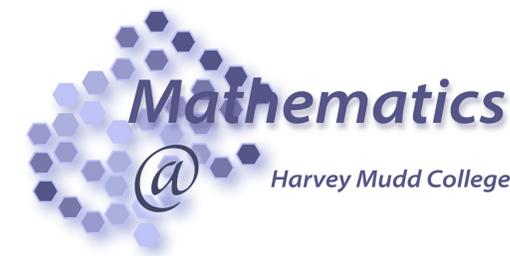


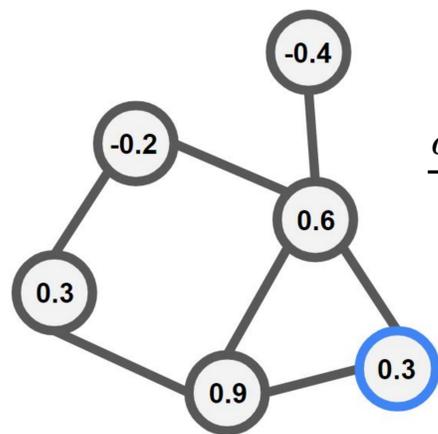
A Smoothed Bounded-Confidence Model of Opinion Dynamics

Solomon Valore-Caplan



Model Motivation and Basics

- Takes place on a network of agents with opinions on $[-1,1]$
- Agents' opinions move towards their neighbors'



$$\frac{d\circlearrowleft}{dt} = \frac{(0.9-0.3)}{1+e^{\gamma[(0.9-0.3)^2-\delta]}} + \frac{(0.6-0.3)}{1+e^{\gamma[(0.6-0.3)^2-\delta]}}$$

- "Smoothed Bounded-Confidence Model" motivated by the Hegselmann-Krause model
- SBCM takes the binary HK filter and turns it into a tunable transition between including and excluding an opinion.

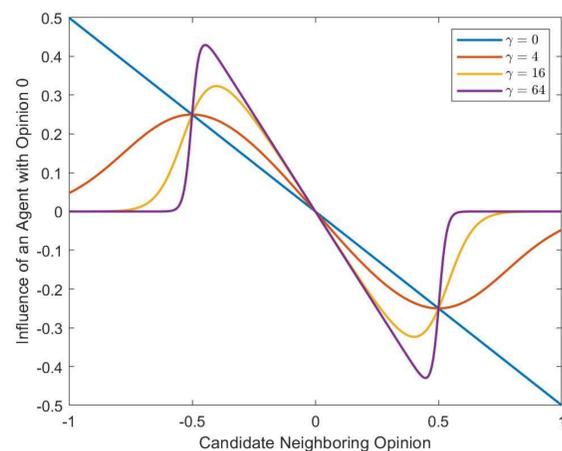


Figure 1: The influence of an agent at opinion 0 ($\delta = 0.25$)

- Model parameters are γ and δ
- The sharpness of transition is controlled by γ
- The cutoff of the transition occurs at a squared distance of δ .

Model Definition

$$\frac{dx_i}{dt} = \sum_{x_j \sim x_i} \frac{(x_j - x_i)}{1 + e^{\gamma[(x_j - x_i)^2 - \delta]}}$$

Equation 1: The dynamics of the system

- In this project, we are focused on a complete graph with two nodes that have fixed opinions

