VRAIN Valencian Research Institute for Artificial Intelligence

infChecker **at CoCo 2025**

Raúl Gutiérrez[1] Salvador Lucas[1]

LEIPZIG, 2025

[1] Valencian Research Institute for Artificial Intelligence
Universitat Politècnica de València
Spain

UPV

Description

- infChecker is a tool for checking **(in)feasibility of goals** $\mathcal{G} = \{F_i\}_{i=1}^{m}$, where $F_i = (s_{ij} \bowtie_{ij} t_{ij})_{i=1}^{n_i}$.
- $\bowtie_{ij}$ represents **predicates** on terms defined by provability of goals $s \bowtie_{ij} t$ with respect to a *first-order theories* $\mathrm{Th}_{\bowtie_{ij}}$.
- $\bowtie_{ij}$ can be one of the following predicates:
  - One (CS-)rewriting step (`->`, `\->`).
  - Zero or more (CS-)rewriting steps (`->*`, `\->*`).
  - One or more (CS-)rewriting steps (`->+`, `\->+`).
  - Subterm (`|>=`) and strict subterm (`|>`).
  - (CS-)Joinability (`->*<-`, `\->*<-/`).
  - One (CS-)convertibility step (`<->`, `<-/\->`).
  - Zero or more (CS-)convertibility steps (`<->*`, `<-/\->*`).
- This year, our participation involves utilizing the same tool employed in the previous year.

An Example

- Given the TRS $\mathcal{R} = \{a \to c(b), b \to c(b)\}$, infChecker can prove the nonloopingness of a as the infeasibility of

$$(\{\overline{\mathcal{R}}, Th_{\trianglerighteq}\}, \{\neg(x,y)(a \to x, x \to^* y, y \trianglerighteq a)\})$$

by obtaining the following structure over $\mathbb{N} \cup \{-1\}$:

$$a^{\mathcal{A}} = -1 \qquad b^{\mathcal{A}} = 1$$
$$c^{\mathcal{A}}(x) = x \qquad x \to^{\mathcal{A}} y \Leftrightarrow x \leq 1 \wedge y \geq 1$$
$$x\,(\to^*)^{\mathcal{A}}\,y \Leftrightarrow x \leq y \qquad x \trianglerighteq^{\mathcal{A}} y \Leftrightarrow x \leq y$$

Implementation and Bibliography

- It is written in Haskell and implements the **Feasibility Framework**. The tool is available here:

  `http://zenon.dsic.upv.es/infChecker/`

- Bibliography:

GL25 R. Gutiérrez and S. Lucas. Proving and disproving feasibility with infChecker. In Proc. of the 14th International Workshop on Confluence, IWC'25, to appear, 2025.

GL20 R. Gutiérez and S. Lucas. Automatically Proving and Disproving Feasibility Conditions. In Proc. of IJCAR'2020, LNCS 12167:416–435. Springer, 2020.

Luc24 S. Lucas. Local confluence of conditional and generalized term rewriting systems. Journal of Logical and Algebraic Methods in Programming, 136, paper 100926, pages 1-23, 2024.

LG18 S. Lucas and R. Gutiérrez. Use of Logical Models for Proving Infeasibility in Term Rewriting. Information Processing Letters, 136:90-95, 2018.