

REPORT DOCUMENTATION PAGE*Form Approved*
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**1. REPORT DATE (DD-MM-YYYY)**

AUG 2011

2. REPORT TYPEConference Paper (Post Print)**3. DATES COVERED (From - To)**

APR 2009 - NOV 2010

4. TITLE AND SUBTITLEPREDICTIVE SOCIETAL INDICATORS OF RADICALISM -
FORECASTING DOMESTIC POLITICAL VIOLENCE**5a. CONTRACT NUMBER**

FA8750-09-C-0132

5b. GRANT NUMBER**5c. PROGRAM ELEMENT NUMBER**

65502F

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Stroh*, Dustin Burke*

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5d. PROJECT NUMBER

09SB

5e. TASK NUMBER

R0

5f. WORK UNIT NUMBER

65

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)MILCORD LLC, 1050 WINTER ST STE 1000, WALTHAM MA 02451-1406
SUNY Binghamton University, 4400 Vestal Pkwy East, Binghamton, NY 13902
Kansas State University, Manhattan, KS 66506**8. PERFORMING ORGANIZATION
REPORT NUMBER**

N/A

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)AFRL/RIEF
525 Brooks Road
Rome NY 13441-4505**10. SPONSOR/MONITOR'S ACRONYM(S)**

N/A

**11. SPONSORING/MONITORING
AGENCY REPORT NUMBER**
AFRL-RI-RS-TP-2011-11**12. DISTRIBUTION AVAILABILITY STATEMENT**

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED. PA #: 88ABW-2010-6266

DATE CLEARED: 29 NOV 2010

13. SUPPLEMENTARY NOTES

Paper presented at HSCB Focus 2011 Conference 8-10 Feb 2011. This work was funded in whole or in part by Department of the Air Force contract number FA8750-09-C-0132. The U.S. Government has for itself and others acting on its behalf an unlimited, paid-up, nonexclusive, irrevocable worldwide license to use, modify, reproduce, release, perform, display, or disclose the work by or on behalf of the Government. All other rights are reserved by the copyright owner.

14. ABSTRACT

The Predictive Societal Indicators of Radicalism (PSIR) Model of Domestic Political Violence forecasts political violence levels at yearly intervals into the future. The model enables policymakers, particularly in the COCOMS, to proactively plan for instances of increased domestic political violence, with implications for resource allocation and intelligence asset assignment. Using a regression model applied to a large number of drivers of conflict variables spanning numerous open source social science datasets, the PSIR model uses a novel Negative Residuals technique. Negative Residuals result from the model predicting higher levels of violence than actually experienced, indicating nation states that are predisposed to increasing levels of violence based on the presence of environmental conditions and drivers of conflict with demonstrated correlation with political violence.

15. SUBJECT TERMS

Forecasting Domestic Political Violence, Social Cultural Models

16. SECURITY CLASSIFICATION OF:a. REPORT
Ub. ABSTRACT
Uc. THIS PAGE
U**17. LIMITATION OF
ABSTRACT**

UU

**18. NUMBER
OF PAGES**

5

19a. NAME OF RESPONSIBLE PERSON

MICHAEL L. HINMAN

19b. TELEPHONE NUMBER (Include area code)

N/A

PREDICTIVE SOCIETAL INDICATORS OF RADICALISM – FORECASTING DOMESTIC POLITICAL VIOLENCE

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ABSTRACT

The Predictive Societal Indicators of Radicalism (PSIR) Model of Domestic Political Violence forecasts political violence levels at yearly intervals into the future. The model enables policymakers, particularly in the COCOMS, to proactively plan for instances of increased domestic political violence, with implications for resource allocation and intelligence asset assignment. Using a regression model applied to a large number of drivers of conflict variables spanning numerous open source social science datasets, the PSIR model uses a novel Negative Residuals technique. Negative Residuals result from the model predicting higher levels of violence than actually experienced, indicating nation states that are predisposed to increasing levels of violence based on the presence of environmental conditions and drivers of conflict with demonstrated correlation with political violence.

