Rashmi Mohan:
This is *ACM Bytecast*, a podcast series from the Association for Computing Machinery, the world's largest educational and scientific computing society. We talk to researchers, practitioners, and innovators who are at the intersection of computing research and practice. They share their experiences, the lessons they've learned, and their own visions for the future of computing. I am your host, Rashmi Mohan.

Rashmi Mohan:
The use of technology for social good is something we all dream of. Our guest today has lived that dream for many years. Kristian Lum has led the Human Rights Data Analysis Group as lead statistician, focusing her efforts on the uses of machine learning within the criminal justice system. Kristian, welcome to *ACM Bytecast*.

Kristian Lum:
Thanks so much for having me.

Rashmi Mohan:
I'd like to lead with a question that I ask all my guests. Please introduce yourself and talk about what you currently do, and give us some insight into what drew you into the field of computer science.

Kristian Lum:
Yeah, so actually you're right. That I have been the lead that decision for the Human Rights Data Analysis Group for quite some time. But as of about a month ago, I joined the research faculty at the University of Pennsylvania in their computer and information science department. That's kind of an exciting update to my affiliation. So what got me into computer science? You know, I started out in math and statistics, both, and there really is quite a bit of overlap between statistics and machine learning, and so I don't really even necessarily see there being these really stark disciplinary boundaries. This sort of just seemed like a natural transition based on the types of things I was working on, and the sorts of affiliations that other people had in computer science, relative to statistics and machine learning. This seemed like a good fit. But operationally, I still definitely take a lot of the viewpoints from my training as a statistician and use those in my work, even in computer science.

Rashmi Mohan:

And the interest in computing in itself, in order to sort of get into math, science and statistics, how did that come about? Is that something that was there from your school days? What was your first introduction to it?

Kristian Lum:
Oh yeah. I think, like a lot of people who start out on sort of a math stats path, I started out just in school, doing the sorts of problems, stats and things that people do in college and high school or whatever. And there wasn't a whole lot of computing. But then in college, as I realized how much I enjoyed actually applying the things I was learning in my statistics courses to real data, it became fairly clear that computing was an important aspect of being able to actually learn things from data, except in fairly toy type of problems. I think that's where that came from, just sort of marrying the interest in statistics with actually wanting to learn something from data. So the component of applied statistics is really what got me headed in this area.

Rashmi Mohan:
Got it. I think it's very interesting that you say applied statistics, because using data in the criminal justice system is a very unique application for somebody who comes from even computing or math and stats. How did you chance upon this field? What is it that sparked the interest for you?

Kristian Lum:
Like a lot of my career, it's been a little bit of a winding path and I think of this as a little bit serendipitous. So back in, I think, about 2012, 2014, I was working in this lab at Virginia Tech in the Virginia Bioinformatics Institute. And this is going to seem like a little bit of an aside, but I promise I'm coming back to criminal justice here. And it was, as it turns out, to be fairly relevant these days, working in this lab where we did micro simulations, so simulating things like epidemic outbreaks.

Kristian Lum:
And my job there was, I was really focused on how you build a realistic population of agents that can pass the disease around to each other in ways that are realistic. As I was working there, I started thinking about how much I just have my interest expanded beyond those sorts of applications and other sorts of application areas we were working on, into the sort of social problems. So how can we use these sorts of methods to understand social problems?
One of the things I was thinking about was applying the methods that we were using to model incarceration is, as a contagious disease. That was really my entree into this area, was it was really a fairly direct move in the sense that I was applying the same sorts of methods that we

were using to simulate things like infectious disease, the spread of infectious disease through a population, to think about what sorts of social influence can cause close associates of people who are incarcerated, to themselves become incarcerated, and looking at how racial disparities in sentence lengths could be playing a more important role than we previously thought in driving racial disparities in incarceration rates in the population.

Kristian Lum:
That's a whole project to explain, so I won't go into all of the details, but that was really kind of the beginning of my work in that area. So then years after that, I was working at the Human Rights Data Analysis Group. This is a human rights organization and we do quantitative analysis for projects that are pertinent to human rights issues. And a lot of the human rights community spent a lot of their time looking outward, so thinking about issues and things that are happening outside of their own countries.

