Hipsteritis

Problem A: Group Affinity and Fashion Sense

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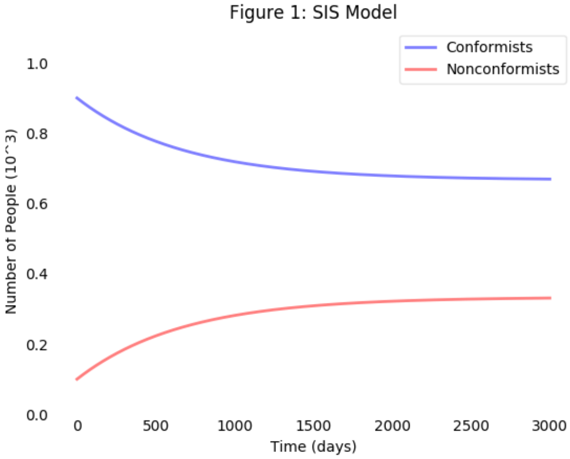
Preface: The goal of this project was to investigate the social dynamics of a group in terms of fashion. Our model is of a dual nature. We take a global view of the interaction between conformists and nonconformists to model the dynamics of these two groups as nonconformist fashion emerges and stabilizes much akin to a virus. For the second part of our model, we solely view the interactions of members within the group of nonconformists and model their synchronicity as social entropy using the heat equation.

Rationale: The role of fashion in anti-conformity movements has always been a significant one. As these types of movements usually organize themselves around a cause of some sort, it becomes imperative that the members of the movement can identify each other in order to organize themselves. The *hippies* of the 1960s were easily identified by their rustic and bohemian manner of dress, *punks* in the 1980s were similarly identified for their preference for leather and intentionally damaged clothes. These movement's fashion functioned as a loose category, with often significantly different manners of dress region by region. However, with the modern *hipster,* this does not appear to be the case. *Hipsters* as a social "movement" started to appear in the mid 2000s and became significantly popular by 2010. Unlike the fashion of social movements of the past, *hipster* fashion was popular seemingly independent of region and quickly homogenized. This difference prompts two questions; how is it that people participate in trendy *hipster* fashion and how is it that *hipster* fashion homogenized unlike its anti-conformity predecessors?

These questions are explored by the application of a dual model. One half models the interactions between conformists and nonconformists using an SIS model and another that models the interactions between individuals as different points in heat equation to model the diffusion and later homogenization of information in the isolated group of nonconformists.

Assumptions: The core assumptions of our model are as follows: The population is static, individuals influence their nearest neighbour the most, physical and digital influence is equivalent, and every individual in a population is influenceable. N value in our heat equation is set to be one, so each location x would be occupied by one individual. The coefficient on our heat equation solution is assumed to be 1.

Figure 1: SIS Model



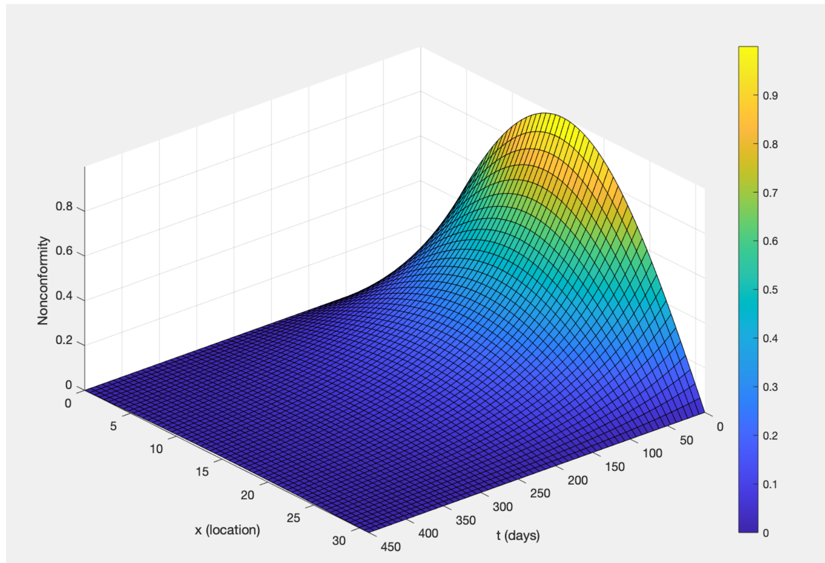
SIS Model: We use an SIS model to estimate the social dynamics of individuals appearances:

$$\frac{dC}{dt} = -\beta\frac{C}{P} + \gamma\frac{N}{P} \text{ , and } \frac{dN}{dt} = \beta\frac{C}{P} - \gamma\frac{N}{P},$$

where $P = C + N$ is the total population, C is the population of conforming individuals, N is the population of nonconforming individuals, β is the rate at which individuals change to nonconforming, and γ is the rate at which individuals change to conforming. We set

$P = 100$, $\beta = 0.05$, and $\gamma = 0.01$, as well as setting the initial number of nonconformists to 10% of P. The populations of the subgroups begin to stabilize around day 1500.

After running the SIS model(Figure 1), we observed that the group size converged. This can be modeled as no people moving in or out of these groups. To further explore the dynamics, we considered the individual dynamics of a specific group, focusing on the nonconformists. We use the heat equation to simulate communication diffusion and demonstrate synchronicity.



Heat Equation

We decided to use the heat equation,

$$\frac{\partial}{\partial t}U = K\Delta U \quad (1),$$

with Dirichlet boundary conditions,

$$U(0,t) = U(L,t) = 0 \quad (2),$$

to model the interactions of different individuals within the non-conformist group. Solving the heat equation using separation of variables would give us the eigenvectors

$$\lambda_n = \left(\frac{n\pi}{L}\right)^2, \ n = 1, 2, 3... \quad (3),$$

and the corresponding general solution,

$$U(x,t) = \sum_{n=1}^{\infty} A_n sin\left(\frac{n\pi x}{L}\right)e^{-\left(\frac{n\pi}{L}\right)^2 kt} \quad (4).$$

The heat equation models the amount of heat energy at a specific given location and time; by using the property, we can let the heat energy represent the intensity in the hipsters difference within the non-conformist group. This means that the more deviated the hipster is from 0, the more different the hipster is from the non-conformist group. Another property is that as it reaches equilibrium, it converges to 0, which aligns with our model that as time reaches infinity all of the hipsters would eventually end up sharing the same fashion. The x variables in the equation refers to the location between each individual, and the distance between individuals represents their influence over each other; the closer they are, the more likely they will converge with the majority.

Conclusion: Within the SIS model, we consider a fixed population with subsequently fixed preferences, we would see that the social movement between groups would stabilize. The SIS model feeds the initial conditions of the heat equation, which models the nonconformity of each individual hipster with respect to their location in the group, and the time. As the distances between hipsters decrease, their influence over each other increase as well. As shown in the heat equation graph, the nonconformity values are being influenced by the surroundings and eventually converging to the same value 0 at equilibrium. For our model, it took approximately 450 days for all the hipsters to look alike, and to the point in which there is little to no difference in their hipster-fashion.