Modeling Civil Unrest in the Philippines

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Abstract

This study compares Civil Unrest Model (modified from Netlogo's Rebellion Model) simulation with the actual historical data on civil unrest in the Philippines from 1998-2015. This is intended to determine the viability of using this model in determining maximal values to forecast possible incidents of civil unrests in the Philippines. Using the Civil Unrest Model and the actual historical data, findings showed that incidents of civil unrest vary across three administrations depending on the perception of governance manifested through the approval and trust ratings of the central authority. However, when historical data on the terrorist incidents were compared, the presidency of Estrada and Arroyo showed that perceived governance inversely relates to the percentage of active agents. The simulated results for the two administrations coincide with the historical Uppsala Conflict Data Program. The presidency of B. Aquino's perceived governance (high) diverged from the two previous presidencies as conflict incidents during his term are significantly higher.

Keywords and phrases: Agent-based Modeling, civil unrest, rebellion model, perceived governance, civil unrest

Introduction

Civil unrest is a common term to define various forms of civil disorders and sometimes referred as civil strife. This term is used by law enforcement agencies to describe one or more types of conflict generated by a group of people (Islam & Ryan, 2016). Breakdown of harmonious relationships such as dissatisfaction and disagreement between members of a community and competitive aggression which may lead to disruption of an organization, conflicts, damage to property and injuries are some of the things that define civil unrest (Ballantyne, 2006). This is a powerful form of collective human dynamics, which has led to major transitions of societies in the modern history (Braha, 2012). Typically, it comes in the

form of protest against political or social issues (Islam & Ryan, 2016). In the Philippines, civil unrest had been part of its history. Effects of this unrest can be destructive as in the case of coup d' etat during the Presidency of Corazon Aquino or it can be constructive as it contributed to the restoration of democracy. Various factors have been attributed to the rise of civil unrest. One of which is attributed to the role of central authority. The study examines the incidents of civil unrest in the country from 1998 to 2015 under three different administrations. In this study, it claims that civil unrest incidents continue to increase when the trust ratings of central authority and police visibility are low.

Incidents of civil unrest have been recorded worldwide that is evidenced by long-term datasets. The existing databases include the Comprehensive Cross National Time Series Dataset (Banks, 2009), International Terrorism Attributes of Terrorist Events (ITERATE), RAND terrorist event database, Global Terrorism Database (GTD) and the Uppsala Conflict Database. These databases have coded several variables that include civil unrest incidents in each country worldwide (La Free & Dugan, 2007).

In the context of modeling and identification of universal patterns of behavior of social unrest, Braha (2012) cited that the study on collective human dynamics including collective aggression has been the focus of much discussion. Other studies discuss the causes of civil unrest incidents (Deininger, 2003; Ballantyne, 2006) of different emphasis. In the Philippines, Ringuet (2002) discusses what caused the rise of civil unrest specifically in Mindanao.

In this study, civil unrests in the Philippines through the Uppsala Conflict Database is used to analyze the patterns of unrest using factors like policeman population, police visibility, and approval and trust ratings of three presidents: Joseph Estrada, Gloria Macapagal Arroyo, and Benigno S. Aquino. Results of the analysis are compared to the simulated data on civil unrest

incidents employing the modified Netlogo Rebellion Model (Wilensky, 2004). The study focuses on the administrations of President Joseph Estrada (1998-2001), President Gloria M. Arroyo (2001-2010), and President Benigno S. Aquino (2011-2015).

Objectives

The paper intended to modify Wilensky's Rebellion Model into a Civil Unrest Model considering perceived governance of constituents. It simulated civil unrest data in the Philippines under the three administrations from 1998-2015. It also characterized the administrations based on the perceived governance by the constituents.

The Model

This study utilized Agent-based Modelling (ABM) in analyzing the civil unrests in the Philippines from 1998-2015. The Netlogo model on Rebellion was used and modified into the Civil Unrest Model. The Netlogo's Rebellion model developed by Uri Wilensky is an adaptation from Joshua Epstein's model (2002) on civil violence. Wilensky's Rebellion model depicts a population with central authority. It contained the following elements/ parameters: perceived governance, cop density, agent density, awareness of issues of cop/agent, and maximum jail term.

In this model, the population randomly wanders in the world space. Considering the factors on their level of perception of governance against the central authority and their perception of the risks of being jailed, these agents may be quiet, jailed or actively challenging the authority. A separate population of cops, acting on behalf of the central authority, seeks to arrest or suppress the active agents. The cops wander around randomly and arrest people who are actively rebelling.