Kristian Lum:
As we were talking about it, we were thinking, we have a lot of stuff going on here at home that is certainly relevant to human rights. And so we should be trying to take this lens of human rights and statistical data analysis and all of these things and apply them to the issues that we're seeing at home. We started out by looking at policing, and we've sort of moved our way into the criminal justice system, more broadly, in our work there.

Rashmi Mohan:
Wow. And the kind of data that you're looking at Kristian, I mean, again, maybe this is just my naivety, but do you find that the data that you have is sufficient, both within the US as well as outside, for you to actually draw meaningful insights from it?

Kristian Lum:
Yeah, that's actually a great question. So when I started out doing this work, I was really having to rely only on data you could find on the internet. So luckily, a lot of cities and states are making criminal justice relevant data available on the internet for people to do their own analysis. And so it wasn't like there was complete lack of data and we had to build things up from nothing, but it was more difficult to find the sorts of information that we needed to do really solid analysis.

Kristian Lum:
Now, as time has gone on, and I've gotten deeper into this field, I have been more able to come up with data sharing agreements with various institutions within the criminal justice system, to have access to more private data that's you're not just going to find on the internet, for good reason. Yeah, I actually do think, for the most part, I do have the data that is necessary to do

the sorts of analyses that I'd like to do, but of course there's always things that aren't measured, or things you would like to be able to understand better. But yeah, I'd say by and large, I do now, based on having built up a little bit of a career in this area and having made connections in this area, so that I can get that sort of access to data. Again, under fairly strong data sharing agreements and things like that.

Rashmi Mohan:
I mean, that's a great segue into what I was definitely going to get at, which is when we talk about data, then of course privacy can't be very far behind, even in areas such as personalization and shopping. There is a sense of intrusion that you feel, if the recommendations that you get are too close to what you were studying. You know, your browsing patterns, et cetera. What kind of concerns have you dealt with in this specific realm, with regards to data privacy, and are there any special considerations that you need to make?

Kristian Lum:
A lot of the data that you're going to find if you do start working in this area, is going to be personally identifying information, right? And so you have to take any sort of precautions that you would do there with any other sort of data, where you have that sort of personally identifiable information. It's sensitive information, right? It's information about people's criminal history in some cases, it's information about interviews that have been conducted with the people while they've been incarcerated. It's all sorts of stuff that really shouldn't entirely be public. And so there's really good reasons for it to be private.

Kristian Lum:
And of course, we take all the precautions that are necessary to make sure that that remains private as we're using it. I think when we're talking about data from the criminal justice system, we also get into some really kind of different ethical gray areas, where some of the data that we have is actually a matter of public record, and you can kind of find it out there in the world. It's not really super private, in the sense that it is sort of on the public record, and so you can just get it via FOIAs or however else, through scraping of government websites about, say, who's in jail or things like that.

Kristian Lum:
But this, I think, really brings up the question about what we should do with it. Even if it's out there, once you have researchers who are compiling it and using it in analysis, there are questions about how appropriate it is, I think, to publish that data with the individual's names in it, even though it's there, right? It sort of makes it easier for people to information that's not really relevant to the analysis itself, but could, years down the road, I think, be embarrassing for the person or cause them more difficulty getting a job, if it's sort of out in areas that are more easily

searchable and findable, say, published in an academic journal or especially some sort of open access sort of paper.

Kristian Lum:
And so I think you get into this sort of strange gray area where there is data you can get, where people are individually identified, but it is a matter of public record. So what do you do with that, right? Do you have any sort of obligation to not further put that person's name out there, tarring them as a criminal for life, right? I think these are areas that we need to think a lot about.

Rashmi Mohan:
Right. No, absolutely. And one of the other things that I wanted to touch upon, which you had mentioned previously is, while you go through and review this data and actually perform analysis on it, you're starting to draw insights from it. I have a two part question. One is, if you feel like the data is not complete enough, what has been your experience, in terms of influencing organizations to either collect more data or share more data with you? And the second question I had is, as you draw these insights and uncover these potential biases that you may see, how deceptive are they to your findings? How receptive are they to actually take it and make changes within their organization, based on what you find?

