New and Upcoming Features
of the Visual Generalized Net Editor Gennete

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Abstract

Gennete is a visual editor for Generalized Nets [1], providing automation and productivity features currently not available in other GN modeling environments. In order to utilize these features in the context of the new open GN modeling framework, a series of maintenance releases have been planned. The main goals of these releases are to add support for XGN language (current standard for GN model representation), to streamline the interface for visual editing and to extend the versatility of the program with new import/export features and other usability features.

Keywords: Generalized Nets, visual editor, integrated development environment (IDE), software, open source.

1   Introduction

Gennete was the first interactive visual editor for Generalized Nets developed in 1998 and since then has been used as a convenient drawing application for designing GN models. In 1999, Gennete was integrated with the simulation core developed by Nikolov and Georgiev [2] and became applicable for building basic models. Over the next few years development of the simulation core slowed down and during 2001-2003 the core was phased out and replaced by the new GNTicker server [3, 4]. Lack of documentation and availability of the main developer resulted in partial integration of Gennete with the new server. The need for up to date model development environment resulted in creation of new GN IDE [5]. Implemented in Java, GN IDE provides platform independent solution for GN editing and visualization the simulation progress. The focus of GN IDE development so far has been in compliance with the existing standards

(like GNTP [3] communication protocol and the ability to edit all aspects of the XML based storage format - XGN [3]). Fewer efforts were made for facilitating the process of design and editing the topological structure of the models, an area where Gennete already offers intuitive and streamlined interface. To foster the development of much needed complete solution for GN modeling the necessity for transitional version of Gennete compatible with the new XGN standard was outlined. Such version of Gennete will allow GN IDE to become mature mean for simulation and modeling before special efforts are made to simplify the visual editing workflow. It also provides a clear prospective of the scope of functions that need to be implemented in the planned releases of Gennete.

2   New and Upcoming Features of Gennete

The new version of Gennete was repurposed to serve as a standalone visual editor for GN. All simulation capabilities were removed from the program and interface was streamlined for visual editing only. To insure integration with the new open GN framework Gennete is now complaisant with XGN and can load and store all visual properties of the GN models.

2.1 New visual objects

In order to facilitate the design of more complex and well documented models some new graphical elements has been planned for introduction consistent with recent developments of the GN theory. The most important of these are:
- GN reference object – a named vertically expandable object which could represent link to external generalized net model. This model can be a subnet or outer net for the currently visualized model and can be used as a hyperlink for navigating through models;
- Abstract generalized net symbols – vertical, horizontal and diagonal ellipsis used to represent omitted transitions or places in the description of abstract models;
- A basic set of standard shapes and comment blocks.

2.2 New export features

To advance Gennte's versatility and long term data security the existing export formats (Bitmap, JPEG, LaTeX and Windows Metafile) were updated and two new formats were introduced:
- SVG – Scalable Vector Graphics [6] is a XML based vector format, which represents graphic primitives with their mathematical equations, allowing scaling and editing without loss of image quality. This format is suitable

when further editing of GN model is needed in applications like Inkscape, Adobe Illustrator, and Corel Draw;

- PNG – Portable Network Graphics [7] is raster format employing lossless compression which is very effective in reducing the size of the GN model drawings. This format can be utilized in cases when GN model needs to be incorporated in web pages or word-processing applications.

Besides their popularity and open non-proprietary specification, both new formats were chosen because of their ability to represent animation, a feature which can be used in the future to display GN model simulations.

2.3 Support of external clipboard formats

The original version of Gennete supported only internal clipboard, which cannot be used for interaction with other Microsoft Windows applications. To facilitate scientific publication, the private clipboard formats of two of the most used office applications – Microsoft Office and Open Office – are going to be introduced in the new release of Gennete. Support of the formats is planned to be limited to drawing specifications only based on:

- Office Drawing 97-2007 Binary Format Specification [8];
- OpenDocument Drawing section of the OpenOffice file format specification [9].

2.4 Syntax sensitive editor

Gennete was originally equipped with Generalized Net syntax check which was executed before simulation and on user demand. The new version allows generalized nets syntax to be constantly monitored and prevent the user from making trivial errors as connecting two places directly without passing via transition, or two transitions without an in-between place, or mixing incoming and outgoing places on the same side of given transition.

