https://github.com/cs-ubbcluj-ro/lab-work-computer-science-2024-TeodoraVlad12/tree/main/3-Parser/FinalLabParser

Parser

Overview

This document explains the design and behavior of an **LR(0) parser** implemented for a given grammar. It includes the parsing process, the structure of the parser, common issues (like premature reductions), and recommendations for general improvements to enhance accuracy and robustness.

Parser Description

1. **Purpose**:
    - The parser processes an input string and determines if it belongs to the language defined by a grammar.
    - If valid, it produces a parse tree representing the derivation steps for the input.
2. **Input**:
    - A grammar file defining the language.
    - An input string to be parsed.
3. **Output**:
    - A parse tree or a representation of the parsing process.
    - Error messages for invalid input.
4. **Components**:
    - **Grammar**: Stores the set of rules for the language.
    - **Parsing Table**:
        - **Action Table**: Specifies shift, reduce, or accept actions based on the current state and input symbol.
        - **Goto Table**: Determines state transitions for non-terminals during reductions.
    - **Stack**: Tracks parser states during parsing.
    - **Parser Output**: Builds and maintains the parse tree.

Parsing Process

The parser operates in a loop, repeatedly performing the following steps:

1. **Shift**:
    - Read the next input symbol and push it onto the stack along with the corresponding state.
    - Transition to a new state based on the parsing table.
2. **Reduce**:

- Apply a production rule when the input matches its right-hand side (RHS).
- Replace the RHS symbols on the stack with the non-terminal from the rule's left-hand side (LHS).
- Use the Goto Table to transition to a new state for the LHS.

3. **Accept**:
   - If the entire input is reduced to the start symbol SSS and the end-of-input marker ($) is reached, the parser accepts the input.
4. **Error Handling**:
   - If no action is defined for the current state and symbol, the parser reports an error and halts.