

Data Science Insight 1

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My Data Science Insight is SpatialOS by Improbable. Improbable is primarily a gaming company which was founded in 2012, and rolled out its key technology, SpatialOS, in 2015. SpatialOS is essentially a complex cloud-based simulation tool. While most video games are split up into different physical spaces that only load when the player is in them (an approach called sharding), SpatialOS is split up into different “Workers” which each compute a type of task (for instance the cars in the city, or the birds in the sky). Their approach allows them to model very complex systems on a large scale. The most fascinating part of all of this is what Improbable has done with their technology. Herman Narula and Rob Whitehead both started the company with the intention of making video games. However, as they were in the process of developing SpatialOS they realized that there was nothing else like it, and the more they talked to people the more they realized that it could be used for things outside of gaming. So they hired some people from Google and Amazon to help steer the model. Its first ever project was a collaboration with the UK government; a simulation of the entire infrastructure of the internet that was created to test possible scenarios for if the web’s routing infrastructure is attacked. Nowadays their focus is primarily on games, but they continue to do arguably much more successful modeling work on the side.

One of the more notable things that they’ve been involved in recently is the UK’s coronavirus response. Agent based models to simulate virus spread have become extremely popular since the outbreak of Covid-19, but SpatialOS allows Improbable to create similar models with a whole new level of detail, which is why they’ve been tasked by the government to create models that will help determine pandemic policy. The models usually consist of millions of people living in a city with programmed behaviors (like how often people are going out or interacting). You can then impose different levels of quarantine regulations on the city to see how it impacts the spread of the virus. These models are extremely important for understanding how we should respond to the pandemic. However, they are still controversial in many ways. First of all, there are many variables that you’ll never be able to get enough accurate data for to truly reflect the real world (Ex: does getting Covid-19 provide immunity? To what extent? This is a variable the modeler will have to make up.). Second of all, our world is vastly more complex and random than a model can accurately portray. This second problem is something that using SpatialOS fixes to a certain extent, since it allows for vastly more complexities than the average modeling tool. For instance, most Covid19 models might just have a variable that says the probability of whether or not a single agent is at any given location at the moment. SpatialOS theoretically allows agents to have morning coffee runs, and trips to the grocery store, all of which creates more detail and accuracy in the model. However, the first problem of lacking sufficient real world data is still an issue. SpatialOS has been used by academics around the world to simulate things like how violent extremism emerges in populations, or the UK housing market. It’s use is almost infinite, and it could really revolutionize how we do modeling.