SCALING THE DATA MOUNTAIN

Mary Yang's Bioinformatics Mission in Arkansas

By AMP Staff

The research community is inundated with data, particularly data that involves genes, proteins and small molecules. Today, data is measured in petabytes, one of which is equal to 1,000 terabytes. One petabyte could store the data contained in 20 million filing cabinets that contain 500 billion pages of printed text.

Thanks to advanced sequencing technologies that literally map the entire genome, the amount of biological and clinical data generated in the past decade is overwhelming. Obtaining and collecting data isn't the limiting factor anymore. Extrapolating meaningful, useful information from the data is the challenge the scientific community faces. We need individuals with the skills necessary to parse and interpret the growing mountain of data.

Enter Arkansas Research Alliance Academy member Mary Yang, a professor of information science at the University of Arkansas at Little Rock and the lead instructor for bioinformatics courses. Broadly speaking, bioinformatics is a multidisciplinary field that encompasses molecular biology, genetics, computer science, mathematics and statistics. Yang's leadership in the Systems Genomics Laboratory at UA Little Rock is not just about managing data; it's about pioneering new pathways in science and education and preparing the next generation of Arkansans to navigate and conquer the data mountain.

"We continue to develop and grow in this field," Yang said. "Working on human data, for example, requires a great many people with biomedical and computational skills. This is an opportunity for Arkansans to compete for or create high paying jobs, which is a benefit to our state's economy."

Yang said artificial intelligence is valuable, but scientists are still needed to conduct research. (Photos provided)

Creating a specialized community that understands the complex computational challenges in bioinformatics is a catalyst to supercharging Arkansas' burgeoning innovation economy. Yang's Systems Genomics Laboratory is a promising step towards building that valuable professional workforce.

Mary Yang

"Students graduate from our bioinformatics program, and they have a job offer immediately," Yang said, "and half of them work in Arkansas ."

Bioinformatics specialists are in high demand at places like the University of Arkansas for Medical Sciences in Little Rock and the Food and Drug Administration's National Center for Toxicological Research in Jefferson County. Both are vital research centers that parse and process enormous stockpiles of data in the pursuit of new drugs and therapies. The challenge, Yang said, is "reducing the noise and pinpointing the precise molecular targets from vast amounts of data."

"For example, everybody knows that cancer is caused by genetic mutation," she said. "Consider that the human genome is 3 billion base pairs of DNA, but among these, maybe 1 percent or less leads to cancer or other diseases. That's an incredible amount of data to sift in search of that 1 percent."

Artificial intelligence could prove valuable in assisting bioinformatic specialists, but the technology is not a cure-all.

"The strength of AI is that it can handle very large data and make quick computations," Yang said, "but you still need scientists to conduct the research. Even AI needs the direction and vision only scientists can provide."

Mary Yang has published more than 100 research articles and serves as the director of the Joint Graduate Program in Bioinformatics at the University of Arkansas at Little Rock and the University of Arkansas for Medical Sciences. She became a member of the ARA Academy of Scholars and Fellows in 2023.