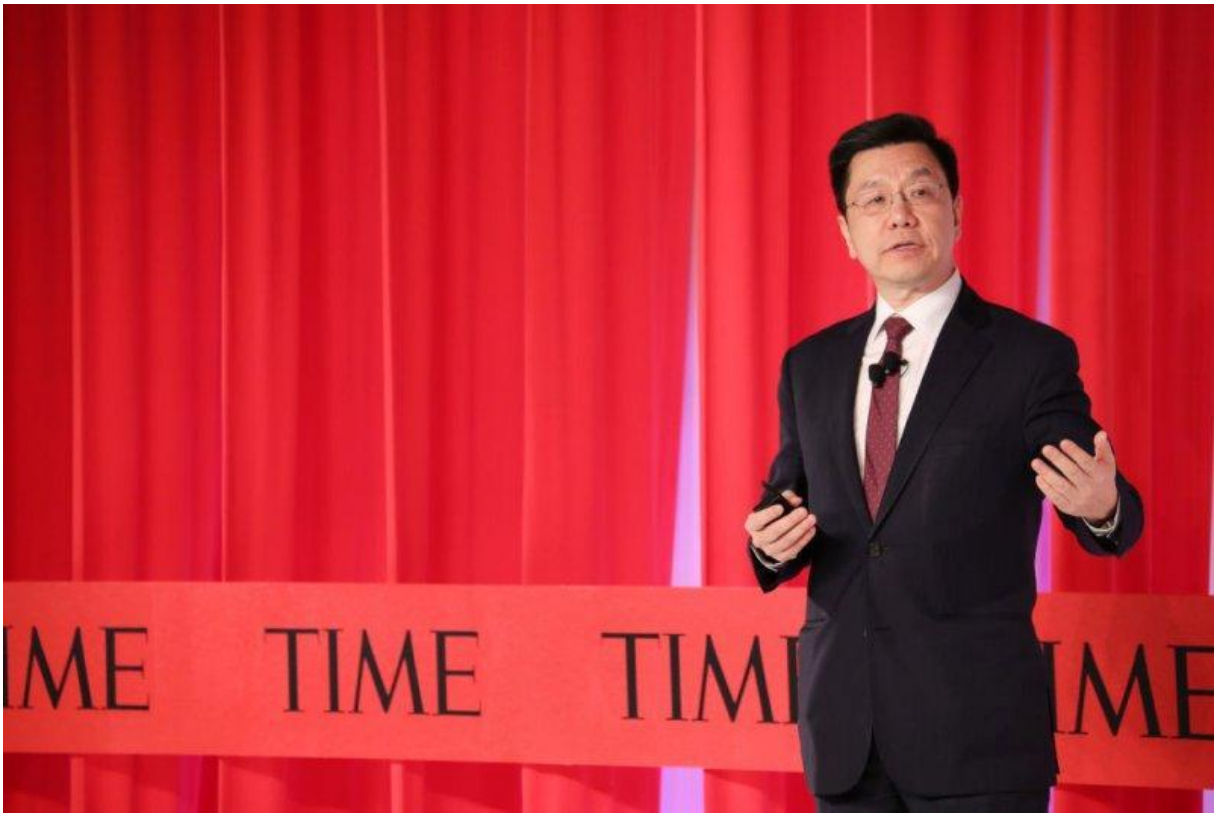
1 How AI Will Completely Change the Way We Live in the Next 20 Years



NEW YORK, NEW YORK - Kai-Fu Lee gives a talk during the TIME 100 Summit 2019 on April 23, 2019 in New York City.
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By Kai-Fu Lee
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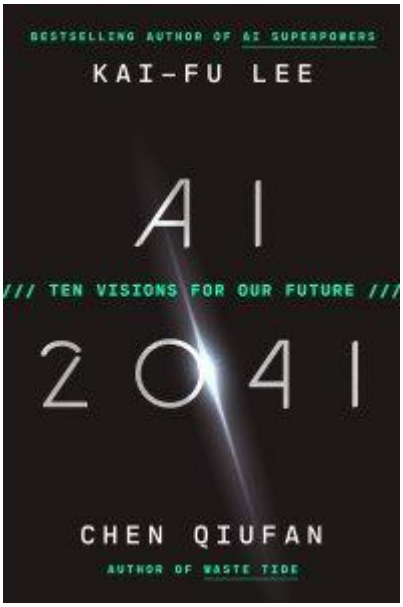
Artificial intelligence (AI) could be the most transformative technology in the history of mankind—and we may not even see much of this sweeping change coming. That's because we often overestimate what technologies can do in five years, and underestimate what they will be able to do in 20.

As I've traveled the world talking about this subject, I'm constantly asked, "what will the future hold for humans and AI?" This is an essential question for this moment in history. Some believe that we're in the midst of an "AI bubble" that will eventually pop, or at least cool off. Those with more drastic and dystopian views believe everything from the notion that AI giants will "hijack our minds" and form a utopian new race of "human cyborgs", to the arrival of an AI-driven apocalypse. Each of these projections may be born out of genuine curiosity or understandable fear, but they are usually speculative or exaggerated. They miss the complete picture.