Kristian Lum:
Yeah. All right. So for the first question, how successful have I been in getting people to collect more data? Not at all. That's a really easy one to answer there. There's a lot of momentum around what sorts of things are collected and how they're stored. And I certainly can't go redesign all of the systems that people use to store data. And so I haven't even really tried on that front.

Kristian Lum:
When it comes to the reception, I think it's really mixed and it really depends on who you're talking about. So a lot of my work is sort of done through this critical lens, that points out how unfairness in the criminal justice system ends up being inherited by models that are built on that data. And so in a lot of ways, the critiques I have of the models are critiques of the system itself, which I think can be tricky. What I've found is that the reception really depends on who you're talking about, but I've been surprised at how much people have been willing to listen and how much I've been invited in to various conversations, to sort of make these critiques heard in places that I didn't expect to have that opportunity. Yeah, it's a mixed bag, I think.

Rashmi Mohan:
Interesting. Have you at all had the opportunity to observe maybe, or follow a certain organization over a period of time, like from the time that you make suggestions or you're invited

in to provide your opinion, to see they've possibly made changes and you've had an opportunity to evaluate the data coming out again? Have you had that sort of a timeline to review the data?

Kristian Lum:
So I wouldn't say I've been involved in anything that's happened for quite that long. One example of something I've been involved in was this research advisory council with the Mayor's Office of Criminal Justice in New York City. And this group of researchers was convened to help give advice. We didn't ultimately end up being able to say, "You should do this or should not do that," Or, "You can do this or you can't do that," but it's just to give advice on the redesign of a new risk assessment tool that they were rolling out and have since rolled out in New York City, to assess the likelihood that someone who's been arrested will fail to appear for a court date if they are released.

Kristian Lum:
That was just rolled out fairly recently. So we're not really at the stage where I'm seeing data to be able to evaluate how it's performing now, and I'm not even sure I will have access to that, but I did get to see the whole design process from a fairly early stage, and it was definitely interesting. I did feel like in several cases they were listening to the people who were there, representing points of view that weren't necessarily traditional in terms of how risk assessments should be made.

Rashmi Mohan:
That's very, very heartening to hear. I'd like to switch gears a bit, Kristian, and go back to something that you said initially, which is that when you started your career, you were looking at the spread of infectious diseases. Given the times that we're in right now, I'd love to hear more about... I know you're working on something related to the global health situation with COVID-19. Could you tell us a little bit more about that?

Kristian Lum:
Yeah. I've got several projects teed up on this. It might be because I'm one of those people who, when presented with anxiety-inducing situations, just work myself into the ground. I should probably be embarrassed by the amount of things I have going on this, given the short timeline we're talking about. But one of the projects I'm really excited about is working with some epidemiologists, so an old colleague of mine, Eric Lofgren, who is at Washington State University, and a new colleague through this project, Dina Fefferman, who's at the University of Tennessee, to model the spread of COVID in jails.

Kristian Lum:

And also not just jails, but in jails and in the communities, because jails are a fairly porous barrier between the community and the jail itself, so people are constantly coming and going from jails. Top line finding that we have there is that if you can reduce transmission in jails, that has spillover effects into the community. So you can also reduce infections in the community as well.

Kristian Lum:
What sort of interventions could reduce transmissions in jails? Well, you could do things like arrest fewer people, expedite release, things like that. And so we have this model, a sort of standard epidemiological model with some additional bells and whistles attached to it. We're actually modeling the flow of people in and out of jail, and within jail to their court dates and back, that looks at how the spread of COVID in jails can have an impact on the whole community.

Kristian Lum:
That's something that should be coming out within the next... Well, it's a Friday, so early next week, I would think. And I'm really excited about that project. I should also mention, and this is a huge oversight to not say this in the beginning, when I mentioned the other two researchers I'm working with, I'm also working with some researchers from the ACLU, Aaron Horowitz and Brooke Watson, on this project. So that's been a really fantastic collaboration that has just been all consuming for like the past three weeks or a month.

