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Boundary identification and error analysis of shocked material images MARGARET HOCK, Univ of Alabama - Huntsville, MARYLESA HOWARD, National Security Technologies, LLC, LEORA COOPER, Massachusetts Institute of Technology, BERNARD MEEHAN, National Security Technologies, LLC, KEITH NELSON, Massachusetts Institute of Technology — To compute quantities such as pressure and velocity from laser-induced shock waves propagating through materials, high-speed images are captured and analyzed. Shock images typically display high noise and spatially-varying intensities, causing conventional analysis techniques to have difficulty identifying boundaries in the images without making significant assumptions about the data. We present a novel machine learning algorithm that efficiently segments, or partitions, images with high noise and spatially-varying intensities, and provides error maps that describe a level of uncertainty in the partition- ing. The user trains the algorithm by providing locations of known materials within the image but no assumptions are made on the geometries in the image. The error maps are used to provide lower and upper bounds on quantities of interest, such as velocity and pressure, once boundaries have been identified and propagated through equations of state. This algorithm will be demonstrated on images of shock waves with noise and aberrations to quantify properties of the wave as it progresses. DOE/NV/259463126 This work was done by National Security Technologies, LLC, under Contract No. DE- AC52-06NA25946 with the U.S. Department of Energy and supported by the SDRD Program.

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