Plan Overview

A Data Management Plan created using DMPonline

Title: Risk Assessment Of Rare Events (RARE) In A Complex And Uncertain World

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Project abstract:

Certain rare events have significant costs, financial and/or humanitarian, and decision-makers must consider strategies that reduce or mitigate the risks of such events. Examples of rare events are the financial crash of 2008, hurricane Ida and the 2009 satellite collisions. Events that can affect the operation of a business or a government policy can also be rare, such as a bank defaulting on its debts, a virus mutating into a different strain or the leakage of radionuclides from a nuclear waste repository. The first step to successful risk management is an accurate assessment of such risks by precisely quantifying the probability and other so-called "risk measures" of rare events. Such quantification requires interrogating "digital twins" based on stochastic models that describe the phenomena under consideration. In practical applications, the stochastic models are high-dimensional, i.e., dependent on hundreds or thousands of model parameters, and solving them is computationally expensive. This computational complexity compounds the cost of sampling the underlying model parameters rendering accurate computation of risk measures difficult or even non-viable for most applications.

This project will develop the next generation of highly efficient and scalable computational methods that are specifically designed for risk assessment of rare events (RARE) involving high-dimensional and computationally intensive stochastic models. The proposed methods will build on recent mathematical and computational ideas and innovations from random sampling, Markov Chain Monte Carlo, hierarchical and importance sampling and reliability analysis to make accurate risk assessment involving complex models possible with the currently available computational resources.

The expected outcome is a transformative increase in the possible accuracy of risk assessment in a wide class of problems which will ultimately allow risk managers and policymakers to make better, more informed decisions. While the methodologies developed in this project will have broad applicability, the developments will be motivated by, and battle-tested against, a flagship application of assessing the risk of leakage of radionuclides from a nuclear waste repository given the uncertain permeability of the soil.

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Copyright information:

Risk Assessment Of Rare Events (RARE) In A Complex And Uncertain World

Data Collection

What data will you collect or create?

The project builds on collaborations with researchers in Technical University in Munich where past data on nuclear sites will be provided.

How will the data be collected or created?

Data will be collected in digital format and published in public repositories.

Documentation and Metadata

What documentation and metadata will accompany the data?

Aim and methodology.

Ethics and Legal Compliance

How will you manage any ethical issues?

There are no ethical issues with the data.

How will you manage copyright and Intellectual Property Rights (IPR) issues?

If applicable, copyright and IPR issues with be addressed at Project Meetings following University Policies.

Storage and Backup

How will the data be stored and backed up during the research?

Data will be stored and backed up following the University's adopted approach.

How will you manage access and security?

Project does not include sensitive data that requires additional security. If such a need arise, access will be managed through the university's information system team.

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

All data is assumed to be of long-term value unless stated otherwise at the final project progress meeting. This data is to be retained, shared and preserved as per the University's approach and in public repositories.

What is the long-term preservation plan for the dataset?

The University' long-term preservation plans are adopted.

Data Sharing

How will you share the data?

Generally, Data will be shared (if appropriate) as per the University's approached. This is usually electronically on request. Additionally, reports and public code will be published in public repositories with the necessary data for validation.

Are any restrictions on data sharing required?

There are not foreseen restrictions on data sharing.

Responsibilities and Resources

Who will be responsible for data management?

Heriot-Watt University will be responsible for data management

What resources will you require to deliver your plan?

The requested resources are included as part of the proposal (including time paid for IT admin).