The Eyes Have It, But AI Systems Don't... Yet

An Interview with **Joel Zylberberg**, Computational Neuroscientist, York University. Vision: Science to Applications (VISTA)

So one fun project going on now in the lab is, using brain activation patterns to teach AI systems how to do the same task as the individual was doing when those brain activations were recorded.

One big challenge on the machine learning or AI side is really to create systems that are not just able to learn individual tasks, but instead have some semblance of common sense, pushing towards artificial general intelligence.

There are a few ideas in the ML field or machine learning about how to achieve that, for example with multi-task training. So artificial agents that have to do not just one thing, but several, and the idea is maybe the synthesis between those would contain some ideas of common sense.

The way my work intersects with that is this idea that by using the activation patterns of a person, while they do tasks, to teach AI systems to do those, we can hopefully impart some of that common sense into the machines.

What are some applications of your research?

So there's two main applications that we see coming out of this work. The first is to make better bionic eye-type prosthetics for people with visual deficits. So the idea is being able to predict correctly what the outputs of the eye should be for any given visual input. We could then stimulate those same activity patterns and optic nerves, sending those signals into the brain in individuals with retinal dysfunctions.

The second main application we see is that by understanding better how our eyes extract useful, visual information from dynamic scenes. We might be able to make better vision systems for applications like, autonomous vehicles, that need to work similar to our visual systems across a wide range of different luminance conditions.

So for example when clouds start to cover the sky or when you go under a shadow, the light levels can change dramatically by factors of about 100 in fractions of a second, and that poses a real challenge for vision systems that need to work over those rapid, large changes.

The passion that drives my research is really, just a curiosity to understand the world around me and my place in it, and that's what keeps me happy.