A Sharper Tip of the Spear

How new analytics technology enables the warfighter to "*know the enemy*"

Summary

A pilot deployment by the US Air Force demonstrates that advances in analytics technology enable the warfighter and the analyst to aggregate, process and make sense out of disparate information streams in real time, thus ensuring more accurate, comprehensive and actionable intelligence. In turn, this drives greater precision and effectiveness of subsequent intervention. The article below describes how an AFRL pilot harnessed advanced Higher Order Learning™ (IxHOL™) technology from Intuidex, Inc. and applied it to military real-time messages to provide significantly enhanced threat detection.

"Surgical Spirit"

In this age of asymmetric warfare and terrorism, the enemy operates in relative anonymity, often hiding in plain sight among civilian populations. For this reason, better intelligence is imperative in neutralizing the threat from hostile forces and avoiding civilian casualties. The advances in sensor technology in tandem with analytics and visualization assist the analyst in gathering, processing of intelligence, and empowering the warfighter with greater precision and confidence when acting on field intelligence. In the words of the Army's General Dempsey,

"We depend on technology because it lets us use a scalpel instead of a sledgehammer."

To expand on General Dempsey's metaphor, a modern day surgeon operates with a scalpel as opposed to a bread knife, in order to avoid damage to surrounding organs and tissues. Likewise, better, real-time intelligence in theater of operations, helps ensure mission success while protecting the life of the soldier, and through greater accuracy and precision of intervention, also protects civilian life and non-combatants.

Chatter matters

In the goal of greater precision, accuracy and application of military intelligence, a ubiquitous obstacle is the sheer volume of unstructured data that is available to the analyst. In particular, the magnitude and throughput of the communications stream presents a formidable challenge in terms of extracting key intelligence. A key communication channel in a military campaign is the use of instant messaging technology, customized for the warfighter. An issue of concern identified by analysts who interact with warfighters daily is that valuable latent intelligence in military real-time message channels was not being captured or fully utilized, primarily due to the sheer volume of information and the limitations of an analyst observer to monitor and extract intelligence from the multiple streams. Of particular interest to an analyst observing military microtext data is the determination of a threat or an actionable snippet of intelligence immersed beneath the cascade of data. The challenge therefore is to find a way to automate filtering this massive amount of unstructured microtext data so that crucial pieces of intel are not lost or left 'lying on the ground'.

Analysis of a Higher Order

The Air Force Research Laboratory, in partnership with Intuidex and LongShortWay, collaborated on a theoretical and technical approach to the issue through the employment of Higher Order Learning™ models and Intuidex' Watchman Analytics™ technology to enhance information extraction. Higher Order Learning™ (IxHOL™) supports the analysis of diverse types of data and identifies latent relationships, which provide more accurate classification and mapping of entities observed. IxHOL™ can perform this analysis in near real time and is particularly effective when only small fragments of information are available for modeling.

Intuidex engineers worked with intelligence analysts to establish the 'ground truth' and extraction logic that would provide a foundation for chatter analysis and threat detection. Investigation of communications logs helped identify actionable entities most useful in providing situational awareness, including degree of threat. When Phase I development was complete, the application was beta-tested on data from theater for accuracy and precision.

From Text to TIGR

The process is designed to filter real-time world military messages in a three stage data 'distillation'. First, microtext passes through an information extraction process to identify significant entities within the text. Secondly, messages undergo an automated classification process to determine if they represent a 'threat'. The third and final step is the display of the filtered data as color coded icons in the Tactical Ground Reporting System (TIGR) which is a geospatial data fusion tool. Currently, the second step has been beta tested on live data from the theater, and the other steps have been deployed live in TIGR, which has more than 50,000 users. The visualization of this filtered data provides enhanced situational awareness as it is viewed in its spatial context as well as in relation to other TIGR information sources. Microtext modeling functions ensure pushing the right content to the right person at the right time. Initial feedback has been extremely positive from analysts in theater who found that Intuidex analytics fill a critical intelligence gap, and are particularly useful when cross-checked with other available intelligence sources.

Conclusion: Big Data. Beaten Down

The ability to automate the analysis of disparate information streams, incorporating ground truth established in consultation with field experts, and distilling actionable intelligence related to identifying threats, anomalies or hostile intentions has widespread application in military operations (as well as applications in domestic settings with counter-terrorism and law enforcement). Intuidex' Watchman Analytics™ platform addresses a fundamental data problem, commonly referred to as the "Big Data" problem, where the exponential proliferation of data now has analysts irreversibly at a point of data overload. As this case study demonstrates, Watchman Analytics™ offers a means and framework for the automation of analytical processes including information extraction and prediction where manual or less sophisticated technological approaches are no longer viable. Furthermore, the resultant risk assessment was incorporated into a consolidated view with other military intelligence streams bringing a previously untapped but significant information stream into a more comprehensive operational picture for the analyst. A better informed analyst equates to a better equipped soldier, and a greater chance of mission success.

