Natural Models for Epistemic Semantics

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Belief Revision and Dynamic Logic
Specific problems

- No unique model for one and the same “epistemic situation” (not even up to bisimulation).
- No bisimulation invariance.
- No supervenience.
- Distributed knowledge in terms of information states $\neq$ Distributed knowledge in terms of knowledge sets.
General problem / consideration

- Epistemic logic can only deal with the factual and higher order knowledge of a group of agents about those aspects of a situation that are captured by the formal language that is used to describe that situation.

- Equivalently, epistemic logic only deals with knowledge about the sentences of the formal language that is used.
Consequences

“All an agent knows” in \((M,w)\) is
\[
\text{Know}_a(M,w) = \{ \phi \mid (M,w) \text{ satisfies } [a] \phi \}.
\]

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<tr>
<th>Tightness</th>
<th>Modal Saturation</th>
<th>Non-redundancy</th>
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acceptable models

natural models

Naturalness = modal saturation + non-redundancy

A model is natural if and only if it is isomorphic to a generated sub-model of the canonical model.
Further work

- Distributed knowledge in *dynamic* epistemic logic. Previously unclear due to bisimulation variance.

- Dynamic notions of distributed knowledge. What knowledge can be established by a group of agents through communication?

- Group structure: communication networks.

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