UNIVERSIDAD DE MÁLAGA

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SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

SyntaxTutor

User Manual

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Introduction

SyntaxTutor is an interactive educational application designed to help students understand the functioning of **LL(1)** and **SLR(1)** syntax parsers.

Through interactive exercises, step-by-step visualizations, and pedagogical feedback, the tool guides users in learning these key concepts from the field of language processors.

This manual is aimed at students taking the course and provides basic instructions for installing and using the application effectively.

1. System Requirements

- Operating System: Windows 10/11, macOS 12 or later, or a modern Linux distribution with X11 support (Wayland is not supported in current release).

- No installation required: the application is distributed as a standalone executable.

- Internet connection is not required for regular use.

2. Download and Installation

The latest version of SyntaxTutor is available on the official repository:

- https://github.com/jose-rzm/SyntaxTutor/releases

Download steps

1. Go to the link above.

2. Look for the latest **stable release** (usually shown first).

3. Download the file corresponding to your operating system:

    - `SyntaxTutor-windows-x64.zip` (Windows)
    - `SyntaxTutor-macos-intel.zip` (macOS Intel)
    - `SyntaxTutor-macos-arm64.zip` (macOS ARM)
    - `SyntaxTutor-linux-x86_64.zip` (Linux)

4. Unzip the downloaded file.

3. Running the Application

On Windows:

- The extracted folder contains the executable and all necessary libraries.

- Double-click `SyntaxTutor.exe`.

- If a SmartScreen warning appears, click on *"More info."*and then *"Run anyway"*. This warning appears because the application is not digitally signed, as acquiring a certificate is outside the scope of this project.

On macOS:

- When opening the application for the first time, a security warning may appear due to the app not being signed (similar to Windows).

- To bypass it, right-click the application and select *"Open"*.

On Linux:

- Make the file executable using the following command:

```
chmod +x SyntaxTutor-linux-x86_64.AppImage
./SyntaxTutor-linux-x86_64.AppImage
```

- Alternatively, after making it executable, you can simply double-click it.

4. Application Navigation

When launched, SyntaxTutor presents a user-friendly graphical interface organized into tabs or main action buttons.
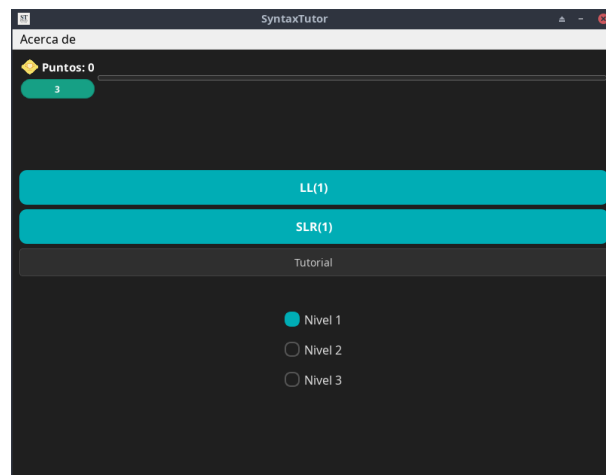

Figura 1: Main Window

Home

From this screen, you can access the different parsers, select the grammar difficulty level, and launch the interactive tour of the application.

Tour Mode

An integrated tutorial that guides the user through the various functionalities of the application. It is recommended to complete it at least once before using the other modes.

PDF Export

From any mode, you can export both the conversation and the analysis tables once the exercise is completed.

Main Workflow

To start an exercise, simply choose a difficulty level (default is level 1) and select a parser.

Once selected, the main window will be hidden and a new window for the Tutor will open. In the following example, a level 3 grammar and the LL(1) parser have been selected:
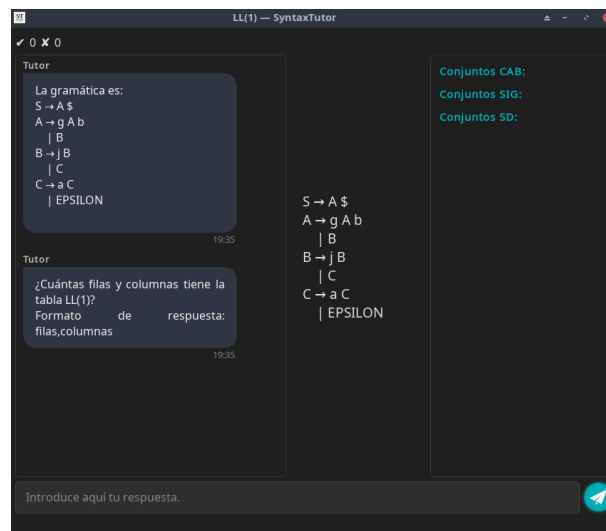

Figura 2: LL(1) Tutor

On the left side, you'll find a chat-style interface where the system asks questions and provides feedback.

In the center, the generated grammar is displayed. On the right side, the progress panel dynamically updates as you advance through the exercise.

The progress panel serves as a quick reference, especially useful when completing the table (last step of the exercise).

The tutor provides enough guidance that no external instructions are needed. Enter your answers in the input field, following the required format. This format is described in each question, in the initial tour, and in Section 5 of this manual.

To insert a new line (only required in the SLR(1) exercise), press **Ctrl+Enter**.

5. Input Format

The input format must be followed carefully in order for validation to succeed. If the input is incorrect, the system will display a clear error message.

LL(1) Exercise

These questions only require numbers, symbols, or comma-separated lists of elements. Example: `a, b, $`.

SLR(1) Exercise

In addition to the formats used in the LL(1) exercise, the SLR(1) exercise may also require:

- One grammar rule per line. Example: `A ->a b`

- An LR(0) item: a grammar rule with a dot (`.`). Example: `A ->a . b`

- A set of LR(0) items: one item per line.

- For the SLR(1) table (final exercise), use the following format:

  - `sX`: shift to state X (for terminals).
  - `X`: transition to state X (for non-terminals).
  - `acc`: accept.
  - `rX`: reduce using rule number X (rules are numbered in the SLR(1) exercise).

If you make mistakes while filling out the SLR(1) table, the **assisted mode** will be activated. This mode explains the expected format and provides detailed hints.

6. Developer Documentation

For those interested in the internal architecture or contributing to the project, the developer documentation is available online:

- **Online Doxygen Documentation:** https://jose-rzm.github.io/SyntaxTutor/

- **PDF version (Developer Manual):** Included in the repository under `/docs/latex`.

This documentation was generated using `Doxygen` and provides detailed information on the classes, methods, and internal modules that make up the SyntaxTutor application.

7. License and Credits

This project was developed as a Bachelor's Thesis at the University of Málaga.

The source code of SyntaxTutor is distributed under the terms of the **GNU General Public License v3.0 (GPLv3)**, which ensures the freedom to:

- Use the software for any purpose.

- Study how it works and modify it.

- Redistribute copies.

- Distribute modified versions.

These freedoms are granted under the following conditions:

- A copy of the GPLv3 license **must be** included with all redistributions of the software.

- The copyright notices in each source file must be preserved and remain unmodified.

- Derivative works must be licensed under the same terms (GPLv3).

The application uses the **Qt 6** graphical framework, which is also available under the GPLv3 license, ensuring full legal compatibility with the project.

If you use this software in an academic context or adapt it for new projects, please consider acknowledging the original author.