DIAGNOSTIC ALGORITHM BENCHMARKING
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Objectives
- Benchmark diagnostic algorithms (DAs) using standardized platform
- Compare performance empirically
- Facilitate research in and maturation of diagnostic technologies

Challenges
- Various diagnostic approaches (expert systems, model-based, data-driven, stochastic)
- Diagnostic algorithms support different operational contexts – difficult to define evaluation criteria

Approach
- Acquire nominal and faulty experimental data with known ground truth
- Use standard formats for system description, data, and diagnosis results
- Create software framework to execute diagnostic algorithms and evaluate performance

Diagnostic Framework (DXF)
- High-level representation of physical system description, sensor data, diagnosis output
- Run-time architecture for executing DAs with experimental scenarios
- Evaluation component that evaluates DAs using pre-defined metrics

Implementation
- Two system descriptions created from the ADAPT Electrical Power System tested
- Archived ~4 minute nominal and faulty scenarios with known ground truth for ADAPT-Lite and ADAPT systems

DXC’10 Diagnostic Problems
- System operational scenario
- Diagnose single-string UAS mission
- Fault isolation time
- Fault detection time
- Fault recovery rec.
- Fault types
- Intermittent offset
- Yes
- No

Results (only DXC’10 DP-I shown, see links for more information)
- No DA dominates all metrics
- Real-world system noise, latencies, transients, and coding errors resulted in DA false positives and classification errors

Publications and Data Sets
- ADAPT Electrical Power System information, software framework, sample data, test data, results, publications and presentations are available on DASHlink:
  - DXC’09: [https://c3.ndc.nasa.gov/dashlink/projects/36/](https://c3.ndc.nasa.gov/dashlink/projects/36/)
  - DXC’10: [https://c3.ndc.nasa.gov/dashlink/projects/33/](https://c3.ndc.nasa.gov/dashlink/projects/33/)

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