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RISMA: A Rule-Based Interval State Machine Algorithm for Performance Analysis, Alert Generation and Monitoring Real-Time Data Processing

This paper presents a Rule-based Interval State Machine Algorithm (RISMA) for monitoring, and analysing the behaviour of interval-based data. The proposed algorithm uses the Interval State Machine (ISM) approach to model any number of interval-based data into well-defined states as well as inferring them. An interval-based state transition model and methodology are presented to identify the relationships between the different states of the proposed algorithm. By using such model, the unlimited number of relationships between large numbers of similar intervals can be reduced to well-defined number of relations, in our case 18 direct states relationships. Significant important information can be derived from the proposed algorithm, such as number and type of related alerts and system performance indicators. This algorithm has been tested using several different data sets received in near real-time, from International Monitoring System (IMS), by the International Data Centre (IDC) of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). For IMS interval-based data and at any period of time it is possible to analyse station behaviour, determine the missing data, generate necessary alerts, and to measure some of station performance indicators. The proposed algorithm, methodology, implementation, experimental results, advantages, and limitations of this research are presented.

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