Exploring Game-theoretic Schelling Segregation

**Motivation**  Segregation is a well-known sociological phenomenon. It essentially means that a population which is mixed along, e.g., ethical, racial, linguistic or religious dimensions tends to segregate over time such that almost homogeneous sub-communities emerge. The most famous example of this phenomenon is residential segregation along racial lines in many urban areas in the US.

Residential segregation along racial lines in urban areas in the US. The data is taken from the 2010 US Census as illustrated in the racial dot map: [https://demographics.coopercenter.org/Racial-Dot-Map/](https://demographics.coopercenter.org/Racial-Dot-Map/).

In order to explain the emergence of segregation, Economics Nobel Prize winner Thomas Schelling [1] proposed a very simple and elegant agent-based model where two types of agents are placed on a grid. Each agent is aware of its neighboring agents and is content with her current position if at least a $\tau$ fraction of neighboring agents is of her type, for some $0 \leq \tau \leq 1$. If this condition is
not met, then the agent becomes discontent with her current position and exchanges positions with a randomly chosen discontent agent of the other type or jumps to a randomly chosen empty spot. Schelling showed with simple experiments that even with $\tau \leq \frac{1}{2}$, i.e., with tolerant agents, the society of agents will eventually segregate into almost homogeneous communities.

This surprising observation caught the attention of many researchers who studied various models and verified Schelling’s predictions experimentally. However, all these models are essentially random processes where discontent agents choose their new location at random. To address this drawback, we have introduced a game-theoretic version [2], where agents choose their location strategically.

**Purpose of the project** We want to study (variants of) our game-theoretic model in depth. This includes a theoretical analysis of the induced graph-theoretic process and its outcomes as well as an extensive empirical study to compare our model with existing models.

**What we expect from you** We expect basic proficiency with graph-theoretic concepts and general interest in Algorithmic Game Theory. You should bring the curiosity and willingness to delve into an interesting interdisciplinary research topic within Theoretical Computer Science. Our main goal is a rigorous mathematical understanding of game-theoretic Schelling segregation, and we expect you to contribute theoretical results to that ambitious endeavor.

**What you can expect from us** We will gently introduce you to the field and accompany you all along this interesting journey. This will be a team effort, and we aim at publishing our results at a renowned international conference.

**How to contact us** You’re welcome to visit us on floor A-1 or send us an e-mail:
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