Hi, this is Craig Smith with a new podcast about artificial intelligence. I’m a former New York Times correspondent now focused on AI. I have been talking to the people who are making a difference in the space and am bringing the most interesting of those conversations to you. This week, I talk to Kaifu Lee, a thought leader on AI in China who just published the book, [AI Superpowers: China, Silicon Valley, and the New World Order](https://www.amazon.com/AI-Superpowers-China-Silicon-Valley/dp/132854639X) just came out. Kaifu, who did his PhD in speech recognition AI at Carnegie Mellon founded both Microsoft Research and Google in China. He now runs [Sinovation Ventures](http://www.sinovationventures.com/), a venture capital fund in Beijing. We talked about the premise of the book, which is that China has already caught up with the US in the field of AI and is poised to surpass it. I hope you find Kaifu as interesting as I did.

CRAIG: Going through the book it looks like you're talking less about national competition than about national competency. Which are very different things because competition implies that one country will dominate another at the end of the day. But what you're talking about really is China developing an AI competency that's equal to or ahead of that of the United States. Can you talk a little bit about that?

KAIFU: I think the two are very correlated. If you have extremely strong competency you will become the leader in the world. So, China has a number of unique advantages, the greatest of which is the huge amount of data. And then the great engineers, companies, entrepreneurs, who are using it to find holes in its sometimes backward traditional economy. And when the economy's backwards you can have a late mover advantage and reinvent retail schools communications, health care, and so on.

Also, I think the government has taken a very techno utilitarian approach which is really to let technologies to be tried before going to regulation. And not working out the kinks before getting the technology to launch. And these factors will propel China forward. While the U.S. does have much deeper research bench, China is rapidly catching up and developing a young cadre of very smart AI engineers who arguably matter more than having a small number of AI superstars because we're now in the age of implementation.

In the age of discovery the US brilliant researchers clearly have an edge. Geoff Hinton, Andrew Ng and so on. The research ruled. But now it's really more about landing the technology in a real business and making money with it. And for that the Chinese make up in AI companies is much more formidable, much more scalable, combining fearless hardworking tenacious entrepreneurs with hard working AI engineers - not writing so many papers but just getting things done, getting problems solved, improving efficiency, profits for banking, reducing costs for factories. It's happening everywhere around us. So, these are the conditions that make up an AI superpower in a very different way than, you know, when you think about national competition. It's more who can build more nuclear warheads, but here we have a very different set of competencies that makes China way ahead in some areas and still way behind in others. But the ones that really matter for the foreseeable future are the elements in which China is strong.

CRAIG: To date the developments in AI are largely confined to their respective markets. The Chinese are developing technology for implementation in China. The U.S. is developing new technology for implementation primarily in the English-speaking world. Or at least the American and European worlds. Can you say that China is ahead if its implementations are restricted to its own market. And one of the things that I've been waiting to see: When are these technological super companies in China going to succeed outside of China. And that's something we really haven't seen.

KAIFU: I have a two-part answer to that but I really think it's not the right way to look at the problem. People think of China as one of the hundreds of markets so you only have one market. What good is that. But my answer is that China is larger and more important and more valuable than the rest of the world combined. And so yes, it's not the whole world. But it may be half the world. So why is it half the world? Well if we look at all the mobile payments that are gathered, which form the strongest basis for AI learning, China has more than the rest of the world combined. If you look at computer vision, gathering of images, face recognition and so on, China has more than the rest of the world combined.

I think the evidence is that the Chinese computer vision companies are worth ten billion dollars. The American ones are worth hardly one billion. So I think to position it as China has only one of the markets and what about the rest of the world, is missing the very facts in front of us, which says China has so much more data and so many more ways of gathering data - and that includes a larger market and more advanced digital collection system, putting sensors and inputs from everything from retail to airports, gathering information from payment activity, this amount of data is phenomenal. And I would argue, if China companies were restricted to stay in China for the next 10 years the total capitalization of Chinese AI companies will still be larger than the rest of the world combined. So that's the first half of my answer.

