Predicting the Future:
Dr. Hsinchun Chen of the UA's Artificial Intelligence Lab

By Jorge Gonzalez-Garcia

"In any business, being able to predict the future is the killer app," says David Pogue, tech columnist for the New York Times. Dr. Hsinchun Chen, MIS professor at the University of Arizona's Eller College of Management, would add "research lab" to Pogue's quote. Because at Chen's world-renown Artificial Intelligence Lab, taking raw data and turning it into useful knowledge in order to make predictions is the daily order of business.

"Artificial intelligence, in general, is turning information into knowledge that people can use," says Dr. Chen. "And analyzing the data in a meaningful way is what allows us to predict likely outcomes." A modest way of saying "predict the future."

On an afternoon in late March, Dr. Chen, 54, is sitting with his wife and son, Hugh, in a large ballroom at the university, smiling and looking dapper in sports jacket and tie. More dapper than one might expect for a MIS professor, but fitting attire for the successful tech entrepreneur that he happens to be.

Dr. Chen has a very good reason to smile -- he has just been named Innovator of Year at the University of Arizona. It is his second such award. The first one came in 2004. In a room full of world-class researchers and entrepreneurs, he is the only one who has been recognized twice.

The road to academic, research and entrepreneurial success for Dr. Chen started three decades ago back in his native Taiwan. "I was educated at National Chiao Tung University, which is like the MIT of Taiwan," says Chen. "Then I studied at SUNY Buffalo and at NYU, but Arizona was always my target school when I was looking for a job.

Even at the time I was looking, the UA MIS department was already ranked in the top five nationally. I chose this department, and so I have been able to pursue my career." At most universities, MIS departments tend to be research oriented to the exclusion of real-world applications. Not so at Eller.

Dr. Chen explains the direct, hands-on approach. "We do systems development, and we create tangible products. Our research leads to new systems and new aggregates, and this is different from what most MIS departments do. It's hands-on work, creating the mathematics, then the system to gather the information, and then analyzing the information to gain the knowledge."

In the world of big data analytics, Dr. Chen is well known for the innovative systems coming out of his AI Lab. "The AI Lab is a research lab within the Eller College of Management," he explains. "I founded the lab in 1989. What we do is develop new technologies and algorithms that can be applied to different information systems and application areas. I've been doing that for 24 years."

When asked to explain an algorithm, Dr. Chen smiles – the kindly professor being reminded that not everyone speaks the esoteric language of mathematics and computer science. "An algorithm is simply a set of instructions and calculations. And, they have to be inside the computer in order for them to do their magic."

One of the most important developments to come out of Dr. Chen's AI Lab was the COPLINK system. He recalls the early days, and this first big challenge. "Back in 1995-1996 when we were getting started, the Tucson Police Department had a system that was very hard to use," he says.

"It was difficult for officers to get and share information with other departments around the country. Every jurisdiction had their own system, and they couldn't talk to one another." "With our system, the 3,500 police departments across the nation could finally share information easily," he adds. "That had never been done before."

"And we put in another important element, and that was data mining. We linked criminal characteristics and associations, and so instead of having to spend 48 hours comparing records, now you could do it in two or three minutes."

"So analyzing the information in an intelligent way, was another element in our system that had never been done before. It was like having a super detective in your computer system just waiting to answer your question. And able to do it a million times faster."

Using the data mining experience gained from the COPLINK project, Dr. Chen and his team at the AI Lab moved next to their most ambitious undertaking, the Dark Web project. Working with their partners at terrorism research centers and intelligence agencies, they developed a sophisticated new system to help combat terrorism.

"We have radicals and terrorists in different parts of the world spreading their ideas," Dr. Chen says. "If you take the available data and analyze it in an intelligent way, defense analysts and policy makers can see how the ideas spread, how individuals become radicalized, and they can create policies to counteract that. This all stems from an evidence-based approach."

"A lot of people pay attention only to what radicals say, but you have to look at what they write. And this additional information, with good analysis, gives analysts a better tool. We have the largest database in the world, with close to 2,000 Web sites, and a billion records. So an investigator at Interpol does not have to go to all those sites, or sift through all that data. It's all at his fingertips."

Developing sophisticated systems for law enforcement agencies provided an entrepreneurial opportunity for Dr. Chen. In 1999, he founded Knowledge Computing Corporation, a UA software spinoff company to commercialize the COPLINK system. KCC was then bought out by i2, a leader in intelligence analytics, in 2009. The combined KCC/i2 firm was then bought out by IBM for $500 million in 2011.

Dr. Chen is grateful for the success he has earned, and points out how his former students and colleagues have also benefited. "To succeed in business or academia, everything has to be a win-win situation," he says.

"For my Ph.D. students, they're the ones who do the research, publish the papers and get the funding. I've had about 10 of these students who were involved in the COPLINK project, and they went on to teach at other universities, including ASU, Virginia and Boston University. We were able to help them find good career paths."

"For my other students, the undergraduate and masters students, some of them became employees at my own company, including a VP of Engineering," Chen adds. "And some of those students got a good payoff at the end. Even the other students, when I look at their careers, were able to get good IT jobs at big companies, like Google and Amazon. I train the best professors and the best IT engineers I can."

"And they are able to have good careers as a result of the experience received working on these projects." One of the students Dr. Chen hopes will continue to do well is his own son, Hugh, 19, and an undergrad at UC Berkeley.

When asked if his son is interested in following in his footsteps, the educator, researcher and entrepreneur nods and smiles. "The short answer is yes. He is studying computer science, with a minor in economics. He enjoys it, and he is doing well. He survived his first semester, and just finished up a 16-hour hack-a-thon.

"I hope he will do something interesting, something he loves, and something that has an impact on society. To know that he is interested in the work I've done, that is very satisfying for me."

When asked what it is he sees ahead for himself and the AI Lab, Dr. Chen's eyes light up and the familiar smile returns. "Actually, I've put a lot of thought into what I want to do in this next phase of my career. It will be in health care and patient support."

"So, this is my passion. With my understanding of technology and healthcare, I can use the lab and the company I started, DiabeticLink, to help people all over the world, including the U.S., China, Taiwan and Denmark. We support diabetes patients now, and then later it will be other diseases, like lung cancer and heart disease."

Warming up to the subject, Dr. Chen continues, "We're entering the era of health big data. There's so much information, about our bodies, the human genome, plus all the insurance and patient records. How do you combine all that in a way that supports patients? I want to help educators and physicians with better data so they can make better decisions. With evidence-based records, people can take better care of themselves. So, I think this is a golden age for people who do work like me. I have 20 years of experience in the field, so I'm excited and ready to go."

Hugh Chen should make a note. His father's shoes just got a little bigger.