module1_lecture9

Mon, 12/27 3:43PM 5:53

SUMMARY KEYWORDS

infections, formula, model, person, spread, excel, cell, paste, equal, virus, lockdown, calculates, day, starting, basketball players, suppose, average, predicts, infected, copy

SPEAKERS

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So what I've created for you here is an Excel file. And we're going to model the spread of infections. And what we're going to start off with this with what's called the basic model. So think of a model where suppose there were no restrictions, no vaccines, and a virus were to hit the society, right? And suppose we wanted to model that, how do infection spread in a situation, in a normal situation like that? So here's my basic model. So what I have assumed is that P is equal to point three. That means, if one person meets with an infected person runs into another person, what's the probability of him or her passing on the infection? That's 30%. Second assumption we have made is N is equal to 20. What that means is that the average interactions for a person every day is 20. Okay, so let's assume that this is the normal state of affairs. And now, let's suppose that, okay, we have one infection in day one, right? So this is like the patient zero. Okay? And how is that going to spread to day two, day three, and so on, right? So that's our aim that we're going to see that starting with one new infection, and day one, how that's going to spread over the days. So let's go to day T equal to two. And let's use our formula to figure out what will be the number of new infections on day two. So recall that in Excel, anytime you want to do a formula, and this is what we did with the basketball players, we put an equal to sign. And now we're going to put in our formula, which is on day two, the number of new infections will be N times P to the power of two minus one, N times P to the power T minus one, right. So we're going to do N, that's 20 times P, that's point three, to the power of, so in Excel when you're trying to do to the power of you use this caret sign, right, and this to the power of T minus one, so the day here, that's in cell A6, right? So that's why we're putting A6 here, minus one. And now if I hit Enter, that calculates the number of new infections on day two. And now we want to do the same thing on days three to 10. In fact, you can do it even way past 10. But here, I'm just going to show you two up to day 10. So if you want to, for example, do the same formula on these, these days, right, so what I'm going to do is the same trick that we had done before, we're going to copy the cell for which we've already calculated the formula. And then we're going to paste it in the remaining cells. So I'm going to choose paste. And remember, I choose the formulas and this automatically paste it into all the other cells here.

So now you can see how the infection spread. Starting from one, it goes up to six in day 2, 36 in day three, 216 in day four, 1296 in day five, and it slowly starts getting wild, it gets 7 thousand, 46 thousand, two hundred and about 79 thousand, and so on. And by day 10, this goes up to about 10 million. So in this model, what it predicts that if you have the normal state of affairs where each

person interacts with 20 people on average in a day, and the infectious rate is about 30%, then if you don't do anything, the number of infections, they run pretty wild, they go off from starting from just one infected person, they easily go up to 10 million in day 10. So this is what epidemiologists mean, when they talk about the virus running wild if we don't do anything. And in terms of what we did with the model, see in each case, right, so on day three, the formula is 20 times P, N times P to the power of T minus one. So the T is in this cell here. So that's why it's three minus one A7 minus one. And now, and this Excel automatically calculates for you all the values up to 10. In fact, if you want to go further, you want to go 11, you can do exactly the same, see, it even has copied it immediately, right? So I was going to do copy and then and paste here using the formula, but Excel already anticipated me and did that. So this is a simple model, which shows how infections can spread if you don't do anything. What I am going to do in the next clip is look at different policies like lockdown, strict lockdown, vaccinations, how they impact N and P, and how that impacts the spread of infections. So let's stop this clip here. And I'll pick up exactly here in my next clip.