Artificial Intelligence and Augmented Intelligence for Automated Investigations for Scientific Discovery

AI3SD Interview with Ms Ekaterina Prytkova
12/01/2021
Online Interview

Michelle Pauli
Michelle Pauli Ltd

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Humans-of-AI3SD:Interview-12

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Principal Investigator: *Professor Jeremy Frey*
Co-Investigator: *Professor Mahesan Niranjan*
Network+ Coordinator: *Dr Samantha Kanza*

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Title	AI3SD Interview with Ms Ekaterina Prytkova
Interviewer	MP: Michelle Pauli - MichellePauli Ltd
Interviewee	SV: Ms Ekaterina Prytkova - Unviersity of Sussex
Interview Location	Online Interview
Dates	12/01/2021

2 Biography

Figure 1: Ms Ekaterina Prytkova

Ms Ekaterina Prytkova: 'AI is a big technology and we need to better understand what it means and what it entails for every part of the society"

Ekaterina Prytkova is a doctoral candidate at the Department of Economics and Business Administration of the Friedrich Schiller University Jena (Germany). Her research is focused on the economics of technological change and industrial dynamics. In particular, she has been working on the nature and diffusion of ICTs, digital infrastructure and artificial intelligence.

In this Humans of AI3SD interview she discusses what an economist of innovation does, importance of studying digital technologies, the nature of AI and the regulatory challenges it poses.

3 Interview

MP: What's been your path to where you are today?

EP: I'm originally from Russia, and took my first step into academia at the Higher School of Economics. There was a strong emphasis on research, which was new to me. They had an international exchange programme with the university in Germany where currently I'm based – Friedrich Schiller University – and here I got to know the faculty of economics and liked the topic, economics of innovation. My master's and bachelor's thesis were about innovation and I got accepted for a PhD here, where I've been for four years. I have also been a visiting researcher at the University of Sussex in the UK. I'm now at the end of my doctoral studies and intend to continue researching digital economics and digital technologies.

MP: What are you currently working on?

EP: Metaphorically, I am a sort of translator, turning the technical characteristics and functions of digital technologies into economic implications. For example, the internet and worldwide web gave access to a lot of information. The economic implication of that is that the cost of information has reduced. But, at the same time, the abundance of information has actually increased another cost: search cost. Now we have to navigate through an enormous amount of information. This internet search process that we're all familiar with has a specific economic implication. And then this trade-off between one cost and the other type of cost gives rise to other businesses, to technologies. For example, internet browsers, which monetised and capitalised on rising search costs. They made searching more convenient, more efficient. I'm currently studying the connection between artificial intelligence and the semiconductor industry where I try to show how technical (in)compatibility between the two results in different product design and market setups.

MP: Why does this research matter?

EP: Digital technologies are increasingly around us. They constitute a bigger and bigger share of the economy and with businesses monetising digital technologies, involving digital technologies in their business models, revolving around them. Artificial intelligence is one of the latest digital technologies, although it's been around for a long time it only entered a commercial phase relatively recently.

We need to understand what digital technologies can do for society? On the one hand, they create economic opportunities for growth and even address some difficult problems (eg the Sustainable Development Goals). On the other hand, digital technologies while deployed can create negative "side effects", for example, of enhancing inequality, or breaching privacy. A very heated discussion is ongoing about the effects of automation where digital technologies play a crucial role. As a society, we need to try to foresee benefits, costs and risks of digital technologies to make use of them rather than create harm. Economically speaking, we do not have to end up in an inferior equilibrium, we have capabilities to avoid that?

AI is a big technology and we need to better understand what it means and what it entails for every part of society, not only for businesses, because it has implications on many sides. AI solutions are currently very ad hoc solutions, even the big ones. They still tend to be the solutions (ie products) of one actor, such as Google. The problem with ad hoc solutions is that they have inertia when facing changes so it leads to inefficiencies and eventually costs. Atop of that, if such (especially big) solutions are developed by one actor but used by many, it creates a perfect setting for a “rich-gets-richer” dynamic that stands on the way of healthy competition. Eventually, it has implications for the product quality. When we talk about such powerful technology as AI, the question of quality is substantial. It is important that in AI development the representation of interests not skewed.

MP: You said part of it is looking at the potential problems that are looming. What potential problems do you see from the work you’ve done so far?

EP: One of the problems is a fair representation of interests so that development is fair for the supply side of AI and a small or medium company can have a chance to develop instead of just being acquired by a digital giant. There is already the trend of ‘innovation for buyout’ where startups pop up only to be bought by a big company and survive through that strategy. It is a legitimate strategy, it’s not illegal. But does that increase incentives for innovation? There is a debate among economics scholars about whether more innovation occurs in big companies or in a constellation of small- and medium-size firms. The answer depends on many things, not in the last stance on the nature of the product in question and stage of its development. Because AI has big potential on both good and bad sides and it is already in deployment, the answer to this question for AI is very important to find.

