# Using Real-time Event Tracking Sensitivity Analysis to Overcome Sensor Measurement Uncertainties of Geo-Information Management in Drilling Disasters

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This paper introduces an application of a novel EventTracker platform for instantaneous Sensitivity Analysis (SA) of large scale real-time geo-information. Earth disaster management systems demand high quality information to aid a quick and timely response to their evolving environments. The idea behind the proposed EventTracker platform is the assumption that modern information management systems are able to capture data in real-time and have the technological flexibility to adjust their services to work with specific sources of data/information. However, to assure this adaptation in real time, the online data should be collected, interpreted, and translated into corrective actions in a concise and timely manner. This can hardly be handled by existing sensitivity analysis methods because they rely on historical data and lazy processing algorithms.

In event-driven systems, the effect of system inputs on its state is of value, as events could cause this state to change. This 'event triggering' situation underpins the logic of the proposed approach. Event tracking sensitivity analysis method describes the system variables and states as a collection of events. The higher the occurrence of an input variable during the trigger of event, the greater its potential impact will be on the final analysis of the system state.

Experiments were designed to compare the proposed event tracking sensitivity analysis with existing Entropy-based sensitivity analysis methods. The results have shown a 10% improvement in a computational efficiency with no compromise for accuracy. It has also shown that the computational time to perform the sensitivity analysis is 0.5% of the time required compared to using the Entropy-based method.

The proposed method has been applied to real world data in the context of preventing emerging crises at drilling rigs. One of the major purposes of such rigs is to drill boreholes to explore oil or gas reservoirs with the final scope of recovering the content of such reservoirs; both in onshore regions as well as in offshore regions. Drilling a well is always guided by technical, economic and security constraints to prevent crew, equipment and environment from injury, damage and pollution. Although risk assessment and local practice provides a high degree of security, uncertainty is given by the behaviour of the formation which may cause crucial situations at the rig. To overcome such uncertainties real-time sensor measurements form a base to predict and thus prevent such crises, the proposed method supports the identification of the data necessary for that.