
Apple vs. Nokia and Blackberry
Amazon vs. Borders and Barnes & Noble
Uber vs. Taxi Industry
Instagram vs. Kodak
Wikipedia vs. Encyclopedia Britannica
iTunes vs Tower Records

While disruption may appear less likely now due to the size and scale of the current leaders, there is a deep and growing pool of AI startups advancing radically different approaches. Some promising contenders include Anthropic, Cohere, Cerebras, Hugging Face, Adept, Copy.ai, Replika, Runway, Snorkel AI, and Forethought.

Bradford Stanley, CFA

Chief Investment Officer of The Stanley-Laman Group. Designer of SLG's proprietary Ad-Star® System. Brad received a BS in Computer Science from Carnegie Mellon University and is a Chartered Financial Analyst Charterholder.

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