Kristian Lum:
And the final thing that I'm pretty excited about on this topic, is I'm working on a project, estimating the parameters of epidemiological models. So like an SEIR model or an SIR model, while accounting for time lags in the data. So the idea here is that normally these types of models and that getting fit to the case count, so how many infections have we counted and over what period of time, or what's the time series look like. But in this case, because it's in the United States and elsewhere, there's this lack of testing, right? The numbers that we see for the case counts are at least as much a reflection of how tests are being distributed as they are a reflection of the number of cases.

Kristian Lum:
And so we were thinking, what data do we think is fairly trustworthy that we can use? And we're thinking, well, probably the number of deaths is more trustworthy. So the number of COVID-19 attributable deaths. That's probably something we should be building a model on instead. And other research groups have come to this conclusion as well. But the problem with this is that you have this time lag from the time of infection to the time of death. People don't typically die within a day of catching the disease. So we're working on building a model that incorporates that

type of time lag explicitly into the likelihood of the model, so that we can come up with new ways to estimate the epidemiological curves, given the reality that, one, we don't really trust the case count data so we have to base the model on something else, and two, there's this non-negligible time lag between what we get to see and what we're trying to estimate.

Rashmi Mohan:
You know, given the situation that all of us are in right now, and I think we're all sort of armchair [inaudible 00:16:30] but I think we're consuming this data at a mindblowing pace, right? Both in terms of news, as well as information like this, that everybody wants to know more, everybody's sort of anxious about it. So I think the work that you're doing is simply fascinating. But this idea that you've mentioned, of the count not being a reliable metric, is that something that you have seen? Is this primarily in the case of infectious diseases or are there other areas that also have this sort of challenge of not being able to get a reliable count?

Kristian Lum:
Yeah. You're actually asking a question that goes back to most of my work at the Human Rights Data Analysis Group. So I would say the bread and butter of that organization, and really a lot of the work that gets done out of that, is understanding undercounts in other types of situations. So what we focus on there is casualty estimation. In the time of some sort of violence, it can be really difficult to collect reliable data on the number of people who have been killed.

Kristian Lum:
And what we found in our experience there is that, when local organizations, government organizations, NGOs, whatever, are trying to collect data on the number of people who've been killed, it doesn't end up being a representative or complete sample. That's not to say they're not doing an excellent job, because all of the people who are trying to collect this data in times of conflict are doing work under really, really difficult situations.

Kristian Lum:
But the reality is, just like I was saying with the COVID-19 case counts, that it's as much a reflection of distribution of tests as it is the number of cases. What we find in data on deaths in times of conflict is it's just as much a reflection of where resources are being allocated to do that sort of data collection, as it is a reflection of how many people have been killed. The work I've been doing at the Human Rights Data Analysis Group for the past, I think, something like five years, has been developing methods to take lists of the names of people who've been killed, from various on the ground organizations, and apply statistical models to come up with an estimate of the number of people who weren't recorded by any of the organizations, so the sort of dark number, the number of people who ended up being completely unrecorded.

Kristian Lum:
And this goes back to some ecological models that originally were developed for animal populations. So estimating the size of, say, fish in a lake. You catch fish in a lake, you tag them, you throw them back in, and then you see how much overlap there is in your second catch with your first catch. This might seem like a little bit of a harsh comparison when we're talking about estimating human deaths, and of course we don't like to imply that there's some sort of similarity there in terms of the seriousness, but when it comes down to the statistical modeling, the methods are fairly similar, in the sense that they are based on looking at the overlaps among the lists of names of people who have been killed.

Kristian Lum:
So if one organization collects the names of a bunch of people and another organization collects another list of the names of people who've been killed, you can look at the overlaps among those lists. Normally, we wouldn't do it with only two lists, because that requires you to assume something like the lists are independent, which we don't believe. But as you get more and more lists, you can relax some of the assumptions you have to make.

