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CONFident at CoCo 2023

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OBERGURGL, AUGUST 23RD AND 24TH, 2023

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- CONFident is a tool for checking **(non-)confluence** of Generalized Term Rewriting Systems (GTRSs).
- A GTRS is a tuple $\mathcal{R} = (\Omega, \mu, H, R)$, where:
 - $\Omega = (\mathcal{F}, \Pi)$ is a signature with predicates.
 - $\mu \in M_{\mathcal{F}}$.
 - H is a set of auxiliary clauses (H is used to model the semantics of conditions).
 - R is a set of rewrite rules $\ell \rightarrow r \Leftarrow c$.

Implementation

- The tool is available here:
`http://zenon.dsic.upv.es/confident/`.
- It is written in Haskell and implements the **Confluence Framework**, a divide-and-conquer squema where different techniques are applied recursively using a pre-defined strategy.
- In the Confluence Framework, we consider two types of problems:
 - **Confluence Problems**, that encapsulate the GTRSs whose confluence is tested.
 - **Joinability Problems**, that are used to prove or disprove joinability.

- The **proof strategy** used in CONFident is as follows:
 - 1 it tries a simplification processor to simplify the input system or its rules;
 - 2 it tries to decompose the problem using a modularity processor;
 - 3 at this point, there exists an alternative option that potentially involves the use of transformational processors (P_{CanCR} , P_U or P_{Uconf});
 - 4 for each branch, it extracts their extended critical pairs, thereby generating joinability problems (termination checks can also be applied);
 - 5 finally, it attempts joinability checks on each joinability problem.

- GLV23** R. Gutiérrez, S. Lucas and M. Vítores. Proving Confluence in the Confluence Framework with CONFident. CoRR abs/2306.16330, 2023.
- LVG22** S. Lucas, M. Vítores and R. Gutiérrez. Proving and disproving confluence of context-sensitive rewriting. J. Log. Algebraic Methods Program. 126: 100749, 2022.
- GL22** R. Gutiérrez, M. Vítores and S. Lucas. Confluence Framework: Proving Confluence with CONFident. In Proc. of LOPSTR'2022: 24-43, 2022.