

LogInf 2021



iltis

Learning Logic in the Web

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What we teach at our universities

Undergraduate course *Logic for Computer Scientists*

Logics

**Propositional
Logic**

$$A \rightarrow \neg B$$

**Modal
Logic**

$$\diamond A \rightarrow \neg \square B$$

**Predicate
Logic**

$$\exists x R(x) \rightarrow \neg \forall z P(z)$$

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Aspects

**Modeling
Scenarios**

$$A \rightarrow \neg B$$

**Formula
Transformation**

$$A \rightarrow \neg B \equiv \neg A \vee \neg B$$

**Algorithmic
Reasoning**

$$\{A, A \rightarrow \neg B\} \models \neg B$$

How we teach logic

Exercise: Analysis of a software problem

An analysis has revealed the following dependencies among three components of a software system:

1. If the backend is working correctly, the database is also working correctly.
2. The backend is only working incorrectly if neither the database nor the user interface is working correctly.
3. At least one component works correctly.

How we teach logic

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Task A:

modeling

Provide a propositional formula for each dependency.

How we teach logic

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Task A:

modeling

Provide a propositional formula for each dependency.

Task B:

transformation and reasoning

Show by resolution that the dependencies imply that the database and the backend work correctly.

Towards a web-based system for teaching logic

Problems with the standard **offline** approach:

- ▶ delayed feedback
- ▶ rudimentary feedback

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Our Goals for a Web-based Framework

- ▶ **teach** how to
 - ▶ model knowledge
 - ▶ algorithmically infer knowledge implicit in the model

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- ▶ **flexibility** to freely combine atomic exercises into more complex exercises
- ▶ **extensibility:**
 - ▶ additional feedback mechanisms
 - ▶ other contents (other logics, formal languages, . . .)

ILTIS: Teaching Logic in the Web



Overview of supported exercises

Task	Propositional logic	Modal logic	First-order logic
Modelling	✓	✓	(✓)
Transformation	✓	✓	⚙️
Reasoning	✓	✓	(✓)
Evaluation	✓	✓	⚙️
Model construction	✓	✓	(✓)

✓ : supported

(✓): basic support

⚙️ : in development

(Shameless) Call for Help and Contributors

We are looking for...

- ▶ Instructors who want to use ILTIS in their courses
- ▶ Interested students, PhD students, PostDocs ... for
 - ▶ laying the theoretical foundations
 - ▶ extending the coverage of topics in ILTIS
- ▶ Experts in natural language processing...
...for educational tasks for bridging the gap between natural languages and formal modeling.

Contributors to the ILTIS project

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