Kristian Lum:
Again, to go back to the simple example, which, again, this is just a simple example here. It's not actually how it's done. The intuition here is if there's a whole lot of overlap between the lists, that means you probably got most of the people because both collection efforts captured almost all the same names. If there's not a whole lot of overlap, well then you think the universe of individuals out there who've been killed is probably much greater than what you're observing, even on the union of the lists that you're looking at.

Kristian Lum:
Again, it gets more complicated and there's all sorts of different methods you can apply to account for capture heterogeneity, to count for dependence between the lists, all sorts of things like that, that ended up being, I think, a really interesting area to do research.

Rashmi Mohan:
Wow. I'm curious to ask, though, in this case of the counting being inaccurate, what would you say is the biggest risk of that? Is it mostly our response to some of these situations that might not be as urgent? In your observation, what is the biggest challenge with this and how big of a problem is it?

Kristian Lum:
I think that really gets at why do we do this, right? Like what's the point? So in my work with the Human Rights Data Analysis Group, in many cases, we have partnered with truth commissions,

where the idea is that after some sort of violent conflict, in order for the peacemaking process to move forward, there really needs to be some sort of shared narrative about what happened, some sort of shared understanding about who is committing atrocities and against whom.

Kristian Lum:
At the most base level, just even understanding the magnitude of the conflict, I think, can help with that process of really acknowledging all the harm that had been done. And the other important, I think, reason to do this is if you can come up with different estimates, desegregated, say, by space or time, or any sort of perpetrator or victim, then you can come up with a better understanding of the dynamics of the conflict.

Kristian Lum:
So for example, if you find that some minority group was much, much more likely to have been killed, but not that much more likely to have been recorded, that can hint at hiding of those sorts of killings, and it can also support claims of genocide. Another aspect of this is you can look at what sort of policy interventions, what their impact was. So for example, if there's some sort of policy intervention and you find that, after that intervention, the number of recorded killings goes down, it's really useful to understand, was it the case that the number of killings actually went down or was it the case that people became too afraid to report them?

Kristian Lum:
So the mechanisms to report safely were also decreased. So being able to disentangle the reporting from the actual level of violence I think is really important for that sort of retrospective policy analysis.

Rashmi Mohan:
Absolutely. I know that your work in this field also extends to sort of academic as well as industry setting, in the sense that I know you help organize the ACM Fairness Accountability and Transparency conference, or the ACM FAccT conference. What is the main sort of goal of that event? What kind of attendees do you attract? Are there a lot of people working on the kind of problems that you're trying to solve, and is this sort of a gathering of those similar and like minds?

Kristian Lum:
Yeah. This is something I'm really proud of. I'm really proud of seeing this community really grow over the last three-something years. So the goal of this conference is mostly encapsulated in the name. It's to study fairness, accountability and transparency in sociotechnical systems. And so this is meant to attract attendees from a whole variety of disciplines. And in fact, it does. So we have people from law, from policy, from statistics and machine learning, from sociology,

from all sorts of different types of studies, philosophy, who present their work there. It's highly interdisciplinary.

Kristian Lum:
The other thing that I think is really neat about this conference is we have avenues for people who don't publish in the ways that academics traditionally do. So via, say, an eight page conference paper. There are also ways that they can have content in the conference. So we have people from advocacy organizations there, policy organizations, and they'll present things like tutorials or these sort of interactive sessions.

Kristian Lum:
I participated in this really interesting session in this past one, deconstructing your memories of how you've thought about designing a sort of fair model. And so we have people from all across the spectrum, all sorts of different institutional types, all sorts of academic disciplines. And it's really a place for people to think really deeply about the impacts of technology on society, and I think it's really important to have all different sorts of perspectives represented when we're thinking about those issues. That's a community I'm really proud of.

Rashmi Mohan:
Well, that sounds amazing. I think that intersection of folks from various disciplines is so critical to have these sort of key conversations, and actually take forward some of these issues. Especially, I mean, given that it is a conference that's around the sort of foundation of technology, I think it's amazing that you're able to attract folks from all of these various disciplines who really need to have a say in these matters.

