

Interview de Fred S. Roberts: Docteur Honoris Causa de l'Université Paris Dauphine

Mr Roberts thank you for coming, we work for the newspaper of Dauphine, La Plume, and we want to promote your research and your coming in Dauphine for the Doctor Honoris Causa ceremony. We want to broadcast this interview on our website and we have four or five questions about your academic life, about your research and about your points of view on subjects of society.

I'm glad to be here. Always a pleasure to come to Dauphine. I'm looking forward to the interview.

One of your major field of research is graph theory, if I am not mistaking...

That's right.

And recently you have been working on Big Data, which is one the major problems now, so my first question would be : How does graph theory inform us about big data, what does it tell about the handling of big data ?

So I think Big Data informs graph theory as well as graph theory informs Big Data. Graph theory helps us understand interconnexions. So you have all heard of the six degrees of separation. Certainly we are all connected to each other if we look carefully enough. There are also networks everywhere and we are also interested in understanding these interconnexion networks, whether it's networks of proteins, or whether it's networks of people, or whether it's networks formed by social media, which we all use now or whether it's economic interconnexions and so on. So graph theory helps us to model this, understand the interconnexions.

My next question would be about social media. As you may have seen, Facebook will launch a new feature which is called Graph Search, and it basically enables you to look for people that you may or may not know, but who have connexions on topics or maybe places you've been. What do you think it tells about anonymity, are there dangers to this approach ?

We all, I think, have given up a lot of our privacy nowadays. Because we like to communicate, we like to find people, we like to find new acquaintances and so on, we like to find out a lot about people, and people are not afraid to share information. But there are some dangers in this. There are dangers to reveal too much about ourselves, there are also dangerous people in the world and they like to find out about us. So we always have to walk a fine line between our desire to communicate and our desire to find out things but also to protect ourselves. Privacy is still a major issue to all of us and social media has some risks involved, and we have to understand that so that we are able to use them.

So a better handling of big data would lead to more privacy, to more secure infrastructures ?

Certainly, it's a research question. Privacy research is a very serious research question and the better we are able to handle big data the better we are able to help maintain privacy. Sometimes, the more data you have the more you can hide things, by obfuscation.

Could you make a link between your research in mathematics and national security? Some of your articles deal with this, could you tell us more about that?

In recent years, I have done quite a bit of work that deals with security. This work involves both natural disasters which is part of security, what we do if there is a flood or terrible heatwave because the climate is changing. The other side of security is safety in terms of terrorism and people who want to harm us. I have been working on aspects of both of those things: sharing the information to understand the situation. The second part of this is to develop best practices that are guided by decision theory, decision support. In Lamsade at Dauphine, there is a very major area research in decision theory. That's the reason I've come back so many times. For instance, I work on security in sports; stadiums where people come for a football match. How can you make sure they are in safe? How can you be sure that someone is not trying to harm them, when you have so many people in one place? I'm also interested in technical approaches to security, we developed methods of what we call "layer defense". So, if you have a stadium, you must start by inspecting people way on the outside, long before they get into the stadium. Then you might inspect them at another layer as they come closer to the stadium. And then you might inspect them at another layer as they seek entrance to the stadium. You can build a mathematical model to help you figure out how long an inspection process can take; at the same time still keep people from being very unhappy because the lines get too long. That's some of what I work on.

Still another problem but which is closely related to sharing and the way we act in a digitized world, is the introduction of massive open online courses. What is your take on this approach of education? Is it too reclusive?

There are some advantages and disadvantages to massive online courses. They get an opportunity to share the most progressive approaches to education and the newest ideas. On the other hand, I really believe in individual professor and individual instructor and relationships that you have with students. I don't know that you get this online. I like to look at my students: are they understanding what I am saying, I try to engage a discussion. I can't do this online. I think there are plusses and minuses.

What are you teaching in Rutgers University?

I don't do much teaching anymore because I'm doing much administration. In the past, I've taught applied mathematics, mathematical modeling, measurement theory, course on the utility decision making and social choices, graph theory and combinatorics as well.

It is a wide range of teaching.

Yes it is, yes it is. And even though I don't do formal courses now, I like to lecture on those topics. And I do that quite often.

Thank you very much for coming.

It's my pleasure, thank you for inviting me, it was very good.