The model cycles through three different rules, known as M (move), A (agents) and C (cops) as follows: (1) Movement rule (M) says

that each cop and non-imprisoned agent moves to a random unoccupied site within VISION (Awareness of Issues) patches; (2) Agent rule (A) says that if an agent's GRIEVANCE exceeds the NET-RISK by a small threshold, the agent decides to rebel. It is also possible for the agent to move from rebellion to quiet; (3) Cop rule (C) says that each cop should look for active agents within VISION patches. If at least one exists, the cop randomly selects one active agent and sends it to jail for a number of turns and moves to the patch of the jailed agent. The patch of the jailed agent is considered unoccupied (Wilensky, 2014).

In addition to the application of the rebellion model, the incidence of civil unrest in the Philippines is simulated using the parameters from the original model. The comparison of the two models is shown in Table 1:

In adopting the modified Civil Unrest model for assessing the patterns of unrest in the Philippines, the model sets the population at 1600. Variables like agent – cop ratio, perception of governance, maximum jail term, among others are used. In the approximation of the historical data or values, the reactions interactions of agents were simulated to determine the occurrence or non-occurrence of civil unrests.

Basic Assumptions of the Civil Unrest Model

The Civil Unrest model assumes the following parameters based on the Rebellion Model of Epstein (2002):

1. Cops will always follow the central authority/governance; they cannot rebel or challenge the central authority.

2. In a population, the proportion of agents who have grievance (perception of hardship and perception of bad governance). Quiet, active and jailed persons are used as agents

Table 1. *The Rebellion Model versus Civil Unrests Model*

Rebellion Model Parameters	Civil Unrest Model Parameters
Initial-cop-density (0 – 100%)	Initial-cop-density (0 – 100%)
	• Proportion of cops and total population of the Philippines for every term of the President (0 - 100)
	• The model is set at .5 as the lowest possible value after taking into consideration the population to cop ratio. The average ratio for the three regimes is .28
Initial-agent-density (0% - 100%)	Initial-agent-density (0% - 100%)
	• Proportion of agents (who disapprove and distrust) and total population of the Philippines within the term of the central authority (president)
Vision (0 – 10 patches)	Awareness of Issues (this is translated to the awareness of the agents to the cops or vice versa as to their respective activities) (0 – 10 patches)
	• The modified model fixes the vision to 5.
Number of Agents	Number of Agents (in proportion to the population)
(in proportion to the population)	• These agents are further categorized into quiet, jailed and active.
Number of Cops	Number of Cops
	(in proportion to the population)
Government-Legitimacy	Perceived Governance
(0 – 1.0)	• The Average Approval and Trust Ratings of the given central authority (president) within their term (Pulse Asia, 2016). In the simulation process, average percentages of approval and trust ratings are used.
Maximum-jail-term in years	Maximum-jail-term for rebellion in years
(0 – 50 turns)	• Fixed at the minimum of 20 years (as provided by the Revised Penal Code as penalty for rebellion)

Table 2. *Presidential Performance/Approval and Trust Ratings Surveys, Database 1999 – 2014*

President	Term of Office	Average Performance Rating (%)			Average Trust Rating (%)		
		Approved	Disapproved	Undecided	Trust	Distrust	Undecided
Joseph Ejercito Estrada	1998-2001	55.0	23.6	21.0	39.5	33.0	27.3
Gloria Macapagal- Arroyo	2001-2010	36.8	35.6	27.2	30.8	39.7	29.3
Benigno Simeon Aquino	2010-2014	65.6	10.0	24.2	64.7	10.3	24.8

in the model.

3. Each agent is rational (has the capacity to think, evaluate and decide on what he perceives to be right/wrong, good/bad, and others).

4. The model utilizes the average Approval and Trust Ratings of the three administrations as indicators for identifying agents. Approval ratings of the presidents refer to their performances in terms of fulfilling their campaign promises, growth of economy, and involvement in any scandal (Geer, 2004).

5. The model assumes that the unrest incidents maybe done by an individual agent or group of agents. In this study, the use of conflict incidents is justified on the basis that each incident is a result of a deliberate plan to manifest opposition on various grounds, by agent or group of agents.

Data Requirements

Actual data of Philippine civil unrest of the three presidents were used to simulate and appreciate the model. In determining the perceived governance of the central authority, the performance/approval and trust ratings of the three presidents are shown in Table 2. The data were used in the simulation of the model. These ratings served two indicators of agents within the population. Specifically, it utilized the disapproval/distrust ratings to indicate initial agent density. It also used the approval/trust ratings to indicate perception of governance. The undecided percentage will account for the silent population; hence, it was not used in the simulation.

