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iterative processing framework: a new paradigm for automatic event building

In a traditional data processing pipeline, the signal associator links the detections to the fitting event hypotheses to generate an event bulletin. Most of the time, this traditional pipeline requires heavy human analyst involvement to improve the quality of the resulting event bulletin. We propose an Iterative Processing Framework (IPF) that incorporates automatic analyst behaviors (Auto Analyst) into the event building pipeline. In the proposed framework, Auto Analyst takes over many of the tasks traditionally performed by human analysts. These tasks include searching for expected signal detections for validated event hypotheses at lower thresholds, in optimized detection bands that are informed by historical data; validating and refining signal detections by performing multiple f-k analyses with varying parameters; and locating events based on unassociated signal detections from single array stations. To test the proposed pipeline, we processed a two-week period (May 01-14, 2010) of the signal detections dataset from the IDC. Comparison with an expert analyst-reviewed ground truth bulletin for the same time period suggests that IPF performs better than the pipeline currently in use at the IDC. Most of the additional events built by the Auto Analyst are low-magnitude events that evaded the traditional pipelines of event building.

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