Another debate fueled by emergence of AI unfolds around privacy and data ownership. As modern AI requires data to function, AI quickly permeates everywhere where data is produced. Thus, data becomes a valuable resource. This creates market incentives and hence suggestion of pricing data appears more and more often. As these processes and mechanisms of data use are already at work, we can analyse them and create robust solutions. One can be creation of an institution (agency, pieces of legislature, etc), another is independent pools of data. The point here is not to constrain business opportunities by imposing regulation of some kind. The point is to make sure that benefits obtained are not at the cost of damage. Instead, organising data markets by adopting and sometimes institutionalising best practices will be a source of economic growth.

These are all attempts to equalise the benefits of developing artificial intelligence. We can make it more inclusive and make its development more balanced and for the good of society, not for the benefit of specific agents.

MP: Are you hopeful that that’s possible? What mechanisms are there to counter that?

EP: In physics, for every action there is an equally strong, powerful counteraction. In economics the same principle can hold true, but with delay. So, a powerful force may develop AI, but then society reacts. In innovation economics, we study this optimal stopping problem – or optimal starting problem – of when to start organising or regulating something. If one starts too early or imposes too many restrictions, or not in the right place, then it chokes innovation incentives. If one starts too late, inferior products and practices can grow roots and path dependence makes it very hard to steer towards a superior solution. This wastes resources and limits growth. Regulators have started taking action, whether that’s GDPR in Europe or the US Congress investigating the nature of the dominance of digital giants like Amazon, Google, Facebook. The reaction of society to emergence of AI has certainly appeared and it is good that, through discussion, we can find the way how to proceed.

MP: What about the nature of AI itself? What's wrong with describing it as a general purpose technology (GPT)? And what's a better framework?

EP: Describing AI as GPT is not wrong, it just might be incomplete. The point is that GPT very often focuses on a very coarse representation – if we imagine that AI is a sphere, GPT represents it as a circle. We do not say that a GPT is a completely wrong concept. It is just an alternative consideration among several other dimensions. First of all, the key point here is systemic nature. This is a system that involves data, hardware, algorithms. AI has this systemic nature, it is an infrastructural technology. It seems like it has a great potential to evolve into something like an internet rather than like a program that you install on a computer. So rather than a small component, AI is more of a system and network of things.

MP: And what kind of response or reaction have you had to that idea?

EP: In academia, we always get all sorts of reactions! Some people totally love it. Some people doubt that this is even necessary to do, arguing that we're splitting hairs, and it's not really important whether AI is a GPT or a large technical system. The criticism is useful to uncover weak points and strengthen the argument. In the majority of cases, the reaction was, "We never thought about that." Everybody jumped on the idea that AI is a general purpose technology because general purpose technology has in its name 'general purpose' and, because AI is applied to so many things, that seems very reasonable. But the theory of GPT is actually based on a specific concept, it's not just something you can apply to many purposes. In the end, a stick is also a general purpose thing – you can put it under the table or you can hit something with it! We're not criticising those who say that AI is a GPT. We just point out some important things not to overlook and the large technical system concept helps us to expose them.

MP: How is multi-disciplinary research helping here?

EP: I think a problem in science currently is hyper focus and hyper specialisation. We sometimes do not see beyond our field very much, which is alarming. We need to make more effort to be more diverse. I'm not saying that we should not specialise. I'm saying that we need to be exposed to more different things. There is a danger that research that is called multidisciplinary is done in a piecewise, partitioned way: I do this part, and you do this bit and we don't understand each other's bits. Communication is essential and what frustrates me but what also makes me love science is that there is always a way to explain things more simply if you try hard enough. It needn't be dumbed down, you just need to find the necessary level of understanding. We need more dialogue – or polylogue – between disciplines. With that, we become a stronger network of knowledge.

MP: What advice would you give to other early-career researchers based on what you've learned or discovered?

EP: In the first year, it is very crucial to work with and talk to your supervisor because that's what builds up your early capabilities to navigate the literature for methods and to understand what is a good and bad research question. Supervision is important so choose your supervisor wisely. Their role is to help you to understand where you're going through advising – it's like leading from behind. A PhD is a challenging thing to do and it helps if you are integrated in your research environment so do that academic networking, attend those conferences, co-author papers – make the most of all the help you can get from your research colleagues and contribute by helping others when you can.