The second half is that the Chinese companies are looking to go abroad, but they're going abroad in a very different way and arguably a smarter way than the Facebooks in Googles. History of tech colonialism is such that America dominated the world. So, Windows and Intel took over the world and had a 100 percent and demanded adoption whether their products were well localized or not. And China was one of the technically colonized countries in the sense of using PC hardware and software. However, in the age of mobile Internet that's not the case anymore. The American technologies are reaching less and less of the world. Chinese technology is actually reaching more and more of the world but not in the same way.

You don't see anyone using [DiDi](https://en.wikipedia.org/wiki/DiDi) in Indonesia. However, DiDi is very cleverly partnering with all the locals so as to form an alliance of the insurgents against the American hegemony. Uber is trying to dominate the world using one brand, one platform, one world. That's the typical American way. Windows, Microsoft, Intel and then going on to attempts by Yahoo, Google, Amazon, with less success but still decent success. But that method is not going to be good enough anymore because technologies now touch physical aspects of our world. Putting Uber in Brazil is not a trivial matter. There's government relations, there's usage patterns, there's taxi coalitions. So, it requires a local to be successful. So, the Chinese AI company approach is 'Let's partner with the locals.' So, Didi has [partnered with locals](https://qz.com/1203151/didis-global-expansion-playbook-is-the-opposite-of-ubers/) in Southeast Asia, South America and is greatly expanding its footprint against Uber. And it doesn't own the local partners. It owns maybe 20 percent, 30 percent, maybe with Softbank, maybe by themselves. And is forming a very powerful alliance where the local companies now feel they have a chance at building products for their own country.

So, China has been through the technical colonialism. So, it's empathetic to other countries and develops ways to work with them to give them money, business, knowhow, experience and perhaps even AI technology and maybe sharing of data parameters at the end of the day. Tencent and Alibaba are among the largest investors in tech in the world. So, it's just the method is different. See the American companies really want one brand, one technology, one platform, own it all. But I think the days of that may be over.

CRAIG: We're talking about corporate AI not national or military. And increasingly these companies do not have a particular national identity. I mean, they may be based in one country or another. Google's a good example. It owns Deep Brain and Geoffrey Hinton works for Google in Canada. Is that happening with China as well? Is that what you're suggesting. That these Chinese giants are first of all private companies or at least quasi private companies and their influence or their profile is becoming increasingly multinational?

KAIFU: Clearly, Baidu, Tencent and Alibaba all have Silicon Valley offices in which they each employee hundreds if PhDs. So, there is certainly a desire to take talent from all over the world. They do have plans to go into other markets. So, yes, they want to become global companies in both senses of that.

CRAIG: Again, in terms of the framework of your book, AI Superpowers, are the superpowers the companies or the superpowers the nation states.

KAIFU: The collection of companies in each country. Yeah, I was not making a case of a nationalism or military. I was not going into that. That's not my expertise. I have no visibility into either U.S. or China, NSA or you know People's Liberation Army efforts. So, I don't cover that.

CRAIG: No certainly. But what I'm saying is that as long as it's not a government-owned effort, as long as it's within the sphere of private enterprise, increasingly they are not national efforts. They're multinational efforts. [Geoff Hinton](https://nyti.ms/2tWNIfb) is a good example, I mean he's a Briton, I think he may now have Canadian citizenship, but he was educated in the United States and worked for a long time in the United States and is now living in Canada. You know that's not American AI, the things that he's developing. It's very international and even with the Chinese PhDs, they study in the U.S., they do research in the U.S., they go back to China. They work in China or they come back to the U.S. and work. It just seems like it's becoming very fluid. And it is going to be increasingly difficult to talk about national strategies other than at the level of education.

KAIFU: Yes I agree with all the points you made and I think that all these things you mention will expand. But at the same time, you know China as well as Canada have had fairly effective national policies that build up national infrastructure for investment, advancement, education, training, improved roads for autonomous testing, help with the VC funding of AI companies. So, each country is rightfully trying to create more tax paying AI companies that will bolster the country's competitiveness. So, I think that's not directly in conflict with the globalization effort you talk about.

