1032-68-173 **Steven P. Brumby*** (brumby@lanl.gov), Los Alamos National Laboratory, Mail Stop D436, Los Alamos, NM 87545. *Evolution of imagery analysis software by a genetic algorithm.*

Extraction of features from imagery data sets is a crucial task facing many researchers. New technologies make collection of huge data sets cheaper and easier, so exploitation of this flood of data now requires automated analysis tools. We investigate machine learning approaches to automate and accelerate this process while retaining human interpretability of solutions. GENIE (http://genie.lanl.gov) is an evolutionary computational software system using a genetic algorithm to assemble populations of candidate image-processing tools from a library of human-selected spectral and textural operators (edge detectors, neighborhood texture measures, algebraic spectral operations, and morphological filters). Training labels are provided for some pixels via a graphical user interface. Each candidate tool calculates a vector of pixel-level attributes, and labeled pixels are presented to a supervised classifier (linear discriminant). Candidate tool performance is measured using a Hamming metric, which drives evolution of the population. This leaves the human free to concentrate on the critical tasks of choosing training data and assessing results. We describe our algorithm and present results on a number of real world problems using satellite and aircraft imagery. (Received August 20, 2007)