Audio file

Education Matters Recording 05.mp3

Transcript

So thank you so much for joining us, Ricky. I'm on education matters. Thank you again for being here. And could you just start by telling us a little? Bit about your job.

OK. And first of all, thanks for having me as well. Yes, so I'm the data manager on the 8th unique project at Lancaster. H unique is a research project across disciplinary research project and my role is to gather or collect and manage all of the data that the project uses during its research. So we're building a large database of hand images. My role has been. To create the systems to allow us to gather that data, manage that data, process it and ensure quality for you know the rest of the researchers on the project.

Well, that sounds like a really interesting job. Can you tell us a little bit about your own education and career journey?

OK, so I'm not from the typical academic background, although I did my first degree many years ago in Lancaster in physics. But I've then gone into industry and spent almost 30 years working in industry in commercial software development and an industrial research and development predominantly in software, but with some hardware projects also. But I joined the university specifically to join this project. About four and a half.

Years ago. That's great. Thank you. So your background, originally your education background was in physics and but then you went on to work in computer science and computer development.

Yes, indeed, not not an unusual career progression and these days.

My other question I was gonna ask about that. So yeah, so you didn't start. In in that field and you're now doing a role which is in an academic research background, but you left. So sometimes people always assume that to work in a university you you have to go through that academic route, but there are routes into research that don't involve that academic route.

Yes indeed I, like I say I I left academia, but then I was looking for a new path to my my career. After many years and I saw the unique research project described and the data manager. Role and I thought that was a great fit for for the technical skills that I have and offered me a chance to go out in a new direction on a really interesting and worthwhile project.

That's great. We often talk about transferable skills and this sounds like a really good way of transferring those skills from industry and into academia and research. Could you tell us a bit more about this project?

So he's unique. It's a five year research project funded by the European Research. Council and led by Professor Dame Sue Black and we are studying the anatomical variation of the physical features of the human hand. So which features of the hand such as vein patterns, knuckle creases, scarring, freckling and deep pigmentation. And others which can be best used from a biometric purpose to identify individuals.

So when you mentioned biometric? Could you tell me a little bit more? About what that means, please.

Yeah. So these these are physical features of the anatomy that can be used to identify and differentiate people.

So looking at my own hand now, when you mentioned sort of vein patterns, do you do you literally mean sort of like the line that I can see of my vein on my hand?

Yes, indeed. And I've, you know, just to reemphasize, I'm not an anatomist myself, but, but yes, with respect to the veins No2 individuals have ever been found to have the same pattern of vein. Indeed, if you look at your left and your right hand, you'll see they have different vein patterns and even in identical twins, No2 twins have ever been found to have the same vein patterns. So from a identification perspective, veins are a very, very strong biometric.

That's great. Thank you. I'm. I'm sitting here now looking at my hands, and I'm guessing it's the same for you mentioned the wrinkle patterns on on knuckles.

And the in. Need. Yes and then other features and combining them we get. We have a very strong identifying information. So even if two individuals say had similar vein patterns that you might not be able to differentiate in a photograph, different knuckle creases, different scarring from. You know, injuries and you know, maybe maybe medical interventions that have accrued over a person's life, all of them come together. To form a strong identifying resource.

So your hand pattern is is similar to a fingerprint in that respect.

It's not an unreasonable analogy, no.

So you've mentioned that you're not an anatomist. So you, you're not somebody who studies the actual formation of the veins and and the biology and and that side of it, you've mentioned that your background is in computer science and. You're part of the database, so. This sounds like it's quite an interdisciplinary project. Lots of different subjects getting involved. Could you explain a bit about what that really means day-to-day so.

But yes, indeed yes. So the project is led by like I said, by Professor Sue Black. She is one of the world's foremost forensic anthropologists and anatomists, so she has a great understanding of the human anatomy. And she specialises in identification of the individuals, the cross disciplinary aspect of it is we have computer scientists. Use the unique data to train AI models, artificial intelligence models to replicate the work and automate the work of an atom. Anatomists and forensic anthropologists, and indeed I'm also an imaging specialist as well as a career in it. I used to be a professional photographer. So I bring a lot of imaging and image processing experience to the role and we've got mathematicians working on the project as well. So it really does bring across that both the anatomical and forensic. Knowledge. Computer science knowledge. Yeah, the math. The mathematics behind the identification process as.

Well, I think this project really highlights in terms of sort of career development and education that you might be someone who really loves maths or photography or computer science or biology and also have an interest in forensics. And it shows that there's lots of different routes and different things that you can do with those subjects that sort of tie it together. So could you just tell us a little bit more about people volunteering for this project and and why is it so important to take part in this research as a participant?

Like I say, with the project we're we're looking to investigate variation in in the human hand, it's believed every hand is unique, but we're looking to quantify and qualify just how unique the hand is from a visible perspective as a biometric. And to do that. We're looking to build the world's largest

database of human hand images, so we've built a system that allows anybody over the age of 18 to anonymously contribute hand images to the project. We walk them through the process of. Computing and we've built up that database. So yeah, that's a really interesting, you know, might be an interesting abstract concept and interesting from a research point of view. But the real reason why we're building this database is because the project grew out of the groundbreaking work. Led by Sue Black in identifying perpetrators of crime who had been caught in images and video. But only their hands or hands and arms visible in the evidence images and her work has enabled law enforcement agencies to capture, identify and prosecute a large number of criminals in in some pretty horrific cases. Through the identification of them via their hands. So it's to support that work that we are looking to build the database and actually create a more automated system for identifying offenders from hand images.

