ACTIVE LEARNING IN UXO CLEANUP

LAWRENCE CARIN
Signal Innovations Group, Inc.
Suite 200
1009 Slater Road
Durham, NC  27703
(919) 475-2151
lcarin@siginnovations.com

This talk discusses the transition of digital geophysics munitions response technology to the field, particularly for demonstration at the former Camp Sibert, Alabama site. Several different classification approaches were considered in this study, and here we focus on the use of active-learning technology demonstrated as part of ESTCP Project MM-0501. Active learning addresses the problem of defining an appropriate set of training (labeled) data with which to build a classifier. Using active-learning technology, we do not require any a priori labeled data. Information-theoretic measures are used to define which signatures from the site under test, based on measured electromagnetic induction (EMI) or magnetometer data, would be most informative to classifier design if the associated label were available. These items are excavated first, not with the goal necessarily of finding UXO, but rather for acquisition of labels. Once these measures indicate that no further labels need be acquired, because the information gain is below a threshold, then the digging-to-learn phase of the process is terminated. Using the acquired labeled data, a classifier is then designed, and an ordered dig list is defined. This framework was demonstrated successfully for the former Camp Sibert study, with results presented in this talk.