

Design of training tests on generalized nets

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Introduction

The present paper raises a discussion about a new aspect of the theory of generalized nets, related to teaching generalized nets and assessing the students' comprehension using training tests, case studies and problems for solving.

This didactic aspect has certain cross-points with the methodological aspect of GNs, that occurs when matching the theory with practical applications.

Introduction

The possible applications of generalized nets are diverse and most of them involve users and/or experts from distinct areas, who are not obligatory experts in mathematical modeling or generalized nets modeling.

The GN modelers themselves are expected to master not only the theory of generalized nets, but also exhibit experience and routine which can only be acquired by learning and practicing.

Formative vs. summative

Summative assessment is generally carried out at the end of a course or project and is typically used to assign students a course grade.

Formative assessment is generally carried out throughout the course and serves to provide the teacher with a feedback from learning activities that may result in adaptation of the teaching methods, so that the learners' needs are better met.

So far, teaching generalized nets mainly employed summative assessment practices.

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Formative vs. summative

Students would choose between either elaborating a topic from the course curriculum, or personally preparing a generalized net model of a process, which they are supposed to be well familiar with.

These two options reflect both extremes of the learner's attitude to the area of generalized nets: passive learners and active learners.

Formative vs. summative

Passive learners would opt for the more reproductive and reiterative type of examination: elaborating a topic from the course curriculum.

Active learners would normally choose the more creative alternative, which allows them to contribute to the scientific field with their own original research by preparing a generalized net model of a process, which they are supposed to be well familiar with.

Formative vs. summative

In-between of these two extremes, a third group is formed by the neutral or hesitant learners who may find the field intriguing, yet difficult to comprehend, who do not feel skillful or confident enough to directly start applying their knowledge of generalized nets to the field of their competence or particular needs.

This intermediate group of learners may still get recruited for GNs, if provided with other alternatives for final evaluation, interim self-evaluation, and feedback to the teacher.

Designing GN training tests

When designing evaluation tests for training courses in generalized nets, the basic recommendations for the respective test formats shall be followed.

Here, a discussion of the specifics of the generalized nets as a scientific area shall be initiated, so that these be taken into consideration and optimally exploited in the process of designing the tests.

Designing GN training tests

Considered appropriate:

- True-or-false test (*for the theorems and statements in the theory of GNs*)
- Matching test (*for the basic properties or components in the definition of GN, etc*)
- Multiple choice test (*definitions and notations, graphic structures*)
- Cloze test

Considered inappropriate:

- Likert scale, Essay writing

Designing GN training tests

Analysis of the results:

- analysis of the educational prerequisites for undertaking / delivery of a course on GNs
- error / guesswork analysis of the results
- comparison of one's test results to their performance in building GN models (with respect to Bloom's hierarchy of educational objectives: knowledge → comprehension → application → analysis → synthesis → evaluation)

Sample GN tests

True-or-false

	<i>True</i>	<i>False</i>
1. <i>Every extension of the Petri nets is a conservative extension.</i>		✓
2. <i>Every colour Petri net can be represented by reduced generalized net.</i>	✓	
3. <i>The concept “abstract transition” represents the intersection of all currently active transitions.</i>		✓

Sample GN tests

Matching

	Statics A	Dynamics B	Timing C	Memory D
<i>Function θ_k, giving the next time moment when a given token enters the net</i>		✓		
<i>Time moment T when the net starts functioning</i>			✓	
<i>Functions θ_2, giving the duration of a given transition's active state</i>	✓			
<i>Function b, giving the maximal number of kept token characteristics</i>				✓

