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Travis Shrontz* (tshrontz@arete.com), Huntsville, AL, and **Seth Zuckerman, Timothy Klein, Alexander Boxer** and **Amanda Steck**. *The ALIEN Network: An Automatic Target Recognition Algorithm*.

In recent years, it has become increasingly important in the defense and security domains to conduct surveillance, reconnaissance, and intelligence-gathering via powerful camera systems, usually airborne and for extended periods of time. In particular, High Altitude Wide Area Motion Imagery (HA-WAMI) systems have produced a copious amount of data making prediction, but this data has been historically difficult to analyze in real time.

In order to address this, Areté has designed an efficient and robust deep learning algorithm, based on classical detection theory: the Attribute Localization and Instance Extraction Neural (ALIEN) Network. When we pair this network with the novel use of masking functions to remove non-target inferences from the overall network loss, we obtain a deep-learning network that performs each of the three operations of (1) detect, (2) localize, and (3) characterize in a single forward pass with high accuracy in seconds. In this talk, we describe the basic architecture of this network and summarize its performance when applied to publicly available datasets. We also summarize some of the challenges and future work related to this problem, in particular in the domain of national defense. (Received September 17, 2019)