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Computational Economics

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Independent Project Proposal – Restaurant Cuisine selection

In my childhood and youth, I observed several storefronts in my hometown demonstrate significant turnover of tenants over time, especially restaurants. Since each of those locations seemed to be attractive pieces of real estate with a positive neighborhood atmosphere, my family and I wondered why those properties so frequently failed to establish successful restaurants for us to enjoy. Some of the attempts certainly performed better than others – perhaps those restaurants’ cuisines better fit the gastronomic demands of our community. I will develop my individual project based on this curiosity – how do property developers or restaurateurs determine the best-fitting restaurant type/cuisine for their location(s) over time? How does communicating with other restaurateurs help them get it right?

Building the model, I will consider a hypothetical town with a given population of residents. These residents will be subject to a utility function based on their preferences for a set of possible cuisines, as well as their tolerance for distance traveled to a restaurant of their liking. They will be distributed spatially on a grid representing the town, and somewhat clustered according to their cuisine preferences. This clustering is intended to represent characteristics such as race, ethnicity or other cultural factors which contribute to both tastes/preferences and population segregation in the real world.

In this town, there will be four restaurateurs who each own a fixed restaurant location on the town grid. Additionally, there will be four different cuisine possibilities for restaurants: Barbecue, Italian, Mexican, and Chinese. Importantly, each restaurateur can choose any of these four cuisines for their location – their options are not restricted by the cuisine choices of the others. The success of each of these locations will depend on their revenue, as generated by their fulfillment of the demand from the town population. Given the tastes and preferences of the population, there exists a perfect equilibrium in which none of the restaurant locations could experience more revenue by choosing a different cuisine.

To address my research questions from above, I will implement a set of learning models in which the restaurateurs make choices of cuisine in successive iterations and compare the dynamics and outcomes of these models with the perfect equilibrium (as determined by enumerating all possible distributions of the four cuisines in the four locations). In the first learning model, the restaurateurs will observe only the revenue of their own restaurant in each iteration. In another, each restaurateur will know the revenue of one of the others (this knowledge will be mutual, so the group is split in two pairs). In a third model, each restaurateur will have knowledge of the revenues at all four locations. I expect that increasing knowledge of other restaurants’ revenues will lead to a quicker approach to the perfect equilibrium outcome of cuisine distribution.

My model will depend heavily on the behavior of the population of residents, so I will need to focus on several components in this regard: residents’ relative preferences for the cuisines and likelihood of visiting each of them on a given night, their tolerance for traveling greater distances to visit a restaurant, and their prioritization of cuisine preference and convenience. Adjusting cuisine preferences over the population essentially amounts to choosing a demographic composition for the population – I will need to make either a uniform distribution of preferences or some informed distribution based on intuition or real-world data. The latter two components/parameters will likely be chosen by an ocular test or by referring to outside literature.

Also significant in the model will be the frequency by which restaurateurs can make their next choice of cuisine. Lower frequency of change will allow more data and knowledge for each period but reduces the agility to respond to these data. Higher chance frequency allows restaurateurs to respond more quickly to their observations, but perhaps reduces the reliability of these observations.