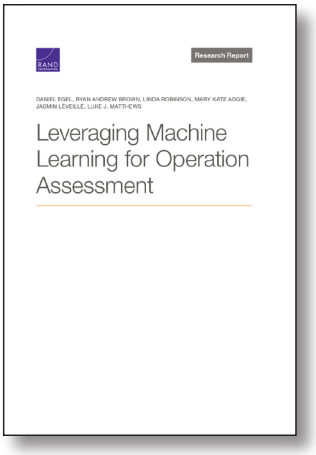

Leveraging Machine Learning for Operation Assessment

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This report demonstrates how machine learning (ML) can support assessment of military operations by describing and illustrating the use of ML in systematically extracting assessment-relevant insights from intelligence, operational, and media reporting. This approach can provide the commander with near-real-time insights from these data, often the best source of information on the efficacy of operations, that are objective and statistically relevant.

RESEARCH QUESTIONS

- How can machine learning tools be leveraged to integrate existing intelligence reporting, operational reporting, and ambient data (e.g., social media, traditional media) into assessment at the operational level of war?

KEY FINDINGS

Machine learning can be a powerful tool for supporting operation assessment

- Data already collected by operational-level headquarters—intelligence reporting, operational reporting, and ambient data (social and traditional media)—are often the best available types of information about the enemy and partner forces and the local population. Yet they are rarely integrated into assessment, because they are often (1) not perceived as sufficiently objective, (2) not available in a structured format easily amenable to analysis, and (3) extremely numerous and require some effort to obtain and organize.
- Machine learning (ML) tools, which can rapidly ingest and interpret large quantities of unstructured text, allow rapid, systematic, and objective analysis of these data, producing insights about the campaign that are objective and statistically relevant.
- Supervised machine learning (SML) is the simplest approach for using ML to incorporate these data into the assessment process. In the SML approach, the assessment team first analyzes, by hand, a subset

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of the unstructured text and then applies ML algorithms to mimic the assessment team's analytical approach for the remaining data.

- ML-derived data can provide a commander with near-real-time insights about a campaign, with each type of data (intelligence, operational, and ambient) providing a different lens for understanding a campaign's effects.
- ML tools are particularly beneficial in campaigns with limited or no assessment-specific data—which is common in campaigns with limited resources or in denied areas.
- This ML-based approach should be feasible for most assessment teams and can be implemented with freely available ML tools that are pre-authorized for use on U.S. Department of Defense classified systems.

RECOMMENDATIONS

- Validate the supervised ML approach described in this report in a controlled exercise.
- Explore how unsupervised ML can be used to inform operation assessment.
- Implement modest standardization of operational reporting.
- Improve archiving, discovery, and extraction of historical intelligence and operational reporting.
- Expand assessment-specific discussions required in professional military education.

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