2.5 Customizable auto routing algorithm for arcs

The arc auto routing algorithm of Gennete has proved to be one of the most productive and enjoyed features of the program. The algorithm searches for the shortest path between two user defined connection points with minimal intersections with existing arcs and no overlapping with existing transitions and places. In the original version of the program, the priority was fixed in favour of the minimal intersections criteria. In the new version, this is now a customizable feature allowing the user to choose from three different options:

- minimal length priority,
- minimal intersections priority,
- user defined, not automatically optimized position.

2.6 New object inspector

The new object inspector allows editing the visual properties of a selected element or the common properties of a selected group of elements. It also provides a simplified interface to naming and colouring wizards described below.

2.7 Naming and colouring wizards

Naming and colouring wizards are automated tools for batch naming or colouring of all GN objects or a selected subset of them. These wizards can be used to generate sequential indices or shades of colors depending on positions of the objects.

2.8 Context sensitive help

Context sensitive help system is now embedded within the object inspector and provides description of the currently edited field or available options for the currently selected object in the current mode. The system also provides additional information about shortcuts and automated functions.

3 Availability of the Source Code and Documentation

Gennete source code is written in Object Pascal and can be compiled with Delphi 7. It is available under GPL v. 3.0 and does come with partial documentation and support from the author. The most recent version of the source and compiled windows binary is available at Ifigenia.org [10]. Since the source can be imported to Lazarus a version for Linux and Mac OS could be created provided that enough interest is expressed from user communities.

4 Release roadmap

To facilitate the progress tracking, an odd/even number version system is introduced. All changes addressed in this article when matured and tested will be available in Gennete v. 3.0.

- Version 2.1.x Beta testing version of XGN load / store capabilities;
- Version 2.3.x Object Inspector and naming / colouring wizards implementation and testing;
- Version 2.5.x Update of file export formats and introduction of PNG and SVG;
- Version 2.7.x Test version of the syntax sensitive editor and the customizable auto rooting arc algorithm;

- Version 2.9.x External clipboard formats and context sensitive help.

When testing is complete, stable releases will have even subversion numbers 2.2, 2.4, 2.6, 2.8 and 3.0.

5 Conclusions

The development of a complete Generalized Nets simulation package has proved to be a challenging task that cannot be easily carried out by a single developer, so extra efforts have to be made to facilitate the collaboration and project's continuity. To address this task new open source strategy for development was adopted. In it, the new platform independent GN IDE was chosen to be the dedicated design and simulation environment for GN modeling. Being still in development GN IDE lacks some of the highly appreciated "wizards" and automated tools available in Gennete. To utilize the existing features of Gennete and outline its future application in the open source GN modeling framework, it was redesigned to serve as a simple small standalone solution for designing and viewing GN models when no simulation is needed.

Acknowledgments

References

[1] Atanassov, K., *Generalized Nets*. World Scientific, Singapore, 1991.

[2] Aladjov H., N. Nikolov, P. Georgiev, K. Atanassov. Software for generalized nets. *Annual of Technical University*, Sofia, Vol. 50, No. 3, 1999, 125-132 (in Bulgarian).

[3] Trifonov T and K. Georgiev. GNTicker – A software tool for efficient interpretation of generalized net models. *Issues in Intuitionistic Fuzzy Sets and Generalized Nets*, Vol. 3. Warsaw, 2005.

[4] Trifonov T., K. Georgiev, K. Atanassov. Software for modelling with Generalised Nets. *Issues in intuitionistic fuzzy sets and generalized nets*, Vol. 6, 2008, 36-42.

[5] Dimitrov D. GN IDE - A software tool for simulation with generalized nets. *Proceedings of the 10th International Workshop on Generalized Nets,* Sofia, December 2009, 70-75.

[6] Scalable Vector Graphics (SVG) 1.1 Specification. *World Wide Web Consortium (W3C)*. http://www.w3.org/TR/2003/REC-SVG11-20030114

[7] Portable Network Graphics (PNG) Specification (Second Edition). *World Wide Web Consortium (W3C)*. http://www.w3.org/TR/PNG/.

[8] OASIS Committee Specification Public Review. OASIS Open Document Format for Office Applications (OpenDocument) Version 1.2 - Part 1: OpenDocument Schema. *Organization for the Advancement of Structured Information Standards*. January 2011. http://docs.oasis-open.org/office/v1.2/OpenDocument-v1.2-part1.html

[9] Microsoft Office Binary (doc, xls, ppt) File Formats. *Microsoft Corp*. http://www.microsoft.com/uk/interop/docs/officebinaryformats.mspx.

[10] Atanassova V. Gennete. In: *Ifigenia, the wiki for intuitionistic fuzzy sets and generalized nets*. http://www.ifigenia.org/wiki/Gennete.