Virtual Theories – A Uniform Interface to Mathematical Knowledge Bases

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Abstract. There are various mathematical knowledge collections and information systems available. They range from completely informal ones like Wikipedia or the Cornell arXiv, zbMath, and MathSciNet via mathematical object databases like the GAP group libraries, the Online Encyclopedia of Integer sequences (OEIS), and the L-functions and Modular Forms Database (LMFDB) to theorem prover libraires like those of Mizar, Coq, PVS, and the HOL systems.[1]

EdN:1

1 Introduction

ToDo

To Do: follow this

1. mathematical knowledge bases are non-interoperable, and usually only accessible to humans (not programmatically; state of the art is to export data, manually massage it into SageMath form and make a SageMath module (PIP) to be included into SageMath).
2. If they are, then they only expose the internal database records, not the mathematical objects. e.g. elliptic curves over the rationals as number quadruples where one of the numbers is represented as a string.
3. we want to compute with them, e.g. to find new relations between sequences in the OEIS (see [LK16]), or to find all elliptic curves in the LMFDB whose conductor is divisible by 5.
4. we want to link them, so the contents must be interoperable $\rightsquigarrow$ Idea: use the MitM approach introduced in [CICM1616], and view math knowledge bases as OMDoc/MMT theory graphs (the ABox component of the MitM ontology).
5.

2 Conclusion

References

[CICM1616] Paul-Olivier Dehaye et al. "Interoperability in the OpenDreamKit Project: The Math-in-the-Middle Approach". In: *Intelligent Computer Mathematics 2016*. Ed. by Michael Kohlhase et al. LNAI 9791. Springer, 2016. URL: https://github.com/OpenDreamKit/OpenDreamKit/blob/master/WP6/CICM2016/published.pdf.

[1] EdNote: continue

[LK16] Enxhell Luzhnica and Michael Kohlhase. “Formula Semantification and Automated Relation Finding in the OEIS”. In: *Mathematical Software - ICMS 2016 - 5th International Congress*. Ed. by Gert-Martin Greuel et al. Vol. 9725. LNCS. Springer, 2016. DOI: 10.1007/978-3-319-42432-3.