HCSS Security

Artificial Intelligence Tools Versus Practice in Conflict Prediction: The Case of Mali

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In the past eight years, a considerable progress has been achieved in the field of conflict prediction and early warning (EW). Together with the growing amount and availability of data, novel methods and tools started emerging, improving models' accuracy, timeliness and, arguably utility. Precisely eight years also passed since the outbreak of the Malian crisis which has been marked by continuous transformation, high number of warring groups, rising importance of jihadism and, most importantly, by a low but growing intensity of violence (Figure 1). In spite of the obvious specificities of Malian context, this macro-overview of the conflict shows the extent to which it is reminiscent of similar patterns of political violence in the region and beyond.

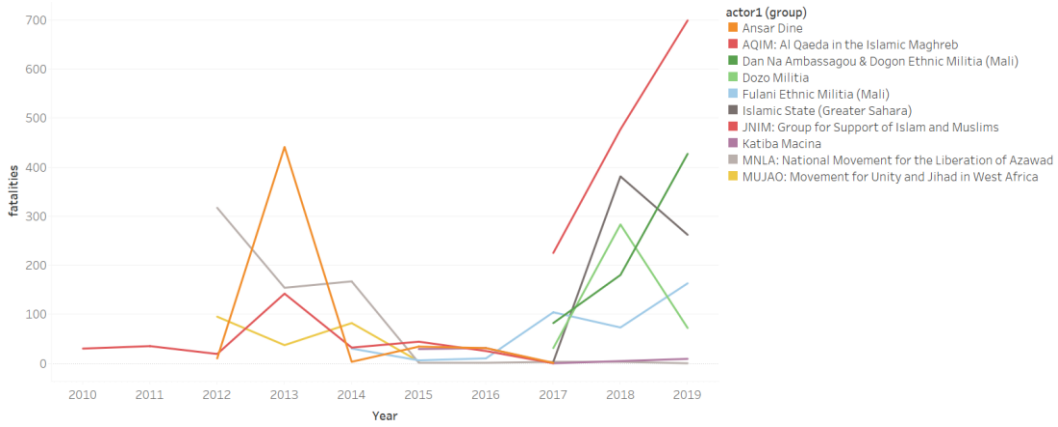

Figure 1: Fatalities in Mali by Actor, source ACLED

Formerly, majority of public early warning tools have focused on global assessments, evaluating states' structural fragility and by extension proneness to conflict outbursts, most often on an annual basis. Such approach, however, bears little significance for Malian peacebuilding community as it does for many other states experiencing similar forms of low-scale scattered violence. This is because typically models assessing national fragility do not allow for drilling down into sub-national conflict trends and simply are not fit for timely early warning given their annual update cycle. These are the challenges that some of the newly emerged initiatives attempt to address.

The question this immediately raises is how relevant these recently emerged methods and tools are for Malian conflict and to what extent are they being used by Malian peacebuilding and early warning community to predict political violence so as to enhance prevention. This publication will therefore explore both the *potential utility* of these innovations as well as their *actual use* on the ground in an effort to detect "structural and proximate signs of violent conflict".[2] Rather than providing a systematic overview, however, the point here is merely to raise the debate and review whether the

[2] Issaka Souaré and Paul Simon Handy, "The State of Conflict Early Warning in Africa," *African Security Review*, 2013, https://doi.org/10.1080/10246029.2013.792553.

recent progress in the field of EW can be and is of use in areas where predicting violence is needed the most.

Going Public, Granular and Short-Term: Overview of Tactically Relevant Conflict Prediction Methods, Models and Tools[3]

Since the Malian crisis, several quantitative predictive methods, models and tools have been either created or improved to the extent where it could be argued that their relevance for low-scale subnational conflicts rose greatly. Such tools implement sophisticated predictive models and methods, originating from the fields of machine learning, statistical inference, and automated event databases. These have been employed in the field of conflict prediction for long, and recent strategic prediction models such as GCRI, Control Risk Map, and EWP, still continue to be applied them. Given the ever finer spatial and temporal resolution of collected data, they also allow practitioners to make conflict predictions ever more accurate.

In the field of machine learning, UCDP's ViEWS is one of the most notable efforts. This model employs machine learning to process dozens of indicators, leading to two noteworthy advancements, making it a potentially useful exercise: the model assesses risk in an unprecedented resolution of 55x55km on a monthly basis.[4] Methodologically, it distinguishes three types of violence following UCDP's tradition,[5] defining 'violence' as at least one fatality. It claims to have reached a precision of Area Under Receiver-Operating-Characteristic curve (AUROC) between 0.9 and 0.95,[6] scores rather rare in the field.[7] Without being greatly tested out-of-sample due to its short existence, the model is gaining attention of the EW community, where at least the most recent commentary in the MIT Technology review by Ryan-Mosley is worth mentioning. Examining the predictive performance of ViEWS model by juxtaposing selected events in Ethiopia to ViEWS monthly predictions, the article concluded that despite certain less accurate conclusions, overall, the model appeared effective in predicting atrocities.[8]

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[3] The line between tactical and strategic prediction is here defined by granularity and temporal scale of individual models, following the most standard definition of ‚tactical', which could be „of or relating to small-scale actions serving a larger purpose" and/or „made or carried out with only a limited or immediate end in view" see "Definition of 'Tactical,'" accessed February 27, 2020, https://www.merriam-webster.com/dictionary/tactical.