The actual average population of the respective administration was used for purposes of determining the initial density of cops. Table 3 shows the average population in the respective administration.

Table 3. *Philippine Population Database 1998-2016*

Philippine President	Year	Average Population
Joseph Ejercito Estrada	1998-2001	76,506,928
Gloria Macapagal-Arroyo	2001-2010	88,588,732
Benigno Simeon Aquino	2010-2016	93,175,526

Results and Discussions

Initial testing of the civil unrest model is shown in Table 4.

As shown in Table 4, the following conditions are observed:

Table 4. *Simulated Data Using the Civil Unrest Model at Varying Approval and Trust Ratings*

Approval/ Trust Ratings	Disapproval/ Distrust Ratings	Quiet	Jailed	Active
90%	10%	10%	0%	0%
80%	20%	10%	6%	4%
70%	30%	9%	7%	13%
60%	40%	11%	8%	21%
50%	50%	11%	6%	33%
40%	60%	11%	7%	43%
30%	70%	10%	7%	53%
20%	80%	9%	7%	64%
10%	90%	10%	7%	73%

a. When perceived governance is positive (50% or more approval and trust ratings)

The higher the rating of perception of

governance/central authority, the lesser is the grievance of the agents. Simulation showed that higher rating in perception of governance/central authority had minimal occurrence of civil unrest. The high rating of perception of governance/central authority when complemented with a sufficient agent - cop ratio further reduced or contained occurrence of civil unrest.

b. When governance is negative (below 50% approval and trust ratings)

The lower the rating of perception of governance/central authority, the higher is the grievance of agents. Low rating in perception of governance/central authority would likely lead to the high incidence of civil unrest. Increasing the cop population may reduce the number of active agents but did not assure non-occurrence of civil unrest

c. Commonalities

The agents' perception of governance of central authority is an important factor that determined the occurrence or non-occurrence of civil unrest. Increasing the agent-cop ratio may reduce the number of active agents but did not assure the occurrence/non-occurrence of civil unrest. Finally, regardless of other factors, for as long as the perception of the agents on governance is rated 90%, there is a non-occurrence of civil unrest.

Simulation Using the Actual Data

Using historical data of the different administrations, simulations are done using the Civil Unrest Model. Figure 1 presents the chart of conflict incidents from 1989-2015. These conflict incidents were sourced from the Uppsala Conflict Data Program (UCDP) of the Uppsala University. In order to remove the factor of population growth from the incidence of conflicts, the ratio of incidence of conflicts and population was used to present this chart.

Proportion of Incidence of Civil Unrest vs Population of the Philippines (1989-2015)

Legend:
Blue line – Estrada Administration
Green line – Arroyo Administration
Yellow line – B. Aquino Administration
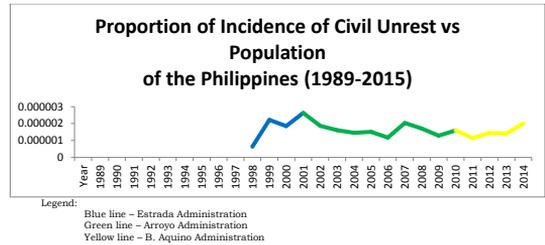
Figure 1. Chart showing the incidence of terrorism across the three administrations.

Estrada Administration (1998-2001)

Based on Table 2, the data for the simulation results is shown in Appendix 1. Initial cop-density was set at 0.5%. Main difference in the two figures lies in the number of active agents. The low trust rating (initial agent density) and high distrust rating (perceived governance) translate to a higher number of active agents when compared to his approval/disapproval rating.

Arroyo Administration (2001-2010)

Table 2 also revealed the performance and trust ratings of President Arroyo. With initial cop density set at 0.5, the Arroyo administration had a high number of active agents in both simulations. This can be due to low approval/low trust and high disapproval/distrust rating as shown in Appendix 2.

Aquino Administration

Table 2 showed the performance and trust ratings of the President Aquino. This provides the data for the simulation results in Appendix C. With a cop density ratio of 0.5, President Aquino showed a high approval/trust rating and very low disapproval/distrust rating. This has translated in low active agents.

Table 5 shows the summary of results for the performance (approval/disapproval) and trust (trust/distrust) ratings of the three regimes and the data result of the agents who are quiet, jailed and actively challenging the central authority.

