

## Homework 6-Bonus-Buying a Pair of Jeans: Model Simulation I

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Due May 15<sup>th</sup> , Tuesday.

### Buying a Pair of Jeans

Bonus extension to homework 5.

#### a. Plot graphs to simulate the probability of the Fashion stat

**Weak Ties.** An acquaintance or expert in Fashion may influence agent  $i$  in making his choices. This may be modeled as a “weak” tie. Let us refer to it as expert or agent  $k$  not in  $N_i$ .

$$P_{ik}(Flash(i, x, t) | Flash(k, x, t - 1)) = \frac{1}{Z_{W_{ik}}} e^{-\beta_{ij} |S_{Flash(i, x, t)} - S_{Flash(k, x, t-1)}|^{B_{ik}}} \quad (39)$$

Assume the weak tie member, agent  $k$ , to be in some state  $\hat{S}_{Flash(k, x)}$  through all times,  $t$ . You choose a state (for each brand  $x$ ). Now, we multiply, as a new method/expert, to the formula (37) (from homework 5) to obtain

$$\begin{aligned} P_i(Flash(i, x, t) | \overrightarrow{Adv}(x, t)) &= \\ &= \frac{1}{Z_{Flash}} e^{-\beta_{ij} |S_{Flash(i, x, t)} - \hat{S}_{Flash(k, x)}|^{B_{ik}}} \\ &\times \left\{ \sum_{S_{Flash(i, x, t-1)}=0}^4 \left[ e^{-[Adv(i, x, t) | S_{Flash(i, x, t)} - \min(S_{Flash(i, x, t-1)} + 1, 4)]^{A_{i, x} + \alpha_{ii} |S_{Flash(i, x, t)} - S_{Flash(i, x, t-1)}|^{A_{ii}}}} \right] \right. \\ &\times P_i(Flash(i, x, t - 1) | \overrightarrow{Adv}(x, t - 1)) \left. \right\} \\ &\times \left\{ \prod_{\substack{j=1 \\ j \neq i}}^{N_i} \sum_{S_{Flash(j, x, t-1)}=0}^4 \left[ e^{-\alpha_{ij} |S_{Flash(i, x, t)} - S_{Flash(j, x, t-1)}|^{A_{ij}}} \times P_i(Flash(j, x, t - 1) | \overrightarrow{Adv}(x, t - 1)) \right] \right\} \end{aligned}$$

From this subroutine, you can iterate in time to estimate a sequence of probabilities  $P_i \left( Fash(i, x, t) \mid \overrightarrow{Adv}(x, t) \right)$  over time and for each *agent*  $i$  and each *pair of jeans*  $x$ .

Plot these probabilities, over time, for each state  $Fash(i, x, t)$  (different colors to show different states, so there are five plots per graph, per brand).