

The WITAS Event Loss Detection Benchmark

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Version 1 (November 2011)

The WITAS Event Loss Detection domain is an encoding of a discrete event system (DES) diagnosis problem as a planning problem [2]. The problem derives from the WITAS unmanned air vehicle (UAV) project, carried out at Linköpings Universitet 1997–2005.¹ It is a fault detection problem: the task is to decide if any event is missing from an observation log. In the encoding as a planning problem, actions that correspond to lost events have a cost of 1, while other actions have a cost of 0, so the objective is to decide if a plan of zero cost exists.

Domain Formulation

The domain formulation uses some quantified and conditional effects, but these are conditioned only on static predicates (i.e., the grounded problem will not have conditional effects). It uses a numeric fluent (`total-cost`) for action costs.

Problem Instances

The problem instances are based on eight flight logs, three of which have missing events. Their characteristics are summarised in table 1. To provide a larger, and more smoothly scaling, set of instances for planner experiments, the set also includes prefixes of the original flight logs, some with events randomly removed. Each problem `logN-oM-mK` is an instance based on the first `M` events from `logN`, with `K` missing events (either missing from the original log, or randomly removed).

There is one instance (`log5-o20-m5`) which admits a zero cost plan even though the log has missing events. This happens because the system model is an abstraction of the real system, and thus not always sufficient to prove that a fault has occurred.

¹See Doherty et al. [1], or <http://www.ida.liu.se/divisions/aiics/aicssite/projects/witas.en.shtml> for more information about the WITAS project, and <http://www.ida.liu.se/divisions/aiics/aicssite/uastech/index.en.shtml> for recent activities of the Unmanned Aircraft System Technologies group.

	#Observations	Has missing events?
log1	41	
log2	110	
log3	93	✓
log4	170	
log5	206	✓
log6	268	✓
log7	273	
log8	99	

Table 1: Size and events missing from flight logs.

References

- [1] P. Doherty, P. Haslum, F. Heintz, T. Merz, T. Persson, and B. Wingman. A distributed architecture for intelligent unmanned aerial vehicle experimentation. In *Proc. 7th International Symposium on Distributed Autonomous Robotic Systems*, 2004.
- [2] P. Haslum and A. Grastien. Diagnosis as planning: Two case studies. In *ICAPS’11 Scheduling and Planning Applications Workshop*, 2011.