5 Questions for Katherine Lin: Data Scientist in Training

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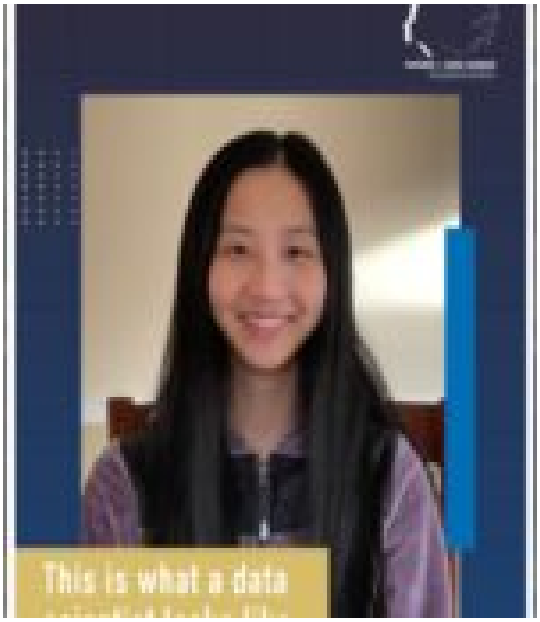
This story sits at the intersection of challenge and opportunity. First, the pandemic. While a time of crisis, it has also been a year of revealing numbers. Take, for instance, all the data generated from this very unique moment in our world's history that can help us reflect on various outcomes and better prepare for comparable crises in the future.

That data, in part, helped Katherine Lin turn yet one more COVID-related disappointment into an opportunity. Lin, currently a senior at Byram Hills High School in New York, was preparing last spring to apply to the Wharton Data Science Academy*, a summer program that introduces state-of-the-art machine learning and data science tools to high school students. When that program was canceled due to the pandemic, Katherine reached out to Program Leader Linda Zhao, a Wharton professor of statistics, to explore possible mentorship prospects.*

That outreach inspired an immersive data science experience for Katherine that began with her studying statistical machine learning models and R programming language through Zhao's online "Modern Data Mining" classes, then moving to working virtually alongside Zhao to conduct comprehensive data research on COVID-19 death rates and its impact on counties with different socio-economic characteristics, and finally presenting her findings in February 2021 during the remote Women in Data Science @ Penn Conference*.*

This year's theme – This is What a Data Scientist Looks Like – *emphasized the depth, breadth, and diversity of data science, including one particularly well-researched student from Byram Hills High School.*



Wharton Global Youth caught up with Katherine to explore her data discoveries. "My biggest takeaway from this entire experience is that I want to go into a career where I can do research in data science just because this experience was so rewarding," says Katherine, who is headed to MIT in the fall. "I was able to get results that meant something and were really relevant. I want to continue that. I want to be able to help people while pursuing my passion for computers and data science."

Curious about her research project and university collaboration, we asked Katherine for all the details. We give you 5 questions for Katherine Lin:

Wharton Global Youth: How much did you know about data science (a field that uses scientific methods, algorithms and more to extract knowledge and insights from structured and unstructured data) when you first approached Professor Zhao?

Katherine: I took AP Computer Science my sophomore year and now I'm a teaching assistant in that class. I have some Python [programming language] and probability experience. I had to learn a lot, so Professor Zhao sent me her class lectures, which was really helpful. The lectures were set up with both machine learning and R so I could learn both at the same time. It had examples with R code and examples with real data sets, where I could see the different machine learning sets in action. That helped me gain a good understanding of how each of the machine-learning methods worked. We also had short Zoom meetings for me to ask her questions. It took a couple of months.

Wharton Global Youth: What did your research process involve?

Katherine: After I finished learning, I was really excited to just get going and start the analysis. I learned that there is a lot of preparation that goes into it first. I spent a lot of time data-wrangling and cleaning, but once we felt ready to move on to the next step, then Professor Zhao helped me through each of the machine learning methods, writing the code, running it, finding the results. That was my favorite part, being able to see the results. Finally came the writeup. This was definitely the most challenging part for me — putting everything we had together into one cohesive report and finding new ways to display our data. I also had the most guidance from Professor Zhao at this point. She gave me a lot of advice and support on how to format it and write it all up.

DATA SPEAK

Data Mining: Extracting and discovering patterns in large data sets.

Data Wrangling: Gathering, selecting and transforming data to answer an analytical question.

Histogram: A representation of the distribution of numerical data.

Kaggle: A machine learning and data science community.

Lasso Regression: Analysis method where data values are shrunk toward a central point.

Random Forest: An algorithm that builds decision trees resulting in more accurate predictions.

Wharton Global Youth: What were some of your key research findings presented in your report, entitled "COVID-19 Impact on Counties with Different Social-Economic Characteristics?"

Katherine: We tried to find the important factors affecting the COVID-19 death rate, for example is one racial group affected more? And do income level and education level play an important role? There were a lot of media reports about how certain groups were being affected disproportionately [by the pandemic]. I wasn't sure if they were completely reliable. After seeing this data, it's definitely true. Some groups do require more support and more resources should be

allocdated to help those groups, especially during this pandemic but also in general during times of crisis. Funneling more resources into those groups could help the U.S. overall. (For more report details, watch Katherine's *Women in Data Science* presentation, along with research from other students, in the video at the end of this article).

Wharton Global Youth: Do you recall a moment during your research where it all came together for you?

Katherine: I had just finished one type of machine learning method and I was going onto a Random Forest and it was bringing back really good results. I got to pull apart the different variables and see what was going on. I had this moment when I thought, 'Oh my God, I can see what is affecting the spread of COVID-19 and I can see all the stuff that was hidden before and now it's out there in the open!'

Wharton Global Youth: What would you like other high school students to understand about data analytics?

Katherine: I wouldn't say that my research was the most technically complex, but just the fact that I did it and had this experience was the biggest thing. Data is everywhere. With a strong base in analytical thinking and an interest in problem-solving, I would just jump right in. E-mail possible mentors or approach summer programs or take a more exploratory approach looking at data sets on Kaggle. You don't necessarily have to analyze them using all these complicated techniques, but you can get a basic understanding of how data works so post-high school you can go deeper and study it in college.