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Building a Knowledge Graph for Scientific Computing

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Mathematical computing knowledge is produced at an immense, and seemingly ever increasing, speed. Very little of it is organised in meaningful ways, making its discovery, insight and discussion harder every year. Following new developments in a given field is time consuming even for experts. Entering a new specialisation is daunting for students.

We will show how building a knowledge graph for scientific computing can address these issues. We have created an ontology that semantically links mathematical problems with publications, algorithms and implementations.

The ontology encodes possible relationships between the entities in the graph. These connections can be explored using a web-based query frontend, which enables non-experts to quickly gain an overview of available methods and software for specific numerical problems in their scientific work. For experienced users, it makes variations of existing algorithms easily discoverable and allows tracking of new publications or software implementations connected to a specific problem.

We will be inviting feedback for our plans to grow this knowledge graph into a community-driven platform with an open, freely accessible API.

Our efforts are part of the scientific computing task area in the Mathematical Research Data Initiative (MaRDI), a consortium in the German National Research Data Infrastructure (NFDI).

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