CRAIG: To me that is where the idea of national AI strategy has its greatest impact, is in the economy. So, it's not that China is competing with the U.S. to become some sort of a master of AI or that the U.S. is competing with China to dominate in AI. It's that the implementations and the basic research that's coming out of each country will have an impact on each country's economy and in the Internet age and with repositories like [arxiv](https://arxiv.org/), the developments in research on one side of the world are disseminated at lightning speed all over the world. So, it's very difficult to have an edge in one country or another. So, what you're talking about really is the entrepreneurial ecosystem that drives unique implementations, not so much about developing algorithms or systems that are unique to one country or the other.

KAIFU: Yes, I think the academic parts of the AI community is very naturally transparent, helpful, honest, use the common data set with the experiments being replicable. So, it's quite different from other sciences where it's not always easy to replicate say a clinical trial. Because of AI's digital nature allows it to be validated, tested and therefore people are basically standing on the shoulders of giants who are eagerly publishing in order to get academic credit but not extending any sort of, you know, national edge, which may or may not be wanted by the government. But if it did want it, it's very hard to actually consummate that.

Having said that, there are some possibilities where the U.S. or any other country could take significant leadership. For example, you know, a lot of the world's best AI people are in Google. And if they make a breakthrough and choose not to publish, well they as a company will have a leadership position to build products others may not be able to replicate. And that would be indirectly a national advantage, should that happen.

CRAIG: Again, I'm not sure whether it's a national advantage or a corporate advantage. In your book you talk about the risk of hermetically sealed corporate environments. Already just going to conferences I can see there is some grumbling about papers being presented, being awarded prizes, that do not give enough of the code to be reproducible.

KAIFU: So even when the original publisher doesn't want to give away source code other people can build it. Because machine learning code is not very large or complex, the replication once the algorithm is known is not an extremely time intensive kind of thing.

CRAIG: The three elements of successful AI are the code, the algorithms, the data, but also the computing power. The computing power in the United States or in the West is really controlled by large corporate interests. Is that the same in China or is there a government aspect to that that helps individual companies.

KAIFU: There is no government subsidy for computing per se, but obviously if you receive some subsidy you can use it on computing if you want. But for a lot of the common big data types of AI, you really don't need that much computing. What we generally talk about are the most complex forms of computing.

If you have a powerful single server with a couple of GPUs that will take care of most computer loads for anything up to video computer vision types of applications.

CRAIG: You talk about data, certainly that's one place China has a clear advantage. Partly, as you note because of the different privacy environments, but also because Chinese society is so interconnected that there's a lot of data being collected all the time. Is that something, again, that you think is giving China an advantage globally? Or is that only in its own market? Or is that allowing them to develop implementations that they can take outside.

KAIFU: China's approach going globally is largely through partnerships. So, for example DiDi's partner in Indonesia, Singapore or India will apply local privacy data restrictions and policies.

So it's not up to Chinese companies to decide. Just like when U.S. companies go to Europe they have to follow [GDPR](https://eugdpr.org/) now. So is it very much controlled at each country and given Chinese AI companies approach to going abroad, it is not doing so by itself, partnering locally, it will get taken care of by the local partners.

CRAIG: I meant more that in developing implementations, there's tremendous data available and it's much easier to get your hands on in China than it is in the U.S. For example in medical implementations, it's a problem because medical data is so tied up in privacy laws. But in China I've been told that there's a lot more opportunity because a lot of the medical data is more readily available to developers.

KAIFU: That is a possibility. The issue is also it has to be quality data. So, because the quality of healthcare is significantly lower in China compared to the U.S., China's data quality is not at the U.S. level. So, we'll have to see how this plays out with potentially much larger group of lower quality data. Whether that's good enough to build systems or not, I think that remains to be seen. But the theoretical relative openness to data sharing is certainly an advantage for Chinese AI companies.