So when you submit this your picture of your hand and you're taking part in this piece of research, but you're not taking part in terms of being recorded to be identified at a later date, are you?

No, no, that's. Not at all. The purpose of the project we are purely building a research database such that all of the all of the features in all of the hands collected can be analysed. To then allow us to quantify which features are the best in alone and in combination for identifying an individual as being a specific individual solely to develop the algorithms and to train artificial intelligence systems to. Analyse the hands totally separately from the criminal justice work. Where where it is hoped it will be later applied. But on images of suspects and evidence images so.

So the images that volunteers can submit, they're being added to a database for almost like practise work and completely anonymous.

Pure purely, yeah. Yet purely for the research database held securely at Lancaster with no one else able to access. Ever. And also completely anonymously, we we don't know who's contributed to the project, but we we gather the data completely anonymously.

But by taking part in this research and submitting your image, that's helping the programme that artificial intelligence that you mentioned, it's helping it to learn what? Features could then be used to identify perpetrators and criminals just from pictures. So there there's quite a a big benefit, I'm guessing to taking part.

Yes, absolutely. And it's about, you know, it's it's about contributing a small amount of people's time and photographs of their hands, you know, securely, anonymously in order to develop those routines that we will help, we hope we'll be able to help protect some of the most vulnerable people in society.

That's really, really helpful. Thank you. I'm. I'm definitely gonna go and take a photo in my. Hand and submit it. I have a bit of a question and it might be quite a I I don't know much about computers so it might be a bit of a stupid question. So how does this computer and the artificial intelligence programme sort of how does it?

OK, so I'm certainly not an expert in artificial intelligence and the deep learning aspects and computer vision aspects, but. The the overall. Process is a the large body of hand images and we we're talking many, many 10s of thousands. They they are used to enable deep learning models, AI models to go through and analyse the features of all the hands and. And there will be some data that's kind of annotated by trained specialists to highlight which parts of hands are the veins, which parts are knuckles, you know, which part, you know, which parts of an image are scarring. For example, the AI models as they learn these features, they then start to be able to analyse. Other

images and spot features in those, so once you can analyse the body of hand images and extract the features from each you can then start to compare the features in each and and that's where you know the mathematics skills come in and. Then start to, you know, draw up a picture of how similar different hands are, and then start to identify hands that maybe the same hand as in the image you are examining. So that's ultimately becomes a process not too dissimilar to that performed by the forensic expert. Manually where if the police have a suspect in a crime and they have evidence, imagery containing the hands of the suspect, they will photograph the. Effect and the examiner. You know the expert examiner would analyse the photographs of the suspect and compare the photographs of in the evidence images and use their expert. You know anatomical biological knowledge to say. Yeah. Is it possible that these features? Are the same. Thus, is it possible it's the same hand of the of the suspect, and in the evidence? Which and so we're looking to automate that sort sort of process, but with an automated model rather than the human interpreter or the human expert. The advantage of doing it automated in that way is that we can process a huge amount more images. Than we can manually. Yeah, currently experts, you know, experts such as Sue can only deal with a handful. Of cases each year simply because of the time and effort involved. Whereas if we can automate that process to a degree, we can massively increase the number of cases that can be investigated.

That's great. Thank you. So I guess another benefit of taking part in this research is, is you're actually cutting down. Because of what's gonna happen, you're going to cut down the amount of time it's going to take for criminal cases to go through and for for offenders to be found.

Yeah, I I can't. You know, obviously I can't speak about the the criminal justice process. Less, and that's beyond my area of expertise, but it will allow the analysis work to be done much more effectively.

So if anyone's listening and thinking they would like to get involved and they'd like to volunteer a photo, you said the process is very simple. What do they need to do?

OK, so by going to the H unique website, H dash unique dot Lancaster dot AC dot U. K They can click the contribute link and then using their mobile phone. It's a simple web app on their phone that will walk them through the process of contributing data. So we have a short questionnaire of some demographic and some basic medical information about clinical conditions and skin conditions that may affect the appearance of the hand. And then we take them through the photographing of their hands in certain poses, using a mobile phone, which then transmits the images to the database or completely anonymously. We never know who's contributing, and it's open to anybody over the age of 18 years or.

Yeah. So you don't need to put your name or anything like that. And none of that data is stored. Brilliant. Thank you. And it's for anyone aged over the age of 18. So anyone from any community can take part.

None at all. Absolutely. And what you just said there is really, really important from any community. Actually we don't want people from any community, we want contributors. Every community, one of the really important things in work of this nature is ensuring that we have as broad a spread of contributors as possible that's covering all age ranges. Like I say, subject to being 18 or over and and. And all diverse backgrounds, so all genders, all ethnic backgrounds. You know, the more inclusive the data is, the better the results that can be, you know, derived.

That's great. Thank you. So we'll put the link below this. So if anybody would like to take part, I'd highly recommend there seem to be lots of benefits to taking part. And can't really see any

negatives. It's entirely anonymous. You'll be helping to create a tool that's going to cut down on the time it takes to identify criminals and also preventing crime in the future. Because I guess it's the same as. Now. We know about fingerprints. It's the same.

Kind of thing? Absolutely. And that that's our. That's our end goal.