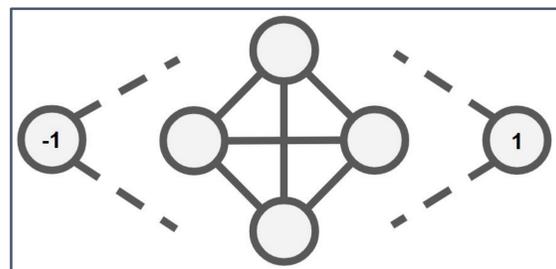


Figure 2: A complete graph with two fixed nodes

Consensus in K_n

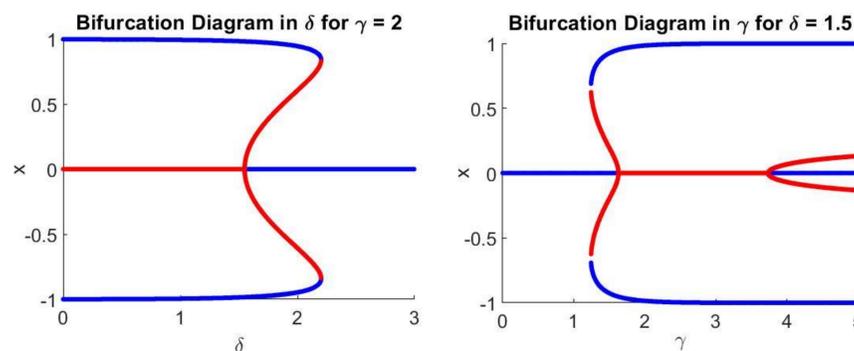
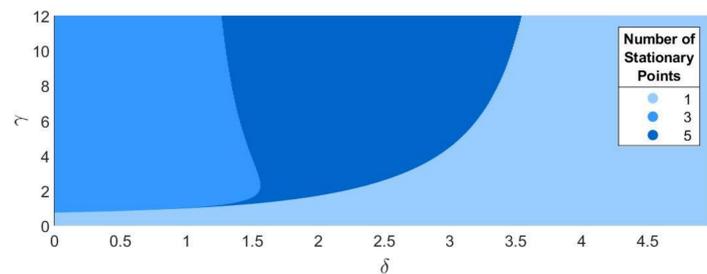


Figure 3: Stationary consensus profiles classification

Fragmentation in K_4

- What about stationary points without consensus?

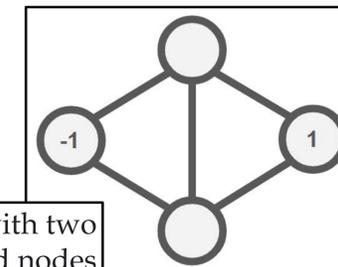


Figure 4: A complete graph with two persuadable and two fixed nodes

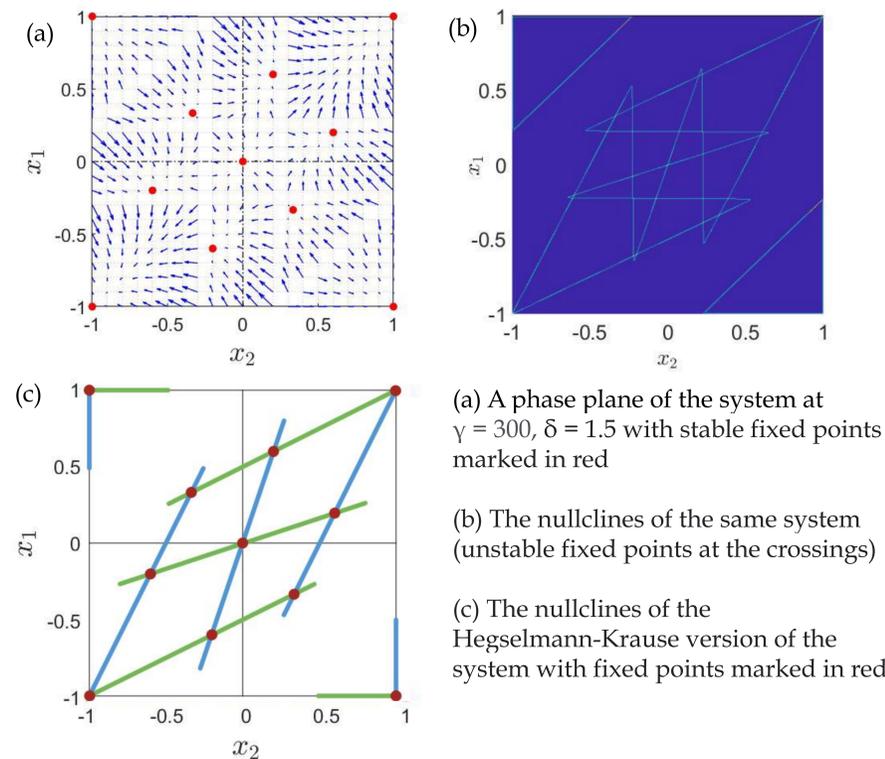


Figure 5: Dynamics of two persuadable nodes

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References

Hegselmann R, Krause U. "Opinion Dynamics and Bounded Confidence: Models, Analysis, and Simulations," *Journal of Artificial Societies and Social Simulation*, 2002