We should also clarify that it's not like Chinese users don't care about privacy. It's just that there is a greater degree of openness to using some data if there is a clear benefit to the user, such as better treatment, safety, or convenience or monetary savings. There is a greater willingness to do that. Companies generally do have to disclose to users that they're collecting data. More users may say Okay. And also, the Chinese laws prohibiting sale or transfer of private data to other companies. So, taking to Facebook-Cambridge Analytica example, people would actually potentially be put in jail for doing what they did. So, it's not like the laws are loose and people are copying data everywhere. I think people get that impression.

CRAIG: When you talk about superpowers, you're talking about China as a nation or Chinese companies as a superpower. But there is an economic impact to the development and implementation of AI. Do you think that that impact or that effect on the Chinese economy is going to help China close the economic gap with the United States.

KAIFU: Well given both countries are superpowers, it's hard to predict how the numbers will go. I think it's probably safer to say that U.S. and China will increase their gap with the rest of the world.

CRAIG: The other advantage that the U.S. has is in being an anglophone nation and so much of education in science and technology is in English. But in terms of being a power globally, is that a restriction do you think?

KAIFU: I do think there is a big advantage for the U.S. What you describe in the language is a part of that. But I think, really, it's the U.S. research and university system that draws the world's smartest people to study in the U.S., many of whom stay in the U.S. afterwards. And that ability to really bring in the world's smartest people helps the US, despite its much smaller population to China, to actually end up with a larger technology elite class than China. And that has been the U.S. advantage going back decades, if not centuries. And that advantage will continue for the US.

CRAIG: Is there a way for China to balance that, because you're talking about, you know, this age of implementation. But that's very different than, as you called it, the deep bench research that is happening in the United States. Will that eventually happen in China? Is there a move toward building that sort of capability?

KAIFU: The Chinese central government would love to dramatically improve universities and research and in fact they have improved a lot over the last 20 to 30 years.

But it takes maybe a century for any country to elevate its universities to be best in the world. It took America that long. So, this isn't something that can be quick-fixed. We see small efforts, such as allowing universities to pay more to bring in really smart international talent in AI and setting up research institutes and things like that. But these are all just Band-Aids not the ultimate solution. The ultimate solution is, you have to make teaching and research a very respected and well-paid job. And also, you have to divert people from going to Alibaba, Tencent and startups and stay at universities and you have to make that job career interesting and pay competitive. And then there's also, on top of that, the problem of attracting global students to study, whether that would happen some day or not. So, I just think it's 50 years of slow progress kind of thing because you just don't see any country elevate its education system and research capacity that fast.

CRAIG: When you talk about China catching up or surpassing the U.S., you're talking about implementation. One of the reasons China has been able to build up corporate entities that now are strong on their own is because they were operating in a closed market. I mean that may be less important now than it was but certainly Baidu - you know this better than anybody - would probably not have been able to compete with Google had Google been able to operate in an unrestricted way in China. Tencent may not have developed WeChat had Facebook or Twitter been able to operate in an unrestricted way in China. Do you think that sort of national protection is still important? And do you see that changing at all?

KAIFU: I think at this point and probably for the last five or 10 years it's really a non-issue. That is, China has developed into a parallel universe as I described in my book.

So take a U.S. company and say, let's have you do a China version completely unencumbered. They will almost certainly fail. Because the entire building blocks are different. The users are different. Their habits are different. And they're working against incumbents that have massive brand, technology, user loyalty as well as local knowledge and the huge amount of data that it takes to build AI and then the large data gives the local companies better AI and better products. And all of which, really, I think make it very difficult for a U.S. company to come in at this point. I would also add the reverse is also true because in a parallel universe it's going to be just as hard for a Chinese company to do something in the US as well.

For those of you who want to go into greater depth about the things we talked about today, you can find a transcript of this show in the program notes along with a link to our Eye on AI newsletter. Let us know whether you find the podcast interesting or useful and whether you have any suggestions about how we can improve.

The singularity may not be near, but AI is about to change your world. Pay attention.