Short-Term Scientific Mission Grant
- APPLICATION FORM[1] -

Action number: CA20111

Applicant name: Claudio Sacerdoti Coen

Details of the STSM

Title: Indexing and Retrieval of Formal Proofs in an Heterogineous Setting

Start and end date: 16/04/2023 to 21/04/2023

Goals of the STSM

The STSM is aimed at implementing prototypes for indexing and searching mathematical statements, theorems and definitions in an heterogineous library obtained by encoding in Dedukti the different logics of the European Interactive Theorem Provers in use. As a consequence, the statements will occur in the library only in encoded forms and the same statement can have different shapes if originally stated in different logics. The challenges consist in combining well tested methods for indexing and retrieval mathematical knowledge (a subset of those described in A Survey on Retrieval of Mathematical Knowledge. Math. Comput. Sci. 10(4): 409-427 (2016)) with new kinds of pre/post-processing, data relaxation and normalization to accommodate heterogineuity.

(max.200 word)

Working Plan

1. the applicant will re-use either the code of Dedukti or the code of LambdaPi to implement crawlers to index the library of exported Dedukti files. The applicant will compare a few data structures/methodologies like substitution trees or features stored in relational tables.

2. the applicant will implement an API for document/item retrieval that returns a scored list of maches

3. the applicant will link the API to LambdaPi, to be used either via explicit user-provided queries or via queries issued by tactics

4. the applicant will implement a very basic prototype of web interface for the API

5. the applicant will study term transformations (approximations, normalizations, feature

[1] This form is part of the application for a grant to visit a host organisation located in a different country than the country of affiliation. It is submitted to the COST Action MC via-e-COST. The Grant Awarding Coordinator coordinates the evaluation on behalf of the Action MC and informs the Grant Holder of the result of the evaluation for issuing the Grant Letter.

extraction, automatic alignment) in order to allow indexing and searching to become effective on statements expressed in the encoding of different logics. A prototype for this is supposed to be able to exploit the rewriting engine of Dedukti/LambdaPi

(max.500 word)

Expected outputs and contribution to the Action MoU objectives and deliverables.

The expected output is a prototype of searchable heterogeneous library where the user can expect to look for theorems having a statement similar to a given one, coming from multiple systems and encoded into different logics.

The STSM contributes to:

1. Research Coordination Objective (RCO) 4, Gather proofs translated in Dedukti into a FAIR database

2. RCO 5, Provide tools for searching large libraries of formal proofs

3. Capacity Building Objective (CBO) 1,Provide tools for searching large libraries of formal proofs

4. CBO 4, Ease access to formal verification techniques in education and other areas of science

5. Working Group 4, on libraries of formal proofs

6. Deliverable 10, expected at month 24

(max.500 words)

Applicant enters max. 500 word summary here.