

Modeling civil violence

Why? - Civil violence has been happening around the world, a recent example of this are the Hong Kong protests

How? - By focusing on:

- Police behaviour
- Social media influence

State of the art:

- Epstein, J. M. (2002). *Modeling civil violence: an agent-based computational approach*.
- Goh, C. K., Quek, H. Y., Tan, K. C., Abbass, H. A.: *Modeling Civil Violence: An Evolutionary Multi-Agent, Game Theoretic Approach*.

1. Modeling civil violence: An agent-based computational approach

The agent-based model offers a promising approach in understanding complex dynamics of decentralized rebellion.

The model addresses the following:

- Both civilians and cops are defined as reactive agents driven by simple rules.
- Civilian agents can be in one of three states (Quiet, Active or Jailed)
- The attributes of civilian agents are position, vision radius, political grievance, risk aversion, and threshold for rebelling.
- The cops' attributes are the position and a vision radius (which may be different from that of civilians)

Ref - <https://doi.org/10.1073/pnas.092080199>

2. Modeling Civil Violence: An Evolutionary Multi-Agent, Game Theoretic Approach

The model addresses the following:

- Multi-agent model expresses revolt in terms of grievance and greed.
- Study is done on the movement of agents based on specific strategies which are later improved using evolutionary learning.
- Arrest is based on Iterated Prisoner's Dilemma (IPD) game.
- Jail term is a variable, history is taken into account. This is missing in the Epstein's model.

Ref - <https://doi.org/10.1109/CEC.2006.1688503>

Limitations of the models

- Modeling of cops' behaviour is crude.
- Model parameters do not take the media into account.
- The effects of social media in a rebellion in the current context are not addressed by the models.

What is the new idea?

POLICE BEHAVIOURAL MODEL - POLICE DEFECTS (CONTROLLED ENVIRONMENT)

Questions the model will try to answer:

- Under what circumstances will the police most likely defect?
- What happens when the police defect?
- How does police defection rate influence the outcome of the model?

SOCIAL MEDIA MODEL - EFFECTS OF ACCESSIBILITY; EFFECTS ON MOBILITY (CONTROLLED ENVIRONMENT)

Questions the model will try to answer:

- How does access to social media change the outcome?
- How does mobility affect the outcome?