

CASE STUDY
Z BY HP AMBASSADOR



TAO SHEN: SOLVING THE WORLD'S HEALTHCARE CHALLENGES, ONE DATA SET AT A TIME

From COVID vaccines to brain hemorrhages, Z by HP accelerates finding answers





For years, Tao Shen has been captivated by the potential for data science to dramatically transform healthcare across the globe.

As a student in Shanghai, he was drawn to and excelled in math and science. He says, “At the time that I was applying to colleges, biomedical engineering was in growth mode and I found it fascinating.” He entered Southeast University, a public research university located in Nanjing, Jiangsu, China, as a biomedical engineering student. Shen studied there

for seven years, earning a Bachelor of Engineering (BME), as well as a Master of Engineering in Medical Image Processing. He says, “I knew virtually nothing about the data science or machine learning fields when I went to university. I soon discovered them and was impressed and excited by the potential of these powerful disciplines.” He secured an internship as a deep learning engineer at Envision Energy, a leading smart wind power technology and energy storage solution company.

AT A GLANCE

TAO SHEN, SHANGHAI, CHINA

- Healthcare AI Developer
- Master of Engineering, Medical Image Processing, Southeast University
- Bachelor of Engineering, Biomedical Engineering
- Kaggle Grandmaster; 11 gold medals, highest ranking is in top 8 worldwide
- Invited to speak at Kaggle Days China
- Loves to play basketball



As a Z by HP Global Data Science Ambassador, Tao Shen's content is sponsored and he was provided with HP products.

Upon graduating, Shen accepted an engineering position at ReadSense, an AI start-up specializing in real-time embedded computer vision systems. He explains, "I worked on large-scale facial identification and verification and was the winner of a face anti-spoofing attack detection challenge

world. He believes that although business and Kaggle differ in many ways, Kaggle offers significant benefits to enterprises. "On Kaggle, we compete with thousands of other data scientists, developing innovative models and systems to help us win. At work, we are all competing for customers. So, companies can

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Tao Shen, Z by HP & NVIDIA® Data Science Global Ambassador

hosted by the Computer Vision Foundation." Face anti-spoofing attack detection is critical to guarantee the security of face-based authentication and facial analysis systems that are gaining popularity in daily tasks, such as phone unlocking.

Business applications of Kaggle

It was during this time that Shen joined Kaggle, the world's largest online data science community, and he went all in winning five competitions in his first six months on the platform. Today, he is a Grandmaster, holds 11 gold medals, and at one time, was among the top eight highest ranked Kagglers in the

benefit from the skills, techniques, and models that are developed on Kaggle, to help them get to market faster and develop or expand their competitive advantage."

Shen adds that another benefit of Kaggle is that, at work, a person will typically only experience one type of data. For instance, a facial recognition engineer will only work with images. But on Kaggle, data scientists have the opportunity to work on a broad range of projects, from predicting insurance policy purchases to identifying landmarks to predicting survival on the Titanic and classifying toxic comments on social media. And because competitions attract top



SOLUTION HIGHLIGHTS:

HP Z8 G4 1125W PSU

- Dual Gold Intel® Xeon® 2 x 6254
3.1 GHz 18C - CPU
- NVIDIA® RTX 8000 - GPU
- 96GB (6x16 GB) 2933
- Ubuntu 20.04
- Z by HP Data Science Software Stack

Z38C DISPLAY

- 37.5-inch diagonal curve
- 3840 X 1600 at 60 Hz resolution

HP ZBOOK STUDIO G7

- Approx: 4 lbs/2 Kilos
- i9 – 10885H processor
- 32GB RAM
- NVIDIA® RTX 5000 (16 GB VRAM)
- 15.6-inch display
- Ubuntu 20.04
- Z by HP Data Science Software Stack

PRE-LOADED, POPULAR DATA SCIENCE TOOLS, TURN-KEY & READY OUT OF THE BOX:

Z by HP Data Science Software Stack

Learn more:

Z by HP Data Science Brochure

experts from across the globe, participants gain exposure to a broad range of ideas and perspectives, enabling them to continually learn and grow.

Shen returned to the healthcare field, accepting a position as a senior research engineer at an AI lab. There, he focuses on bioinformatics—an interdisciplinary field that develops methods and software tools for understanding biological data—and the research and development of biomedical image analysis algorithms to assist physicians in the early detection and prevention of disease. “I’m working on protein structure prediction; the way proteins fold can lead to diseases or help us develop treatments. It’s a challenge that scientists have been working on for decades and AI can accelerate the process of finding answers,” he explains.

