Report on the outcomes of a Short-Term Scientific Mission[1]

Action number: CA20111

Grantee name: Alexander Steen

Details of the STSM

Title: Infrastructure for Automated Theorem Provers Inventory

Start and end date: 07/07/2022 to 13/07/2022

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

The structure of the automated reasoning system inventory and proof format inventory was discussed by Fontaine and Steen. In order to be freely accessible, the inventories are now designed as a public Wiki (currently hosted on GitHub, see https://github.com/EuroProofNet/ATP/wiki) whose entries will be published under Creative Commons Attribution 4.0 International License; so that its information can be (re-)used and extended by everybody. Fontaine and Steen created the Wiki instance in the GitHub repository of EuroProofNet WG2 (https://github.com/EuroProofNet/ATP/).

Fontaine and Steen discussed and created a template for Wiki entries for automated reasoning systems producing proofs and input and proof formats. Additionally, auxiliary pages have been created that describe the project and give detailed information how to contribute to the inventory (the Wiki). Furthermore, they created or co-created first entries for popular automated reasoning systems producing proofs. Additionally, Fontaine and Steen could align with Prof. Geoff Sutcliffe (main curator of the TPTP infrastructure) and get advice and input from his experience. A list of ATP systems supported by the TPTP (only a subset of all available ATP systems) was provided by the TPTP for further usage by WG2 of EuroProofNet. Fontaine and Steen suitably converted the information provided by the TPTP into an extensive table of ATP systems in the inventory. Also, Fontaine and Steen extracted a number of SMT solvers from the international SMT-COMP 2021 in order to enrich this inventory list further. Fontaine and Steen also created or co-created templates and entries for the TPTP input language and proof format (in collaboration with Prof. Geoff Sutcliffe), the SMT-LIB input

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language and the Alethe proof format.

Fontaine and Steen discussed how to activate the relevant community, and in particular the members of WG 2, to contribute detailed entries for the inventory. Also, prospective ideas for securing a medium- and long-term curation of the inventory were discussed.

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

The STSM fully achieved the planned goals. They were:

1. A short technical report on the requirements and proposed design of an inventory for Automated Theorem Provers;

2. An preliminary inventory consisting of selected theorem proving systems (for illustration purposes);

3. A concept including process description on how to activate and include the automated reasoning community to collaboratively curate and extend the inventory.

These outputs constitute necessary prerequisites of deliverable D3 (month 18) and hence contribute to the goals "A deeper understanding of features of theorem provers" as well as the short term technological impact "Tools allowing the translation of proofs between different systems."

The technical report has been created and is available at https://alexandersteen.de/files/EuroProofNet-WG2-Inventory-Report.pdf.

The Wiki implementing the inventory has been created at GitHub, accessible via: https://github.com/EuroProofNet/ATP/wiki. Templates and illustrative entries were created. Even more, via a close collaboration with Prof. Geoff Sutcliffe, Fontaine and Steen were not only able to provide a few entries but also to provide a table of existing reasoning systems (for which detailed entries need to be created). Currently the inventory consists of a list of 99 automated reasoning systems (ATP systems, SAT solvers and SMT solvers). This is an optimal starting point for having stakeholders/developers of systems provide detailed entries for these systems. See the list of systems at https://github.com/EuroProofNet/ATP/wiki/List-of-systems.

It is planned to advertise the Wiki not only via the WG mailing lists and events, but also via major community mailing lists. At the EuroProofNet WG2 kick-off meeting Haifa, Israel, it is planned to present the work and to discuss with all interested WG members. More details are given in the technical report.