Kristian Lum:
Yeah, absolutely. And one key contingent that I did leave out and shouldn't have, is industry. There's also an industry presence there as well, which I think... It's also important to be talking to those folks.

Rashmi Mohan:
Absolutely. Yeah. Speaking of folks from industry, a lot of our listeners are actually practitioners, potentially young professionals, who also would love to hear more about you, from you, on just your career, right? What's your journey been like? How did you navigate your career? You've come from a math and stats background into computer science, and that transition is fairly seamless, but we'd love to hear any unique stories that you may have to share from your career journey.

Kristian Lum:

Sure. My career has been a little bit of a winding path in fact. More than most people's, I think. So the beginning of it starts out pretty straight forward. I went to Rice University and I started out studying math, and about halfway through, I realized, statistics, this is the thing for me. And so I went straight from there to grad school at Duke where I did a PhD in statistics, but by the time I was done with that, I was feeling fairly burned out. I was 25 and felt like a little bit of an adventure. So I took a postdoc down in Rio de Janeiro, Brazil, and ended up going down there by myself at first. And after a few months, it wasn't really working out. I was ending up spending more time trying to deal with the bureaucracy than I was getting real research done.

Kristian Lum:
So I just kind of left, but I ended up spending the rest of the year down in Brazil, kind of taking a break and reevaluating where I wanted my career to go and what I was going to do. I also traveled around Europe for a little bit. So I had a good bit of a breather after grad school and after the beginning of the postdoc, that I ended up leaving early.

Kristian Lum:
To back up a little bit chronologically, about halfway through grad school, I ended up sending a cold email to the founder of the Human Rights Data Analysis Group, Patrick Ball, because about halfway through grad school, I'd been talking to a friend about how I was really excited about all the work I was doing, and I was doing mostly things... Just building models and coming up with algorithms for estimating those models. Standard methodological statistics, sort of things.

Kristian Lum:
I was really interested in finding a way to make those skills have some sort of social impact. So I talked to a friend who had heard Patrick give a talk. I think she was in law school and he gave a talk there. She was like, "You should really talk to this guy." So I looked him up. I was really interested in his work. He was doing a lot of this population estimation for casualties, so estimating the number of deaths and conflicts, like I just talked about, and I asked her for his email and she didn't have it. And so I was like, well, okay. So I think it took me about 10 Google pages in, and I found his email on the last page of somebody's CV. And I was like, you know, what the heck? I'll just cold-email him and see and see what happens.

Kristian Lum:
And so this is about halfway through grad school. I cold-emailed him and I was like, "Hey, I really like your work. I think I could help in these ways. What do you think?" And he's like, "Why don't you come out for the summer?" And we ended up going down to Colombia and working on a project down there for those three months. And I sort of stayed in the orbit of HRDAG after that. That's an important detail going forward.

Kristian Lum:
So anyway, after I came back from this year of just taking some time off and thinking about what I wanted to do, I ended up landing at the lab that I talked about earlier, where we were doing microsimulation things, and I was designing synthetic populations to do those sorts of simulations. After about two years there, I decided that it was better for me to move back down to Durham, to be with my husband, because we were living separately and just sort of for personal reasons, it was too hard to be separate for so long.

Kristian Lum:
So I ended up moving back down to Durham, but at the time, we had a really good friend from grad school who had just started a startup. So our friend, Wes McKinney, had started this company called Datapad, which was doing, basically, cloud-based, big data, visualization, analytics sort of stuff, and they needed a data scientist. So I signed on there as employee, I think, number 10, and spent several months there before the company got acquired. So I also got some experience in Silicon Valley startup world. And I was traveling back and forth from North Carolina where I was living, to San Francisco to work on that.

Kristian Lum:
But then after that... So I told you this is a winding story, right? Sorry if I'm rambling.

Rashmi Mohan:
No, keep going. It's fascinating.

Kristian Lum:
So then after that, gosh, this must've been like 2015 or so, and I'm sure I could get the exact dates, but I don't think that's important for the story. So it was around 2015, after that all ended, I ended up staying and doing tech consulting, just because I'd made a bunch of connections in that area while I was doing this sort of startup thing.

