Problem A: Group Affinity and Fashion Sense

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Abstract

There are many questions that arise when looking at how people tend to congregate into groups, which leads to many ways to address the question. For our problem we addressed the effects of how people choose which groups to associate with as well as how they decide to adjust to the expectations of the other people in the group. Because the close association of the people in the group depends on many factors, we also considered how many influential people are a part of the group.

Developing a model

To first understand the relationship between the number of people in the group taking on the trait compared to time. We use the equation:

$$\frac{dX(t)}{dt} = A(t)B(t)Y(t)X(t)(1 - \frac{X(t)}{n})$$

Next, we assumed that no other people entered or left the group during the time of the trend. Then we identified:

A(t) = the amount of public exposure of the trait in the group
B(t) = the function of close association related to time
Y(t) = the number of influential people in the group taking on the trait
X(t) = the number of people following the trend

To create a usable model, we can look at the A(t), B(t) and Y(t) as if they are constant rather then changing over time. Because of this, we will assign them constants a, b and y respectably. Thus, we have:

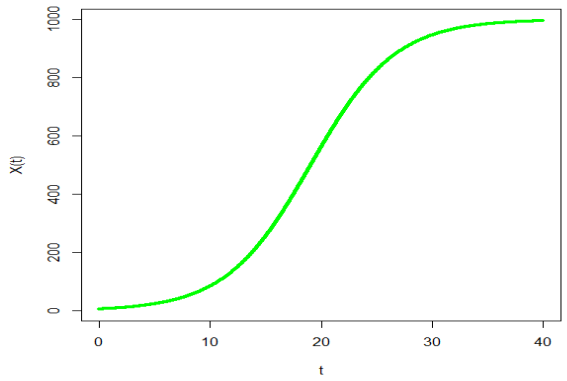
$$\frac{dX(t)}{dt} = abyX(t)(1 - \frac{X(t)}{n})$$

For simplistic sake we can assign a k such that k= aby which gives us the following:

$$\frac{dX(t)}{dt} = kX(t)(1 - \frac{X(t)}{n})$$

Next, we must translate our current equation of change in people with respect to change in time, into a more useful equation relating the number of people taking on the trait with respect to time. To do this we integrate the equation with respect to t. This gives us

$$X(t) = \frac{n}{1 + ge^{-abyt-c}}$$



Prediction

Based on our model we predict that the number of people taking on the trait depends on many different factors, but we found that people are going to take on the trait when the percent of all functions a, b and y are high. If there is not much or any public exposure at all, people are not known to take on the trait. Same goes for how close the group is as a whole and how many influential people are in the group. Overall, we know that the chances of the whole group taking on the trait is more than likely not going to happen.

Conclusion

For our model we set the initial conditions: n=1,000, A=1, B=0.75, Y=.35, c=-10. From these initial conditions we were able to see that by manipulating the amount of public exposure, amount of influential people and the close association of the group that there is a distinct increase in the amount of people that took on the trait. When we increased A, B, and Y we saw that the line became much more vertical which means that many people took on the trait in a very fast period. We feel as though the more vertical the line is the less reliable it becomes. Conversely, we say the same for the more horizontal the line becomes. If the line were to become completely horizontal, then we would see that no one would have taken on the trait which means the trend would be non-existent.

Additional issue: After addressing the additional issue, there are three main ways to increase sales; this is through a greater public exposure, more influential people following the trend and perceiving a larger trend then what is present. With an increase in the number of influential people it is going to make the number of sales higher and the number of people taking on the trait increase. With the increase in all of these aspects the function will grow at a quicker rate.

Reference

(Dr. Benjamin, personal communication, November 5, 2019)