The Negative Residuals forecast states where we expect to observe increases in violence – not necessary high levels of violence – a nuanced interpretation that we believe will be of more use to the decision maker to highlight changes in situations, as opposed to simply high levels of violence in already violent states. In this way, our key dependent variable allows for differentiation between country-years with high numbers of low-level violence and country-years with high numbers of more extreme political violence.

PRIMARY TRACK

Application of Social Cultural Methods, Models, and Tools (MMT)

SECONDARY TRACK

Analytic Methods Science and Technology (S&T)

DESCRIPTION

Created in collaboration with Professor Cingranelli at the Political Science Department, SUNY Binghamton University and Professors Sam Bell and Amanda Murdie at the Department of Political Science, Kansas State University, the Predictive Societal Indicators of Radicalism (PSIR) Model of Domestic Political Violence forecasts political violence levels at yearly intervals into the future. The model enables policymakers, particularly in the COCOMS, to proactively plan for instances of increased domestic political violence, with implications for resource allocation and intelligence asset assignment. Creating a model for predicting the level and intensity of domestic political violence in a country has significant policy implications regarding counterinsurgency and stability operations. Recent experiences in Iraq and Afghanistan have placed a renewed focus on unconventional operations. Being able to forecast levels of domestic political violence is significant for gauging population sentiments towards a

government. Indeed, insurgents often exploit popular narratives and grievances for their own purposes. Therefore, capturing the level and intensity of domestic political violence directed at the government provides an important measure for identifying situations that harbor the necessary conditions for violent and extremist movements to gain traction and incubate.

Using a regression model applied to a large number of drivers of conflict variables spanning numerous open source social science datasets, the PSIR model uses a novel Negative Residuals technique. Negative Residuals result from the model predicting higher levels of violence than actually experienced, indicating nation states that are predisposed to increasing levels of violence based on the presence of environmental conditions and drivers of conflict with demonstrated correlation with political violence.

The methodology of the model is borrowed from Gurr and Moore [1] and is straightforward. Our dependent variable captures the overall level and intensity of domestic anti-government violence within a state in a given year relying on the Integrated Data for Event Analysis (IDEA) dataset [2] that codes instances of political violence in “who” did “what” to “whom” manner from Reuters Global News Service. Additional indicators from open-source social science datasets include the CIRI Human Rights Dataset [3], Polity IV Dataset [4], World Bank [5], OECD [6], Correlates of War project [7], and Fearon and Laitin datasets [8]. To capture intensity, we rely on augmented Goldstein [9] scores that use a weighting system developed from a survey of foreign policy officials on the “conflictual” or “cooperative” nature of various political or economic events. The first step is then to estimate the model and generate the residuals from that model (actual-predicted y). We then examine the residuals to identify all cases where the residuals are negative. This helps in identifying the cases where there is more predicted violence than actual violence. Any time that the predicted violence is greater than the actual violence in a country year there is a negative residual.

Where there are cases with negative residuals, this is where our model predicts that there should be more violence than there actually is. The interpretation that Gurr and Moore [1] and Poe, Rost, and Carey [10] make is that these are cases where the conditions suggest that there should be more of whatever the dependent variable represents in future years (in our case violent protest). Since the violence is not occurring in that year, we might expect to see increases in the future. What this method should tell us is which states have the potential for future violent actions against the state by the citizenry. In other words, there is some excess demand for violence against the state. We may not see it in the present year but that very fact makes it more likely that we will see increases in violence in future years.

This method provides some insight into where and when we should see the opportunity for increased violence. Though political violence might not actually increase in every case, the conditions are ripe for such increases in anti-state violence to occur. As such, it is important to note that this method allows us to capture where increased violence should occur, regardless of the overall pre-existing level of violence. This method is useful in telling us that a state has the characteristics that make more domestic anti-government violence likely; this is different than predicting that a state will have extremely high levels of domestic anti-government violence.

