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Part of the appeal of watching any *Star Wars* movie is seeing how all the films depict the way robots interact with people. In all nine *Star Wars* stories, robots demonstrate a fascinating capability for doing good or bad, acting on their own or with humans. Some robots are super intelligent. Some complete specific tasks. Some resemble people, while others, such as the cute BB-8 droid, do not look human at all while still performing intelligent tasks. Watching the interplay between people and machines in *Star Wars* prompts all kinds of questions about how machines are evolving in real life. Just how intelligent will they become?

For me, the most intriguing question – played in both *Star Wars* and in real life – is this: What exactly do we mean by "intelligence"? As we ride the fourth wave of industrial revolution, AI is considered the innovation driver of connected intelligence. But it's not always clear what the "intelligence" in AI really means. Is artificial intelligence the same as human intelligence? And what is the purpose of the intelligence in AI? What is the role it can and should play for people and businesses in a future world?

One definition of intelligence is "the ability to reason, plan, solve problems, think abstractly, comprehend ideas and language, and learn." With that kind of intelligence, people establish complete dominion over the rest of the natural world. However as the natural world becomes more and more occupied by human-made things, it seems there is never an intelligence as sufficient and powerful as human expected.

A person's imagination and creativity are unlimited. We can, in fact, imagine and create an intelligence that propels humanity forward. That's probably why we created AI, and why AI has evolved so rapidly. AI resembles a certain degree of human intelligence -- the type of smartness for finding, reasoning, predicting, inferencing, and recommending. To do all that, AI manages data at enormous scale and speed. But humanity's own creation, AI, also inspires mixed reactions about how AI will evolve.

What "Intelligence" in AI Means

Too often we get caught up on the trap of assigning to AI the same type of intelligence that humans possess. That's because we assume "intelligence" has a universal meaning. There are actually two forms of intelligence to consider:

- Human intelligence, which has many dimensions.
- AI, which emulates some dimensions of human intelligence, not all of it – not by a long shot.

The previous definition of intelligence is one form. Another definition of intelligence - Gardner's Theory of Multiple Intelligences, for instance, expands the palette of human intelligence to encompass visual-spatial intelligence, linguistic-verbal intelligence, logical-mathematical intelligence, bodily-kinesthetic intelligence, musical intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalistic intelligence.

By contrast, AI is focused on the more narrow perception of intelligence – the ability to reason, plan, solve problems, think abstractly, comprehend ideas and language, and learn. Consider, for instance, how voice assistants are just barely expressing personalities beyond the predictable robotic tone. Would anyone ever characterize a voice assistant as having true interpersonal intelligence? Not at all. However AI can complement forms of intelligence identified by Gardner by relieving our minds of the tedium of having to process vast amounts of information to live our lives better and do our jobs more effectively.

What Do We Want from AI?

So what specifically does the "intelligence" in AI mean? And what do we want from the "intelligence" that AI gives us?

- AI is **Assistive** to people and amplifies our capacity

AI helps people through machine-generated intelligence. AI-fueled machines undertake intensive learning and speedy computation, which helps people solve problems faster and easily. For example, AI can detect a product flaw in seconds, rather than hours and days it might take people to do the same. AI can do store demand forecasting more accurately to manage inventory, avoiding overstocking and understocking, and keeping time-sensitive goods fresh. AI can choose the best route and time to deliver goods to customers.

- AI provides **Augmented** intelligence

AI enables people to unleash our creativity by augmenting our usage of data and technology. AI thus creates a foundation for innovation, increases human productivity, and enables people to do tasks with unmatched speed, deeper reach, and broader scale. For example, autonomous vehicles, drones, and advanced medical devices enhance product and service offerings by elevating our own artistic and scientific capabilities. A truly autonomous vehicle is more than a mechanical device. It makes complicated judgments that enable people to live better lives. AI enriches our work and life instead of threatening them.

- AI is artificial, yet it should be **Authentic**

The word “artificial” intelligence implies something man-made, synthetic, unnatural, and even fake. That’s not the purpose of AI. Yes, AI is artificial and machine-like; but AI, when designed well, should be authentic. Being authentic doesn’t mean it’s 100% accurate -- an unrealistic expectation. People also make mistakes of all types, such as committing accidents, making wrong conclusions, or being biased. Using AI minimizes the rate of mistakes. As machines keep learning with proper guidance, mistakes actually provide feedback so that AI gets better – and in a shorter time frame and on a larger scale than is possible with people acting alone. That’s why the human-machine interaction is imperative.

- The intelligence in AI is **Applicable**, so it realizes the value

AI is beyond knowledge engineering, advanced technology, and scientific research. AI brings new business models, and it is a business driver. We want AI to be pragmatic, to improve our experience, automate and simplify the processes, and generate real insight. We want AI to provide expandable solutions, which can be applied to similar scenarios, can be customized with confidence, and can produce a reasonable output. We want AI to help us explore the world better, break physical limitations, reach macro and micro scope, keep people safe, and relieve people from doing heavy labor. We also want AI to deliver trustable insight and predictions.

What is the “Right” Intelligence for AI?

As promising as AI can be, how do we anticipate what would be the right intelligence in AI?

Some dimensions of human intelligence such as creativity and emotional intelligence can’t be replicated by AI. AI can augment complex forms of knowledge with the advanced research in neural science and psychology, helping human beings discover and understand the most demanding and sophisticated bodies of learning. But human creativity, imagination, critical-thinking skills, self-awareness, and empathy are unique to people. These are not within the skill set of artificial intelligence, no matter how sophisticated the neural network becomes. In summary:

- AI still leaves many forms of intelligence to people, like creativity and innovation as well as the gut feeling, emotion, intuition, and strategy.
- The explainability and interpretability should be expected from AI for people to better understand a machine’s intelligent process and outcome.
- Making important decision belongs to people. Machines help generate insight from vast amount of data and information, thus helping to make that process easier.
- The purpose of intelligence in AI is to make a person’s life better, improve people’s productivity, relieve people from mundane tasks, streamline and optimize business operation,

and reach the remote and dangerous places while keeping human safe.
- AI's value is with practical usage, both in enterprise world and industrial world.

Most importantly, intelligence is acquired through learning. Learning is the foundation of growing intelligence, whether human or machine. And learning is a lifelong process for human beings. Sometimes people say "I learned a lesson" following an instructive experience – which is also an example of growing intelligence. AI resembles certain learning mechanisms of people, like supervised learning, unsupervised learning, and reinforcement learning – which results from people teaching machines to learn. This itself is an outcome of human creativity. By learning, people can also discover good ways to help machines learn better and benefit humanity.

Pact.AI Can Help

With Pact.AI, Pactera provides a complete end-to-end portfolio of data pipeline management, advanced analytics with Machine Learning and Deep Learning, data science and data engineering services, AI application development, AI solution acceleration, and end-to-end delivery that will enable your AI vision and turn AI as business driver. Pactera is helping clients in high tech, banking/financial services/insurance, telecom, retail, consumer packaged goods, manufacturing, and healthcare solve various business challenges with AI. *Contact us* to learn more.

About the Author:

Yingwu Gao is VP of Product Engineering and AI Practice, heading the enterprise product engineering and innovation including AI, Data Science, and Cloud. Her team plays a vital role in defining and building newer market relevant products and services, such as Enterprise AI, Cloud AI solutions, and Pact.AI platform innovation.