Speculation varies wildly because AI appears complex and opaque and it is no wonder that the general view about AI has turned cautious—and even negative. To be sure, aspects of AI development deserve our scrutiny and caution, but it is important to balance these concerns with exposure to the full picture of this crucially important technology's potential. AI, like most technologies, is inherently neither good nor evil. And I believe that, like most technologies, AI will eventually produce more positive than negative impacts in our society.



Courtesy Penguin Random House

So as someone who has studied and worked in AI for the better part of four decades, I thought it would be valuable to write a book, *AI 2041*, focused on the thought experiment describing how AI will transform the world in twenty years.

The power of AI lies in its ability to continuously improve with more data, dramatically exceeding human performance, for single-domain tasks. This is why AI's greatest applications today are Internet and financial applications, where everything is digital and quantitative. In the future this will be expanded to more and more industries and domains, until eventually AI will know us better than we know ourselves. Websites, apps, and other digital devices will know our psyche and motivations through not only every click, purchase, and pause (which are captured today) but every action, movement, and speech (which will be captured in the future, in a secure way that protects our privacy).

This will have profound consequences for everything from how we work and play, to how we communicate and learn.

Rethinking the ways we work

Let's start with the idea of work. In twenty years, nearly all data will become digitized, making it possible to use AI for decision-making and optimization. AI and automation will replace most blue-collar work and "make" products for minimal marginal cost. Robots and AI will take over the manufacturing, delivery, design and marketing of most goods. AI service

robots will do almost all household chores for us. These robots will become self-replicating, self-repairing, and even partially self-designing. Houses and apartment buildings will be designed by AI and use prefabricated modules that are put together like Lego blocks by robots, thus dramatically reducing housing costs. On a smaller scale, 3D printers will make sophisticated or customized goods (like dentures and prosthetics) to be produced for minimal cost. For all of these applications, AI will work 24/7, won't get sick, won't complain, and won't need to be paid. As a result, AI will reduce the cost of most manufactured goods to a small increment over the cost of materials.

But it won't just be blue collar manufacturing jobs at risk. AI will also provide, assist or replace many white-collar jobs, doing the work of capable assistants, but with infinite knowledge. AI can help assist research analysts, lawyers, and journalists by scouring every piece of data in the world, compiling this data, giving time back to professional workers to think about more strategic and complex issues. While professional jobs are amplified by AI, routine white-collar jobs like telemarketing, entry-level accounting, or "paper pushing" will be displaced by AI. These technologies will start as assistants but take over all routine jobs completely over time. Within a corporation, AI will gradually displace entry-level routine jobs throughout each department.

All this implies a massive change to the way we work and it will be necessary to put in place measures to counteract the job losses. Retraining the workforce, rethinking how entry-level jobs work and taking advantage of the countless new jobs created by the merging of AI optimization and the human touch will all be required. It will be a huge shift, but, I believe, a positive one.

Revolutionizing healthcare

At the same time AI is upending the workforce, it will also be improving our lives in meaningful ways—including by making us healthier. Right now, healthcare is being digitized, with everything from data from patient records, to radiology, wearable computing, and multi-omics moving online. This creates an opportunity for AI to redefine healthcare as a data-driven industry, revolutionizing the entire healthcare value chain from diagnosis and treatment to also health alerts, monitoring, and long-term care.

This revolution will start with radiology, pathology and drug discovery. For the latter in particular, AI will help human scientists invent many drugs at much lower costs, thereby finding cures for rare diseases. AI will empower the field of "precision medicine," an area of applied science that tailors individualized treatments for a given patient, instead of treating with blockbuster, one-size-fits-all drugs.

As more digital information for each patient becomes available—including medical history, family history and DNA sequencing—precision medicine will become increasingly feasible. AI is ideally suited to deliver this kind of individualized optimization. Diagnostic AI for general practitioners will emerge later, one disease at a time, gradually covering all diagnoses. Because human lives are at stake, AI will first serve as one tool at doctors' disposal, or will be deployed only in situations where a human doctor is unavailable.

Safer, more efficient transport

AI will also make people's lives better on the road, where autonomous vehicles will bring about a transportation revolution. On-demand cars that take you to your destination with lower cost, greater convenience and better safety. Autonomous cars will become the safest drivers on the road, eventually reducing 90% of traffic fatalities.

The average American drives eight and a half hours per week, so in the future that is time that can be used productively in transit. Future ride-sharing autonomous vehicles will be redesigned as minicars, since we tend to ride in cars with just one or two people. But even a single-person car may be equipped with a reclining seat, a refrigerator with drinks and snacks, and a large screen.

