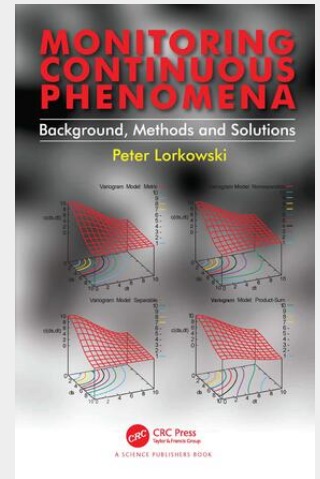


Monitoring Continuous Phenomena

Background, Methods and Solutions

Monitoring continuous phenomena by stationary and mobile sensors has become a common due to the improvement in hardware and communication infrastructure and decrease in its cost. Sensor data is now available in near real time via web interfaces and in machine-readable form, facilitated by paradigms like the Internet of Things (IoT). There are still some obstacles in the usability of the data since the positions (in space and time) of observation and the positions of interest usually do not coincide. Interpolation is the technique to fill such gaps and there are manifold methods to perform it. To actually operate a monitoring system, there are problems like unambiguous identification of interpolation method and associated parameters, appropriate interface to store observations and retrieve interpolated data, continuous update of the interpolation model for real time monitoring, compression and progressive retrieval of observational data and critical states definition and notification by using aggregation of values. This book proposes a general system architecture that addresses these problems. It is not confined to details about particular interpolation methods but rather takes a holistic view on the problem of monitoring. State-of-the-art technologies like geostatistics, sensor web enablement and field data types are introduced and applied in order to provide a viable toolset for the problem domain. The focus is on the overall organization of the monitoring and the architectural design of the software system and the associated simulation framework that is used to systematically evaluate different monitoring approaches. The whole cycle of a monitoring entailing observation, interpolation, discretization, storage, retrieval and notification is covered. Concrete solutions for several common problems in this context are provided.



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