Improving Multi-Level Interactions Modelling in a Multi-Agent Generalisation Model: First Experiments

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Outline

Motivation: multi-level interactions

Interaction modelling using PADAWAN

Case study
Context: agent oriented models for generalisation

- Existing multi-agent models:
  - AGENT (Ruas 1999)
  - CartACom (Duchêne 2004)
  - GAEL (Gaffuri 2008)

- Buildings, roads ... → agents trying to generalise themselves, choosing algorithms.
Transversal and Hierarchical Interactions

AGENT (Ruas 1999)
Transversal and Hierarchical Interactions

CartACom (Duchêne et al. 2012)
Transversal and Hierarchical Interactions

GAEL (Gaffuri et al. 2008)
Other Kinds of Interactions Needed

• What we are able to manage:
  – Hierarchical interactions between a feature and its components (a block and its building).
  – Only hierarchical or only transversal interactions.

• What we would like to manage:
  – Hierarchical interaction between a object and another one located inside (a road and included bus stations).
  – More complex interactions than only hierarchical or only transversal.
Other Kinds of Interactions Needed

Object involved both in hierarchical and transversal relationship.
Object involved in more than one hierarchical relationship.
Other Kinds of Interactions Needed

“Diagonal” interactions.

Diagram showing a network with nodes labeled 'Block' and 'Aggregate', connected to 'Buildings'.
Other Kinds of Interactions Needed

– We assume that a more generic way to model multi-level interactions would help.


– Especially one interesting model: PADAWAN (Picault and Mathieu 2011).
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PADAWAN

• Multi-agent multi-level simulation models (Picault and Mathieu 2011)
• Three interesting features:
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• Three interesting features:
  – Hierarchical relationships.

“Inclusion” or “composition”
PADAWAN

• Multi-agent multi-level simulation models (Picault and Mathieu, 2011)

• Three interesting features:
  – Hierarchical relationships.
  – Generic way to express interactions, the conditions of their executions and the way they are triggered.
PADAWAN

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• Three interesting features:
  – Hierarchical relationships.
  – Generic way to express interactions, the conditions of their executions and the way they are triggered.
  – Generic way to link interactions to agents using interaction matrices.
- Multi-agent multi-level simulation models (Picault and Mathieu 2011)

- Three interesting features:
  - Treelike structure.
  - Generic way to express interactions, the conditions of their executions and the way they are triggered.
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Adaptation of AGENT

• Issue: different ways to express behaviour.
  – AGENT: Constraints driven interactions.
  – PADAWAN: Interactions are selected.

• Adaptation: advices of constraint to trigger interaction.

• Result
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Case study
Case study: introduction

Rocks 1:25k

1:50k
Case study: introduction

Rocks 1:25k

1:50k
Case study: introduction

Rocks 1:25k

1:50k
Case study: modelling

• New kind of agent: dead-ends estate.
Case study: modelling

- New kind of agent: dead-ends estate.
- New constraints: “is there enough room on this side of the dead-end” (left and right).
- New action.
Case study: results

Buildings from BDTopo, IGN
Road: 1:50k

1:50k
Conclusion

• Unsolved problems identified.
• Adaptation of AGENT to PADAWAN.
• First thoughts and experiments for a multi-level agent solution.
Perspectives

• Handle more interaction types in the model.
  – First step: adaptation of CartACom and GAEL to PADAWAN.

• Orchestration of agents.
Thank you!