Improving Conflict Early Warning Systems for United Nations Peacekeeping

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"Most United Nations peacekeeping missions ***do not have sufficient capacity to collect and analyze the information*** *needed to address day-to-day threats nor to* ***predict potential crises that could lead to rapid escalations of violence****.."*

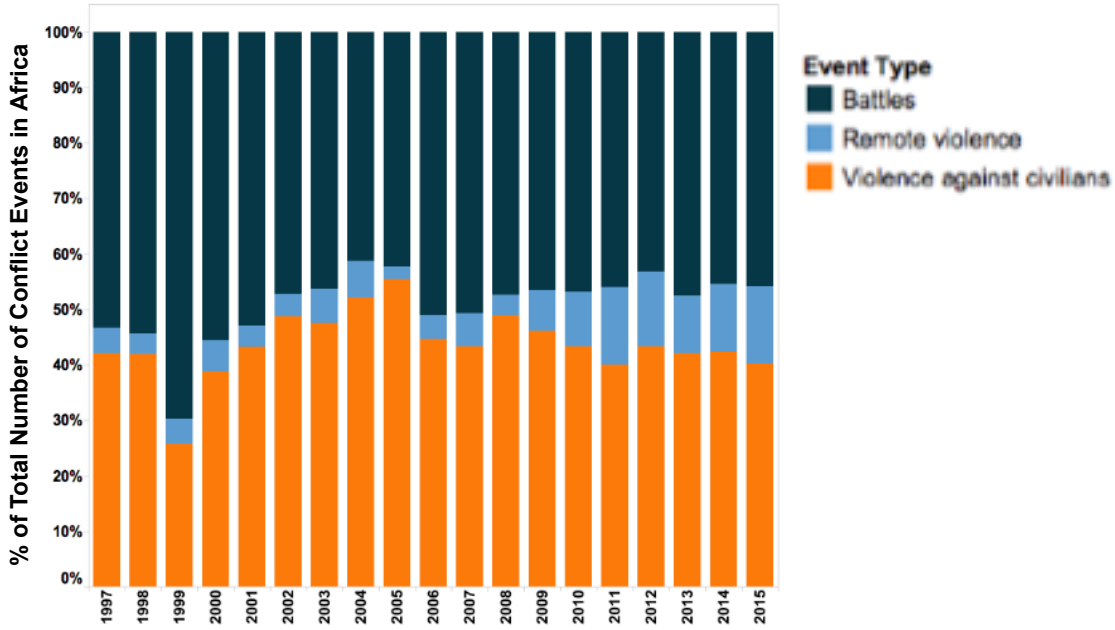
-Report commissioned in 2009 by UN Department of Peacekeeping Operations

The lack of robust conflict early warning systems presents a major constraint to UN peacekeeping missions' abilities to save civilian lives. Current conflict early warning systems are based on human assessments of impending conflict so consequently are unsystematic, subjective and do not provide country-wide coverage. This brief proposes the UN incorporates a data-driven early warning system that utilizes machine learning models to make conflict predictions to overcome these drawbacks.

Key Recommendations

1. Incorporate machine learning models into conflict forecasting.
2. Retain current community-alert network to add context to model predictions.
3. Program machine learning models into user-friendly dashboard.
4. Nest new data-driven system into existing UN early warning system.

40% of conflict events in Africa are attacks that are ***specifically directed at civilians****.*



UN peacekeeping missions have the critical objective of protecting civilians from attack. While their **current early warning systems** for predicting conflict outbreak **provide valuable local context**, they have **serious drawbacks** that prevent the UN from protecting civilians effectively:

Subjective: Conflict predictions are made by human analysts and are usually determined by levels of ongoing violence. Consequently, the current system may miss conflict warnings that are driven by other socioeconomic indicators.

Unsystematic: Analysts must distill a substantial number of qualitative reports into a conflict risk assessment in a very limited time window. This is not only a huge administrative strain on UN staff, but this unsystematic process implies a larger chance for human error in conflict predictions.

Limited: The current system only covers areas that host UN staff or local liaisons. Therefore, this system leaves communities located far from peacekeeping bases vulnerable in the face of an attack.