Compute muscle fast-tracks advances

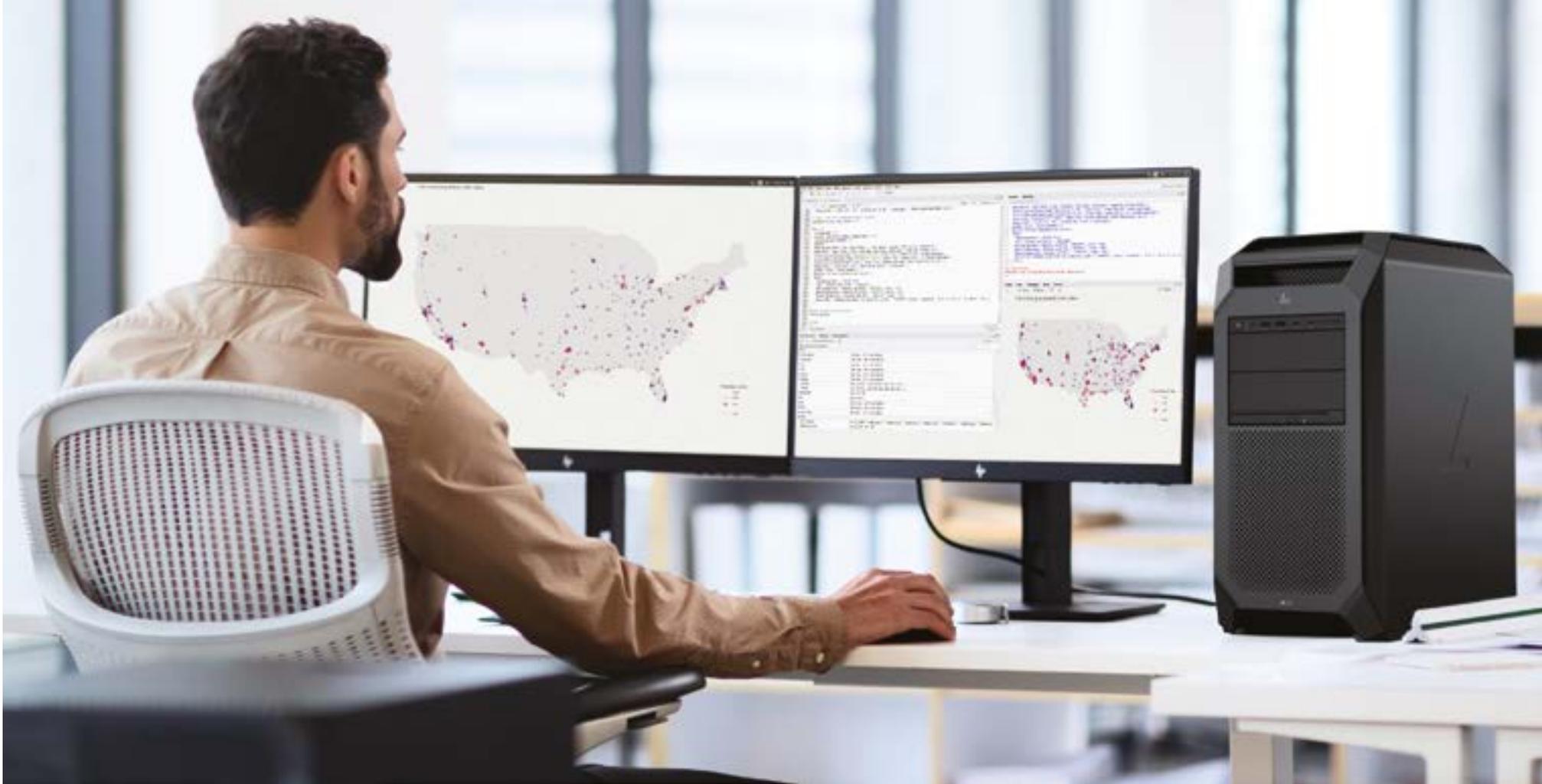
Deloitte estimates that efficiencies gained through data science and machine learning use cases can save between 380,000 to 403,000 lives annually in Europe alone. As a Z by HP & NVIDIA® Data Science Global Ambassador, Shen uses the HP Z8 G4 Tower Workstation with an HP Z38c LED monitor, and the HP ZBook Studio Mobile Workstation as tools to help drive healthcare advances.

