SWEN90004 Modelling Complex Software System

Assignment 2 Proposal

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1 Descriptive Overview

Our group decides to replicate the **Rebellion** model. This model is based on model of civil violence by Joshua Epstein (2002). It describes the how agents behave against central authority in relation to their grievance and power of authority. Where grievance of agents depends on government legitimacy, perceived hardship and risk aversion of each individual. Power of authority is determined by number of police officers, their vision and maximum jail terms. There are two global variables in the model that cannot be directly set in the interface that are **k**, the factor for determining arrest probability, and **threshold** for agents to rebel.

2 Design of Rebellion Model

There are two kinds of members in this model, **agents** and **police officers**. Police officers only has one state that is arresting active agents (rebelled agents) in their vision. If there are more than one active agents in the vision, they will arrest randomly one of them. There are three different states for agents, quiet, active and jailed. The state update rule are as following:

2.1

$$Quiet \Rightarrow Active$$

$$grievance - riskAversion \times estimatedArrestProbability > threshold$$
$$\text{Where } grievance = perceivedHardship \times (1 - governmentLegitimacy) \quad (1)$$

2.2

$$Active \Rightarrow Quiet$$

2.3

$$Active \Rightarrow Jailed$$

If police officers find active agents in their vision, they will randomly arrest one of these active agents and change their state from **active** to **jailed**.

2.4

$$Jailed \Rightarrow Quiet$$

2.5

$$Active \Rightarrow Quiet$$