Table 5. *Summary of Simulation Results Using the Performance and Trust Ratings and the Corresponding Percentage of Agents Either Quiet, Jailed or Active*

Administration	Actual Performance and Trust Ratings		Simulated Percentage of Agents		
	Approval/Trust	Disapproval/Distrust	Quiet	Jailed	Active
Estrada	55%	24%	6%	7%	11%
	40%	33%	6%	7%	20%
Arroyo	37%	36%	5%	7%	24%
	31%	40%	7%	7%	27%
Aquino	66%	10%	4%	5%	2%
	65%	10%	3%	4%	3%

The simulation results of the three administrations have shown the importance of the perception of governance, manifested by the approval/disapproval rating and trust/distrust ratings, in the formation and determination of active agents. The result is similar to the initial simulated data.

In order to confirm these simulated results on the active agents in each administration, we will now use the terrorism incidents in the Philippines from the UCDP to test how these hold to the actual occurrence of terrorism incidents per administration.

Though preliminary data showed high incidence of conflict as shown by the UCDP Database during the Aquino administration when compared to the Arroyo and Estrada regimes, simulated data using the approval and trust ratings rating (with positive perceived governance indicator) showed that active agents range from 2-4%.

The Arroyo administration has a lower incidence compared to Estrada. But it has higher incidence when compared to Aquino The approval rating of Arroyo stood at 37% (negative perceived governance indicator). Simulated data result showed a high of 24-27% active agents in the population.

The Estrada Administration when compared to Aquino and Arroyo has higher incidence of unrests. The approval rating of Estrada stood at 55%. Simulated data results showed 31%-35% active agents.

Regardless of the approval rating, the percentage of agents that are quiet and jailed is 3-6% and 4-7%, respectively. The number of active agents on the other hand inversely corresponds to the approval rating of the president.

Results showed that the approval and trust ratings of the president can provide a good indicator as to the percentage of active agents in a population who maybe challenging the central authority.

Conclusion

Using the Civil Unrest Model, the approval/disapproval and trust/distrust ratings of the central authority (president) may be used to gauge the percentage of active agents who maybe challenging the central authority. Furthermore, it may be considered how actions, policies, issues of central authority may impact on the perception of its constituents. Generally, when people perceive positive governance, there are lesser grievances and may less likely lead to civil unrest or conflict. When people perceive negative governance, grievances are prevalent and will more likely lead to heightened civil unrest. Central authority may consider an inclusive, participative means of engagements with the said constituents.

It is incumbent upon the central authority to address the perception of governance (grievance) and the consequent civil unrest perpetrated by active agents.

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APPENDICES

Appendix 1. Simulated Data of President Estrada's Administration on Approval and Trust Ratings respectively.

Factoring Approval Rating
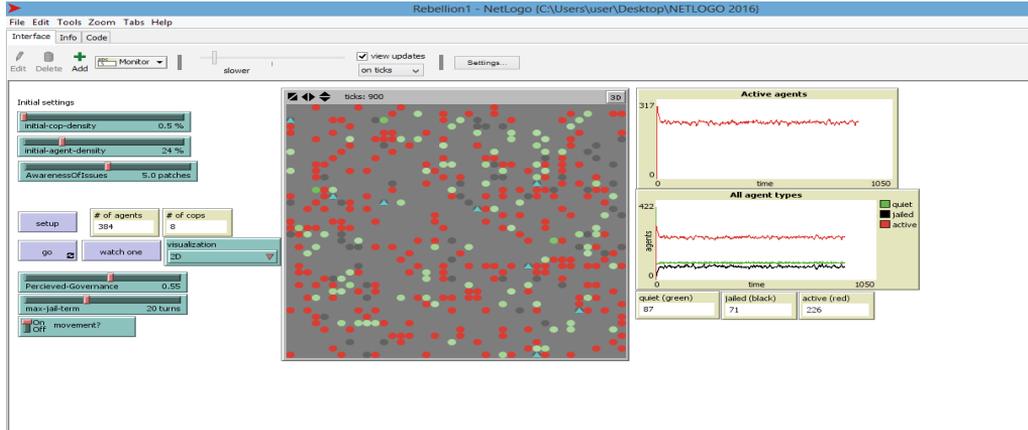
Factoring Trust Rating
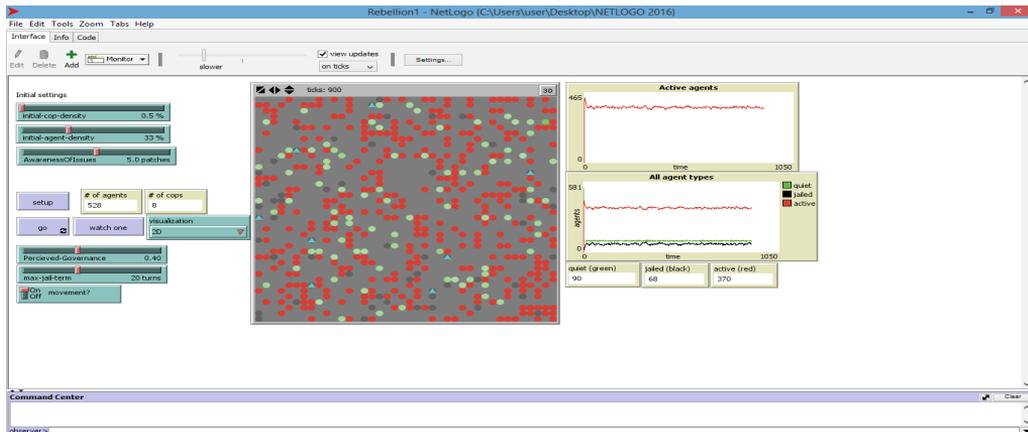
Appendix 2. Simulated Data of President Arroyo's Administration on Approval and Trust Ratings respectively