Case in point: In the race to develop a COVID-19 vaccine, a Kaggle competition asked data scientists to develop models and design rules for RNA degradation to help solve a problem that had eluded academic labs, industry R&D groups, and supercomputers. Shen then put his Z8 workstation to the



“THE MACBOOK COULD NOT HANDLE MY RESEARCH, AND I COULD NOT DO TRAINING CODE ON IT. WITH THE ZBOOK, I INSTALLED ALL MY TRAINING CODE AND CAN RUN IT EASILY. I CAN SIT OUTSIDE OR TRAVEL AND STAY PRODUCTIVE. IT’S AMAZING.”

Tao Shen, Z by HP & NVIDIA® Data Science Global Ambassador



test. He says, “Biomedical research demands huge computational resources. The Z8 has two GPUs, each with more than 5,000 cores, so it’s exceptionally powerful and fast. I can run an experiment on the Z8 in one hour compared with five to six hours that it used to take me. I was so impressed I wrote about it in a [Chinese blog](#).”

He notes that in addition to accelerating his work, he can also multiply it, running four to six

experiments in parallel, something that wasn’t possible with his previous machine. “Running so many experiments at the same time makes the GPUs hot but the cooling system on the Z8 is great and keeps it running,” Shen says.

Cutting compute time for detection

He also used the Z8 to reproduce his award-winning intracranial hemorrhage detection

project. The Radiological Society of North America (RSNA) Intracranial Hemorrhage Detection and Classification Challenge required teams to develop algorithms to identify and classify subtypes of hemorrhages on head CT scans. Shen says, “This project meant a lot because we were helping the medical community identify the presence, location and type of hemorrhage in order to quickly and

effectively treat affected patients—helping to save lives and limit disability.”

While Shen completed his submission before his ambassadorship, once he saw the power of the Z8 he wanted to understand how it would improve the process. He says, “I really struggled with my machine the first time around. At 300GB, the data set was massive and took me between two and three

KAGGLE: LEARN, COMPETE, CHANGE THE WORLD

- Over 6 million registered Kagglers solve data science problems, gain access to powerful tools and resources, and compete for prizes.
- There are five tiers: Novice, Contributor, Expert, Master, and Grandmaster. Currently, there are 211 Grandmasters.
- Kaggle has run hundreds of competitions, from improving gesture recognition to improving the search for the Higgs boson at CERN. Competitions have resulted in successful projects including furthering HIV research and traffic forecasting. The learnings that result from the competitions and shared on Kaggle are being transferred into enterprise workflows to transform how business works.

Visit www.kaggle.com to learn more.



THE POWER OF Z:

Run experiments in one hour versus five to six hours

Slash model training time from two to three days down to six hours

Cooling system provides ideal temperature control

ZBook runs training code with power and speed

days to train the model. With the Z by HP solution, training time was just six hours—an incredible time savings.”

Shen finds the ZBook Studio to be similarly impressive, gifting him with power, speed and portability. He says, “The MacBook could not handle my research, and I could not do training code on it. With the ZBook, I installed all my training code and can run it easily. I can sit outside or travel and stay productive. It’s amazing.” He adds that his experiment time on the ZBook takes only half an hour longer than on the Z8 workstation, while giving him similar compute power in a sleek, lightweight, mobile format.

Shen points out that the ZBook could be a game-changer for enterprises. He says, “The ZBook’s huge GPUs could help us with model development and we could run production on them. They could dramatically boost productivity in such environments.”

Enhancing—and saving—lives

Shen is excited about the potential for data science and AI to dramatically transform healthcare outcomes around the world. The amount of data generated yearly in the global healthcare industry is around 2,314 exabytes, marking a 15X increase in the amount of data generated in global healthcare since 2013. All this data can be harnessed for early disease detection and prevention, to speed up wait times for patients, to automate drug discovery and improve pharmaceutical supply chain flows, and help providers gain cost savings and improved efficiencies.

Shen concludes, “Already, data science helped us turn the tide on COVID-19, and we’ll be even better prepared when the next pandemic threatens. Data science is literally helping us save lives.” Now that’s a healthy outlook for the future.



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As a Z by HP Global Data Science Ambassador, Tao Shen's content is sponsored and he was provided with HP products.

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