Plan Overview

A Data Management Plan created using DMPonline

Title: Max-plus switching systems and long max-plus matrix products

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Template: EPSRC Data Management Plan

Project abstract:

Switching max-plus linear (SMPL) systems are used to model the propagation of delays in a railway network.

Suppose that departure times of a network at a particular instant are given by a vector x(k). The departure times at instant k are given by a recurrence relation based upon the departure times at a previous instant multiplied in the sense of max-plus arithmetic by matrix A(u(k)) where u(k) is a control variable. At every instant, the network may slightly change, which is encapsulated in this control variable. This has a residual effect on the ultimate departure times, which one often seeks to optimize in some way: for instance, by minimizing the cumulative delay with respect to a given regular schedule.

The main idea of the proposed research is to study the switching max-plus linear systems as vector orbits of a finitely generated max-plus matrix semigroup: the set of all possible max-plus matrix products of a given finite set of matrices.

In this research we will be particularly interested in the long max-plus matrix products and developing for them an analogue of the CSR representation of max-plus matrix powers suggested by Sergeev and Schneider. We then aim to apply the new theoretical results which we obtain to switching max-plus systems and the above mentioned optimization problems over them.

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Copyright information:

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Max-plus switching systems and long max-plus matrix products

Data Collection

What data will you collect or create?

The reasearch I will be working with is purely theoretical and it does not require any data to be collected or created. The closest type of data I will use will be fabricated examples required to illustrate or to confirm the correctness of the mathematical research I will be doing.

How will the data be collected or created?

I have no intention to collect data but I may fabricate a worked example for the research. This will be done by myself and the lead supervisor.

Documentation and Metadata

What documentation and metadata will accompany the data?

Any fabricated examples of note will either be given in publication or will be disregarded entirely.

Ethics and Legal Compliance

How will you manage any ethical issues?

Not applicable

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

In terms of data this is not applicable. In terms of actual research I will ensure to properly cite any work that I use in my own reseach where necessary.

Storage and Backup

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

Not applicabe

How will you manage access and security?

Not applicable

Selection and Preservation

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

Not applicable

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

Not applicable

Data Sharing

How will you share the data?

The examples will mainly be of use for myself but I will freely share them upon request.

Are any restrictions on data sharing required?

Not applicable

Responsibilities and Resources

Who will be responsible for data management?

Not applicable

What resources will you require to deliver your plan?

Not applicable