Zooming In: Methodology

The analysis was performed using **three case countries**: the Democratic Republic of Congo, the Central African Republic, and Somalia. Each of these countries has been especially violent in the last several years and each is hosting a UN mission.

Each country was broken down into a set of **50 x 50 kilometer grid cells**. A cell was defined as having conflict if there was at least one violence against civilians attack that occurred within it in 2016. Cells were also defined by their severity of conflict which was determined both by the number of conflict events happening in 2016 as well as the total number of fatalities across those events. Each model was **tested predicting both conflict occurrence and conflict severity.**

Three machine-learning models were assessed: logistic regression, lasso, and random forest. The lasso model was determined to be the best at predicting conflict occurrence while the logistic regression and lasso models were the best performers in predicting conflict severity.

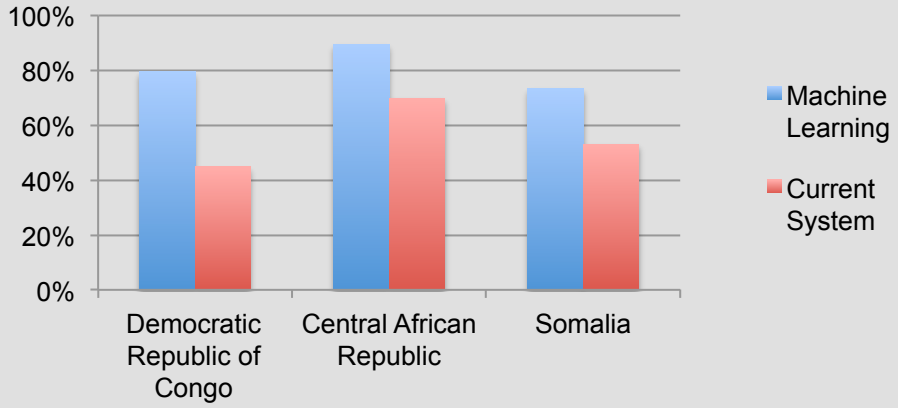
The Data-Driven Early Warning System

This new early warning system would use machine learning models to predict conflict occurrence and severity based on a host of geographic and socioeconomic factors:

- Income
- Food security
- Population
- Number of ethnic groups
- Employment
- Education
- Migration
- Neighboring conflict
- Infant mortality
- Terrain type
- Distance from precious commodities
- Distance to urban center
- Distance to capital
- Distance to border

An analysis was performed comparing the new data-driven system with a simulated version of the current system, which uses only incidences of violence and a few social cohesion factors to predict conflict. As seen below, the machine learning model out-performs the current system simulation in each country.

Machine Learning out-performs Current System simulation



Accuracy on predicting conflict occurrence within conflict areas for current system simulation versus the machine-learning model

Implementation Roadmap

Much of the capacity required to implement a data-driven system like this – such as data collection and processing capabilities – are already in place in UN peacekeeping missions. Consequently, the implementation of this system requires no major overhaul; a data-driven system can be nested within the existing system. The following implementation steps are recommended for incorporating the new data-driven system within the existing early warning system.

1. **Build data-driven early warning dashboard.** To minimize the administrative strain on staff as well as keep the system easy to understand and use, the models should be developed into a dashboard. The system should be designed so that staff can easily input data on a set of key indicators and receive a conflict severity prediction (e.g. low, moderate, high) for each area.

2. **Identify NGO partnerships.** The machine-learning system requires input socioeconomic data that the UN is not already collecting. However, the UN has access to this data through a host of formal or informal partnerships with local NGOs. The UN should leverage these partnerships to obtain the necessary indicators for model predictions.

3. **JMAC / JOC analysts input field data into model dashboards.** The process of converting data into conflict predictions is simpler than that of the existing system. Rather than reading a vast amount of qualitative reports, JMAC and JOC analysts input quantitative data shared by the NGOs and receive a probability of conflict occurrence and severity for a 50x50 kilometer area as output.

4. **Use model predictions in collaboration with field reports.** As community-alert networks, the UN's current system, provide rich context on conflict predictions, they should not be disregarded. Instead, the UN can use the machine learning models to make predictions across the entire country and use local communication to corroborate those predictions or to understand the context driving conflict outbreak in different areas.