Kristian Lum:
So I did some data science consulting for some small startups, like one was called Treasure Data. I also did some data science consulting for larger companies, one of those is called eBay, where we were looking at building an anomaly detection system. And I also spent about half my time back with HRDAG, because I'd felt like that was sort of where my heart had been since grad school. I'd really felt like that was something I was really interested in pursuing again.

Kristian Lum:
And so I was sort of splitting my time doing all of that. And then I think sometime around 2016, I ended up... It was a lot to be doing a bunch of different types of consulting. It's a lot to keep

track of when you're doing things that are just so different. And so I ended up joining full-time at HRDAG, I think it was sometime around 2016, and stayed there until just now about a month ago, when I moved over to the University of Pennsylvania. So a whole lot of different types of things from the sort of standard trajectory, then into a research lab type of environment, then to a startup, then to sort of being an independent data science consultant, and then sort of back to the nonprofit world, and now back to academia. So it's kind of this full circle type of thing.

Rashmi Mohan:
Yeah. That's great, Kristian, because you are like the poster child for somebody that we think about when we say transition from academia to industry and back is actually very challenging, or just even working across those lines seems to be very difficult in many cases, but your journey has been proof of the fact that it can be done. You know, I think it's especially inspiring, 'cause you started out this entire journey with a cold email, and sometimes we're so afraid to make those decisions and say, "Should I even reach out?" And I think your example is a great way for us to think about this and say, what is the worst that can happen? You won't hear back.

Kristian Lum:
Yeah. That's about it.

Rashmi Mohan:
That's great. So Kristian, we're running out of time, but I'd love to hear more about, now that we're all couped up in our respective homes and sheltered in place in many locations, what are you doing in your free time? If you have any.

Kristian Lum:
I don't have a whole lot of free time. So what I do these days, since we are all cooped up is, well, I would be doing this anyway. Let's be honest, I'd be doing this anyway. I hang out with my daughter. I have a 16 month old daughter who takes up a whole lot of time and energy right now, but I wouldn't have it any other way. She is just a delight and a joy, and I don't need to go on that because I think probably most parents feel that way. And I could go on for hours about how wonderful she is, and that would just be beside the point and probably kind of annoying.

Kristian Lum:
Some of my other hobbies though, which I don't get a lot of time to do these days, maybe in a couple of years, I really like rock climbing, mostly indoors, some outdoors, especially when I was at Virginia Tech. I used to really like to go rock climbing outdoors and near the River Gorge. And the other thing that's kind of weird, I guess, is I really like sewing costumes. I used to, I plan to revive this again, go to the Renaissance Fair at least once a year and pretty much always in a

new costume. And so that was sort of my yearly project, was sewing something brand new for me, my friends, my husband, any number of people who wanted to go.

Rashmi Mohan:
Wow. Yeah. That is a unique hobby. Have you been sewing any masks? Because I know a lot of us have.

Kristian Lum:
I plan to, I have not yet, but I definitely plan to.

Rashmi Mohan:
Got it. Well, it's been amazing, Kristian, talking to you. For our final byte, I'd love to hear, what is it that you're most excited about in your field of computing over the next five or so years?

Kristian Lum:
I feel like I haven't really had, as you can tell from my, like what was my career like, answer, I haven't really had much of a plan. I've sort of always just followed wherever I felt there was something interesting to do at the time. And so I think that's probably what's going to keep happening for the next five years. I'll probably just continue following whatever peaks my interest, as long as I can have a job that lets me do that.

Kristian Lum:
So yeah, I don't know. Right now, COVID-19 is really interesting. Fairness is really interesting. That is fairness in machine learning. There's all sorts of things that are really interesting and we'll see what happens.

Rashmi Mohan:
Great. Thank you so much for talking to us. It's been an absolute pleasure to host you on our show. Thank you for taking the time to speak with *ACM Bytecast*.

Kristian Lum:
Thanks so much for having me.

Rashmi Mohan:
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