[4] Michael Colaresi, "Early ViEWS: A Prototype for a Political Violence Early-Warning System," n.d., 29.

[5] State based, non-state based and one sided, see Marie Allansson, "Methodology - Department of Peace and Conflict Research - Uppsala University, Sweden" (Uppsala University, Sweden), accessed March 1, 2020, https://www.pcr.uu.se/research/views/methodology/.

[6] Area-Under-Receiver-Operating-Characteristic curve is used to measure the predictive power of models forecasting anomalous events. For more information see Sarang Narkhede, "Understanding AUC - ROC Curve," Medium, May 26, 2019, https://towardsdatascience.com/understanding-auc-roc-curve-68b2303cc9c5.

[7] For an indication of the AUROC scores and an overview of different models' performance of civil war onset prediction, see Hannes Roos et al., "Improving the Early Warning Function of Civil War Onset Models by Using Automated Event Data" (Hague Centre for Strategic Studies, May 2018).

[8] Tate Ryan-Mosley, "We Are Finally Getting Better at Predicting Organized Conflict," *MIT Technological Review*, October 24, 2019, https://www.technologyreview.com/s/614568/predicting-organized-conflict-ensemble-modeling-ethiopia-ahmed/.

Though far from a thorough replication test, this article is particularly useful in showing the level of intuitiveness and therefore general usefulness of this openly accessible tool for a wide array of practitioners in conflicts of low intensity, including Mali. A mere comparison of ViEWS' forecasts with ex post data on Mali offers a promising view (Figure 2).

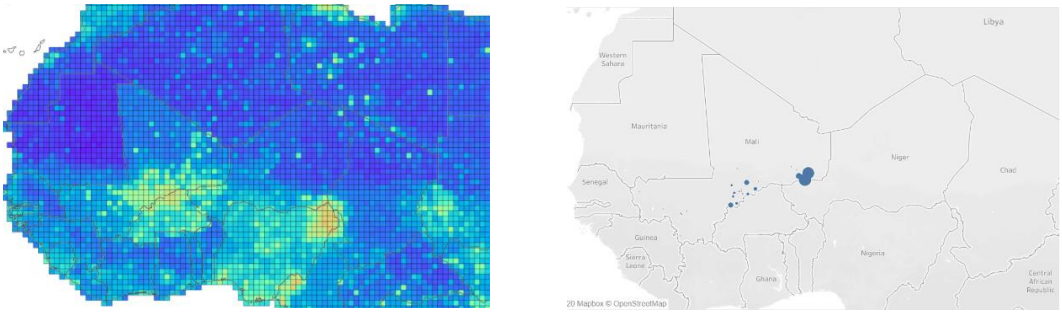

Figure 2: (left) ViEWS forecast on state-based conflict for November 2019, heatmap, source ViEWS; (right) fatalities in Mali in November 2019 excluding civilian casualties, source ACLED.

By combining several methods to predict political violence, including machine learning and simulated data analysis, the Water Peace and Security (WPS) project also reaches promising levels of accuracy. It assesses the possibility of water-related conflict eruption on nationally established districts (second-level administrative units) every 3 months, defining 'conflict' as at least 10 fatalities.[9] A key contribution of the WPS approach lies in its effort to combine quantitative and qualitative assessments, offering data-driven hotspot identification of second-level administrative regions for the purpose of subsequent local conflict mitigation, driven by simulated data and qualitative assessments. It thus enables diverse actors to zoom in on specific water-energy-food variables that may, in case of scarcity, prove to be significant threat multipliers. By relying on the qualitative assessments, the WPS toolbox attempts to fill in gaps that are brought about by the common issues of low quality and availability of data in remote areas.

Automation of event databases then represents another, distinct contribution to conflict prediction methodology that gained a new momentum in the past several years. Their creation is increasingly well automated, providing an incredibly large and near-real time source of data on world events. Apart from smaller initiatives such as Terrier and Phoenix II, and partially automated ones such as ACLED, two have become the flagships of this fully automated approach: GDELT and Lockheed Martin's ICEWS; automatically processing, coding and geolocating thousands of news items on both violent and non-violent occurrences,[10] these tools provide information on events that

[9] 'Water, Peace and Security', accessed 22 April 2020, https://waterpeacesecurity.org/map.
[10] Phillip Schrodt, "Conflict and Mediation Event Observations Event and Actor Codebook" (Department of Political Science Pennsylvania State University, March 2012), http://eventdata.psu.edu/.

are often considered conflict triggers, while the advances in automated translation allow the systems to collect news in around 100 languages, arguably enhancing their usefulness even in more marginal areas. This heavy focus on the events, rather than the structural indicators is precisely where the models depart from traditional EW models composed thus far. Though the automation of event databases continues to face considerable challenges in the accuracy of geolocation, translation, duplication of entries and categorization of events,[11] they have been improved over the course of several past years and currently have been proven useful in complementing structural data on conflict proneness.[12]

Generally, despite their shortcomings, these methods, models and tools have a theoretical potential to enrich the conflict prediction and tactical early warning capacity of practitioners in Malian context, especially as the above tools in particular are open source, demanding limited human and financial resources for application. What remains, however, to be explored is the possible gap between this 'potential' and the practice on the ground.

