Closure Spaces & SLCS - WP1 preliminary report

G. Broccia, V. Ciancia, D. Latella & M. Massink (CNR-ISTI)
with L. Bussi, F. Gadducci & E. de Vink

IT-MaTTerS - PRIN
May 22, 2020

[With E. de Vink]

[With E. de Vink]

Preliminary investigation on

Closure Models, Bisimilarity and SLCS [CLMV 2020]

[With E. de Vink]

Preliminary investigation on

- Closure Model Bisimilarity
  - Extends Kripke bisim. as well as topological bisim. [vBB 2007];

Closure Models, Bisimilarity and `SLCS` [CLMV 2020]

[With E. de Vink]

Preliminary investigation on

- Closure Model Bisimilarity
  - Extends Kripke bisim. as well as topological bisim. [vBB 2007];

- Closure Coalgebra (Neighbourhood Frames/Models);

Closure Models, Bisimilarity and SLCS [CLMV 2020]

[With E. de Vink]

Preliminary investigation on

- Closure Model Bisimilarity
  - Extends Kripke bisim. as well as topological bisim. [vBB 2007];

- Closure Coalgebra (Neighbourhood Frames/Models);

- MiniLogica (minimisation tool);

Closure Models, Bisimilarity and SLCS [CLMV 2020]

[With E. de Vink]

Preliminary investigation on

- Closure Model Bisimilarity
  - Extends Kripke bisim. as well as topological bisim. [vBB 2007];

- Closure Coalgebra (Neighbourhood Frames/Models);

- MiniLogica (minimisation tool);

- Adequacy;

Closure Models, Bisimilarity and SLCS [CLMV 2020]

[With E. de Vink]

Preliminary investigation on

- Closure Model Bisimilarity
  - Extends Kripke bisim. as well as topological bisim. [vBB 2007];

- Closure Coalgebra (Neighbourhood Frames/Models);

- MiniLogica (minimisation tool);

- Adequacy;

$\implies$ Carrying on investigation;

Closure Models, Bisimilarity and SLCS [CLMV 2020]

[With E. de Vink]

Preliminary investigation on

- Closure Model Bisimilarity
  - Extends Kripke bisim. as well as topological bisim. [vBB 2007];

- Closure Coalgebra (Neighbourhood Frames/Models);

- MiniLogica (minimisation tool);

- Adequacy;

$\implies$ Carrying on investigation;

$\implies$ Quantitative extensions.

VoxLogicA Extension/Enhancement

VoxLogicA Extension/Enhancement

- GraphLogicA (extending towards general graphs);

VoxLogicA Extension/Enhancement

- GraphLogicA (extending towards general graphs);

- Preliminary investigation on User Interface issues per spatial model-checkers

VoxLogicA Extension/Enhancement

- GraphLogicA (extending towards general graphs);

- Preliminary investigation on User Interface issues per spatial model-checkers

- GPU enhancement of VoxLogicA
  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

VoxLogicA Extension/Enhancement

- GraphLogicA (extending towards general graphs);

- Preliminary investigation on User Interface issues per spatial model-checkers

- GPU enhancement of VoxLogicA
  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

$\implies$ Carrying on investigation on UI issues;

VoxLogicA Extension/Enhancement

- GraphLogicA (extending towards general graphs);

- Preliminary investigation on User Interface issues per spatial model-checkers

- GPU enhancement of VoxLogicA
  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

$\implies$ Carrying on investigation on UI issues;

$\implies$ Taking cognitive load issues (e.g. memory, attention) into consideration.

- Existential quantification

[with L. Bussi (Tesi di Laurea) and F. Gadducci]

Extending SLCS

- Existential quantification

  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

- Fresh names in S**T**LCS

  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

Extending SLCS

- Existential quantification

  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

- Fresh names in S**T**LCS

  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

- Revisiting minimisation (in S**T**LCS)
  - plays a more prominent role when combining space and time than when applied to space only;

Extending SLCS

- Existential quantification

  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

- Fresh names in S**T**LCS

  [with L. Bussi (Tesi di Laurea) and F. Gadducci]

- Revisiting minimisation (in S**T**LCS)
  - plays a more prominent role when combining space and time than when applied to space only;

$\implies$ Recall: symmetry on names (too).

Applications

- F. Banci Buonamici, G. Belmonte, V. Ciancia, D. Latella, and M. Massink.
  Spatial logics and model checking for medical imaging.
  STTT 22(2), 2019/2020.

- G. Belmonte, V. Ciancia, D. Latella, and M. Massink.
  Innovating Medical Image Analysis via Spatial Logics.
  LNCS 11865, 2019.

- V. Ciancia, D. Latella, and M. Massink.
  Embedding RCC8D in the Collective Spatial Logic CSLCS.
  LNCS 11665, 2019.

- M. Massink (invited talk)
  Verification of Data in Space and Time
  DATAMOD 2019: 8TH INTERNATIONAL SYMPOSIUM "FROM DATA TO MODELS AND BACK" (DATAMOD), Oct. 7 - 8, 2019, Porto, PT.

GRAZIE!