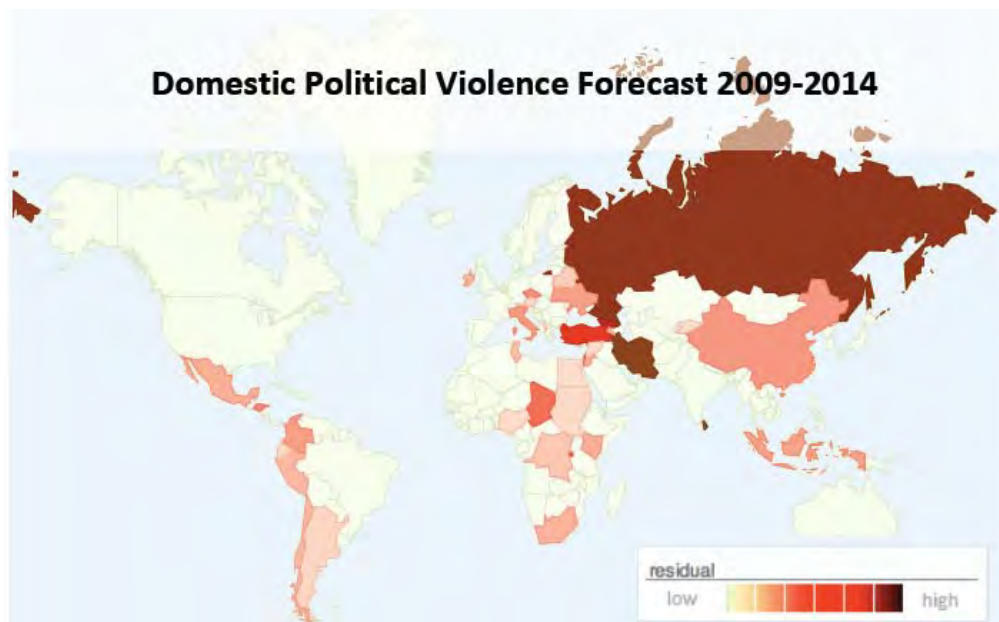


Figure 1: Global heat map of domestic political violence forecasts based on intensity of negative residuals for 2009-2014 time period.

The regional variation in performance of the PSIR model compares favorably against the target levels of 80% accuracy and recall and 70% precision specified by the DARPA ICEWS program. Our model complements the DARPA ICEWS models that use a binary dependent variable for conflict by using a nuanced dependent variable that captures the intensity of the conflict.

Measuring domestic political violence targeted at the government captures the pulse of a population and how it views governing authorities. Significant areas of unrest are likely breeding grounds for violent movements, and therefore the results of our model will provide decision makers with knowledge needed to proactively address security concerns effecting U.S. interests.

ACKNOWLEDGEMENTS

This work is part of the Predictive Societal Indicators of Radicalism (PSIR) project supported by Air Force Research Laboratory (AFRL) under the direction of Mike Hinman.

BIOGRAPHY

Dr. Alper Caglayan's – Senior Scientist at Milcord – research interests include applied artificial intelligence and semantic knowledge management, and the application of these technologies to human social culture and behavior modeling. Alper's recent research on HSCB modeling and analysis includes building developing predictive indicators of radicalism, global models for forecasting political violence, multiple criteria decision making tool for SSTR operations, semantic wiki for complex operations, decision models for effective shura building. Dr. Caglayan has co-founded four companies including Peoplestreet, a social network company for managing professional relationships; Open Sesame, the first implicit personalization server software now part of Adobe; Bowne Internet Solutions, an Internet consulting company now part of Lionbridge; and Charles River Analytics. Dr. Caglayan is the principal author of Agent Sourcebook, and has published and contributed to five books and over 100 articles. Alper has a Ph. D., Electrical Engineering from Virginia Tech.

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