Early Warning in Mali: Private-Public Partnership on the Forefront

Early warning appears to be an established activity in Mali, especially over the past twenty years. Apart from the security apparatus, several civil initiatives also conduct thorough and institutionalized efforts to predict conflict and warn policymakers of impending violence. And though these appear to take advantage of the newly emerged methods, their use of the public tools seems inexistent. This section will attempt to introduce individual actors, outline the methods and tools they utilize for EW and assess their (mis)match with the above initiatives.

By far the most significant civil early warning effort in Mali occurs under the auspice of the Economic Community of West African States (ECOWAS) and bears the name ECOWARN. This initiative is longstanding, well preceding the crisis in 2012. ECOWARN is a cross-domain platform gathering early warning signs from expert monitors from ECOWAS and its member states, while, interestingly, grassroot associations under the umbrella of West African Network for Peacebuilding (WANEP) fill this centralized system with a more bottom-up information via trained local monitors, to reflect proximate conditions which "are otherwise not reflected in media

[11] Phillip Schrodt, "Seven Current Challenges in Event Data," *Asecondmouse* (blog), March 13, 2019, https://asecondmouse.wordpress.com/2019/03/13/seven-current-challenges-in-event-data/.
[12] Roos et al., "Improving the Early Warning Function of Civil War Onset Models by Using Automated Event Data"; Michael D. Ward et al., "Learning from the Past and Stepping into the Future: Toward a New Generation of Conflict Prediction," *International Studies Review* 15, no. 4 (December 2013): 473–90, https://doi.org/10.1111/misr.12072.

reports".[13] On the margins it should be mentioned that even though there has recently been a push to give member states more power in the process via the establishment of national EW centers, these are yet to be operationalized and the above-outlined structure continues to be relevant.[14]

WANEP's and ECOWAS' documentation of their activity, however, shows that the methodology of their EW mechanism extends beyond expert judgement and indeed converges to some extent with the abovementioned methods and models, even if not tools. ECOWARN is said to have an automated predictive software involving 66 indicators, developed jointly with a private data consultancy group named Virtual Research Assistants (VRA),[15] with which ECOWARN appears to have a long-standing cooperation.[16] Though the exact modalities and effectiveness of this cooperation cannot be examined, it does indicate that ECOWARN adopts at least to a certain extent a data-based approach to EW. VRA is said to offer customized datasets with a focus on the assessment of precursors to political violence. The prevailing approach consists of automating allegedly contextualized predictions by applying forecast models to country's historical data. On top of that, the company says to incorporate also social media-based sentiment mapping and automated event databases,[17] in creation of one of which – 10 Million Events - they have been involved.[18]

Conclusion

There are two main conclusions to be drawn. Firstly, due to their improved spatial and temporal resolution, the newly emerged or improved methods, models, and tools have the potential to be useful - albeit imperfect - prediction instruments even in low-scale conflict settings such as the Malian one. Interestingly, however, Malian civil society actors do not make use of these public tools, as far as the analysis of accessible documents can reveal, while there is an indication that they do incorporate progressive and evidence-based EW methods and models via private actors.

This raises several questions for future research, extending beyond the conflict of Mali. Although the private-public partnership seems to assure a certain level of alignment of practice and the technological advancements, its effectiveness in conflict prediction

[13] Charles T. Hunt and Noel M. Morada, "Regionalism and Human Protection: Reflections from Southeast Asia and Africa" (BRILL, 2018).
[14] Although the National Center for the Coordination of Early Warning and Early Action of Mali was established in October 2017, the meeting of its ‚steering and monitoring committee' only convened in September 2019. See "ECOWAS Attends First Meeting of the Steering and Monitoring Committee of the National Early Warning and Response Mechanism to Security Risks in Mali" (ECOWAS, September 19, 2019), https://www.ecowas.int/35801/.
[15] "African Regional Communities and the Prevention of Mass Atrocities" (Budapest Centre for Mass Atrocities Prevention, 2016).
[16] "Annual Report 2005," *WANEP*, 2005, 200.
[17] "VRA - Virtual Research Associates," accessed February 26, 2020, http://vranet.com/.
[18] Gary King and Will Lowe, "10 Million International Dyadic Events," March 7, 2017, https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/BTMQA0.

should be further examined. More importantly, however, though the first section noted an increased potential of public tools for a more timely and accurate conflict prediction, they continue to be omitted by local actors. This points to several possible challenges, from lack of human resources on the side of practitioners to the still limited tactical utility of the tools on the ground. If so, it raises the debate over the sufficiency of contextualization of these models and the potential necessity to enhance them with qualitative data collected in a bottom-up way.

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