Autonomous vehicles will be part of a full smart-city infrastructure designed to host autonomous vehicles as part of an interconnected transport system. As automation rates increase, cars will be able to communicate with one another instantly, accurately, and effortlessly. For example, a car with a blown tire can tell nearby cars to stay away. In addition, consider a car passing another can communicate its movement path precisely to nearby cars, so two cars can be two inches away, yet with no risk of collision. Or, if a passenger is in a hurry, their car can offer an incentive (say five cents) to other cars for slowing down and giving the right-of-way. These improvements will create an infrastructure of mostly AI drivers, eventually.

Enhancing the education experience

So far, we've mostly talked about the impact AI will have on adults. But kids will feel the effects, too. AI will become our children's most effective teachers, grading exams and answering common questions with greater precision and patience than human teachers. Unlike human teachers who have to consider the whole class, a virtual teacher can pay special attention to each student.

An AI teacher will notice what makes a student's pupils dilate or eyelids droop. It will deduce a way to teach geometry to make one student learn faster, even though that method may fail on a thousand other students. AI will give each student different exercises, based on his or her pace, ensuring a given student achieves a full mastery of a topic before moving to the next. With ever-more data, AI will make learning much more effective, engaging, and fun.

In this AI-infused learning, teachers will be human mentors and connectors for the students. Human teachers will be the driving force behind stimulating the students' critical thinking, creativity, empathy and teamwork. And the teacher will be a clarifier when a student is confused, a confronter when the student is complacent, and a comforter when the student is frustrated: roles AI cannot play.

Augmenting our home lives

When we leave school and work, AI will be waiting for us at home—opening up new worlds of immersive entertainment and delivering a virtual experience indistinguishable from the real world. Combined with technologies like virtual reality (VR), augmented reality (AR) and mixed reality (MR), the boundaries between real life, remote communications, games, and

movies will blur. By 2041, we will be able to teach children science by having them interact with virtual Albert Einstein and Stephen Hawking, and use VR to design specialized treatment for psychiatric problems, such as PTSD. AI will make great toys and companions—in VR they will be fully photo-realistic, and as robots they will become increasingly realistic. AI won't, however, be able to truly love us back.

Problems and solutions

As our generation witnesses the beginning of the AI revolution, we will also be forced to deal with the downsides of this new technology, which are already emerging. AI, like all technologies, can be a double-edged sword. These problems include privacy, bias and security. Extreme misuse of AI technologies such as deep fakes or autonomous weapons can lead to major threats.

It's my belief that technology-induced problems are often most effectively solved by technology-based solutions. Think about the advent of the circuit breaker to avoid electrocution, and anti-virus software to stave off computer viruses. Right now, many people are worried that AI accurately targets individual users with content and ads that can result in addiction or opinion-shaping behaviour, and that large Internet companies are unlikely to self-regulate because dampening accurate targeting would also reduce profit.

As a result, many feel government regulations are the only solution. While regulations are necessary, I believe it is equally important to pursue private-sector mechanisms and new technological solutions to solve these problems, and incentivize companies to build responsible AI. Entrepreneurs and investors should explore new ways to align corporate interest in long-term user benefit (such as increased wealth, knowledge, or happiness) rather than short-term user behavior (such as click-through or money spent). Watchdogs could use dashboards to track large Internet companies' performance in responsible AI by measuring complaint frequency against metrics like "fake news" displayed or "AI bias and unfairness" to hold them to account or pressure them to improve.

Privacy of data is a major concern, particularly in the field of healthcare. But there is an emerging field called "privacy computing" that shows signs of promise. For example, federated learning is an AI technique that trains AI across multiple decentralized devices or servers holding local data samples. It approximates centralized training, while disallowing the central AI owner to see the data. Another method known as "homomorphic encryption" encodes the data in a way the AI owner cannot decrypt. AI is trained directly on the encrypted data. This doesn't work on deep learning yet, but future breakthroughs are possible. Finally, a trusted execution environment (TEE) reads encrypted and protected data, and decrypts the data for AI training on a chip in a way that guarantees that the decrypted data will not ever leave the chip.

Each of these technologies still has bottlenecks or technical issues that prevent them from building powerful AI while fully protecting personal data. But over the next twenty years, I anticipate significant progress.

I am confident that by combining regulation, private sector mechanisms, and technology solutions, the AI-induced risks and vulnerabilities will be addressed, in ways similar to every other technology tidal wave that we have experienced.

AI in 2041 will be as challenging as it will be exciting. AI will create efficient services that will give us back our most valuable resource—time. It will take over routine tasks, and liberate us to do more stimulating or challenging jobs. Humans will work symbiotically with technology, with AI performing quantitative analysis, optimization, and routine work, while we humans contribute our creativity, strategy, and passion. Each human's productivity will be amplified, allowing us to realize our potential. We are the generation that will inherit the unprecedented wealth from AI, so we must also bear the responsibility of rewriting the social contract and reorienting our economies. But if we do, and if we begin to plan for the future now, AI will create unprecedented economic opportunities, save millions of lives and push us into thinking more deeply about what really makes us human.

https://time.com/6097625/kai-fu-lee-book-ai-2041/ (Accessed 14 September 2021)