Factoring Approval Rating
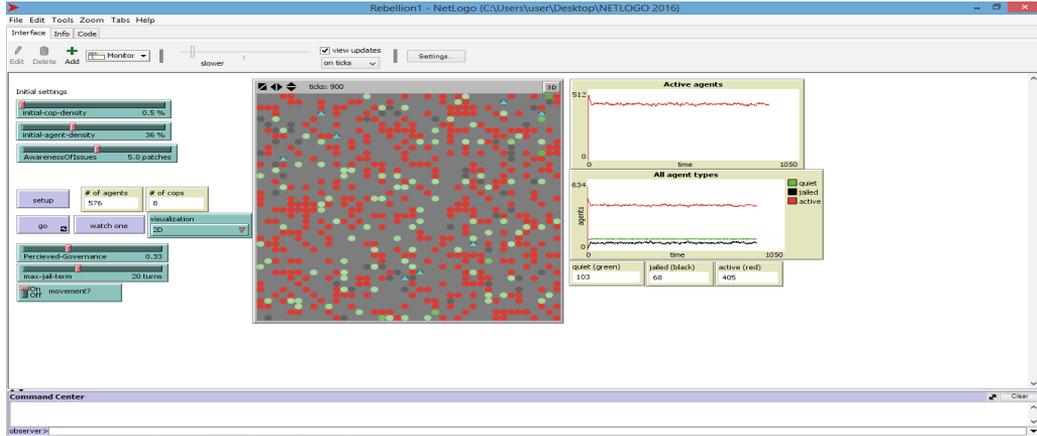
Factoring Trust Rating
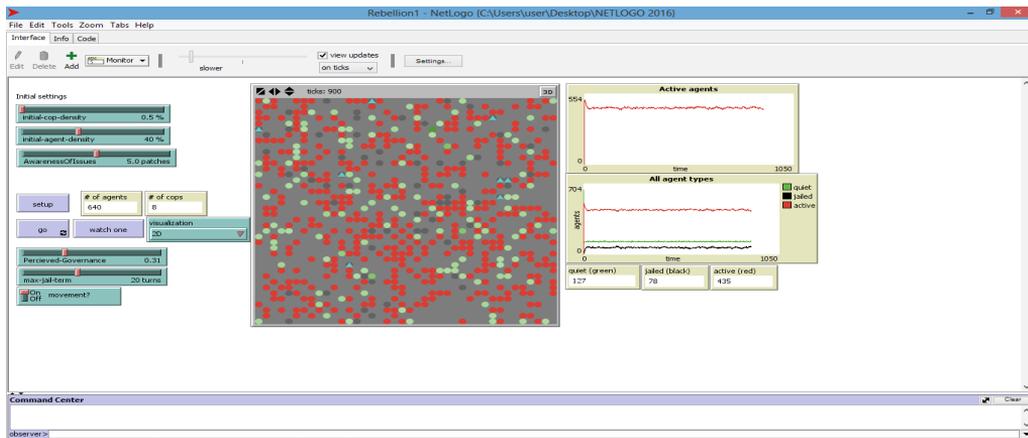
Appendix 3. Simulated Data of President Aquino's Administration on Approval and Trust Ratings respectively

Factoring Approval Rating

Factoring Trust Rating