Sample GN tests

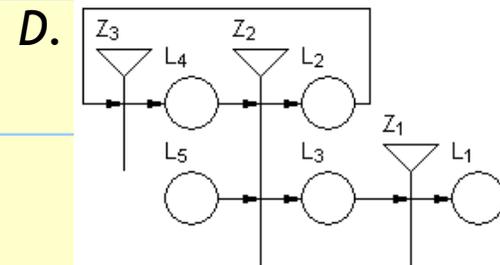
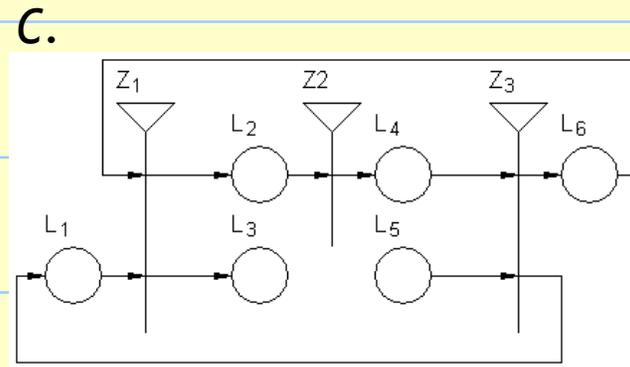
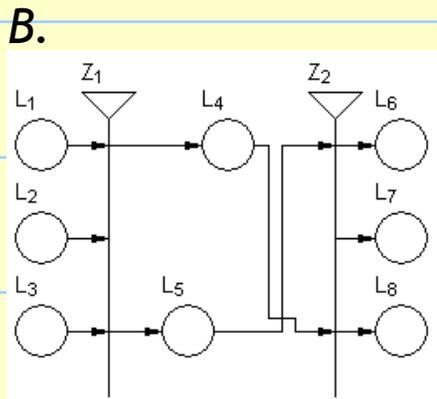
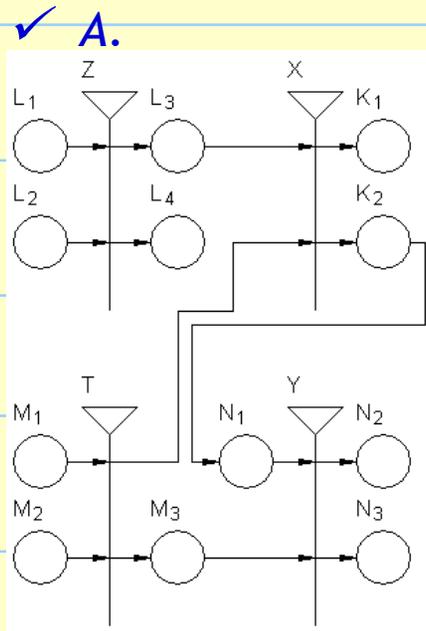
Multiple choice (text)

- 1. How is determined the elementary timestep of a model, obtained as a composition of two models with different timesteps?*
 - A. The average of both elementary timesteps.*
 - B. The quotient between the larger and the smaller elementary timestep.*
 - C. The smaller of both elementary timesteps.*
 - ✓ D. The greatest common divisor between both elementary timesteps.*
- 2. Which of the following can be changed, using a local operator?*
 - A. The set of tokens' initial characteristics.*
 - ✓ B. The structure of a transition.*
 - C. The strategies for tokens transfer through a transition.*
 - D. The characteristic function of an output place.*

Sample GN tests

Multiple choice (graphic)

Which of the following graphic structures of a generalized net contains a mistake?



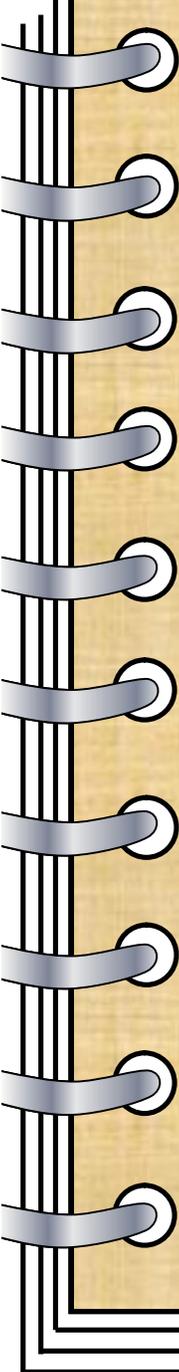
Sample GN tests

Cloze test

- Each generalized net contains at least one transition.
- The transition type \square is an object of Boolean type.
- Self-modifying generalized nets constitute a(n) conservative extension of the generalized nets.

Sample GN tests

More sample GN tests are available in the “Lecture courses” section of the wiki on intuitionistic fuzzy sets and generalized nets, www.ifigenia.org



Thank you for your attention!

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