ICSI 409 Final Coding Project

April 2022

1. Implement the CYK Algorithm in a programming language of your choice (preferably python or c++) and test with 3 strings of length 4, 5, and 6.
2. Implement a Push Down Automata (preferably python or c++) and test with a Palindrome Language.

1 Problem 1

Implement the CYK algorithm for any random CFG to test whether a given input string belongs to the language generated by a grammar taken from the user.

Inputs:

- A list of production rules with comma-separated values for each new non-terminal symbol. E.g: $S- > AS|BS|\epsilon, A- > a, B- > b$. For your convenience, you may also split up the production rules from S, e.g.: $S- > AS, S- > BS, S- > \epsilon, A- > a, B- > b$.
- An input string to test with the CYK algorithm.

Outputs:

- The full CYK table with matrix format.
- A statement mentioning whether the string belongs to the language or not.

Note: No hard-coding of grammar or the input string will be accepted.

2 Problem 2

Implement the PDA that accepts all strings that are palindromes and rejects all strings that are not. The length of the palindrome may be even or odd. Don't hard-code the string to test. Your code should prompt the user to enter a string.

Input:

The string to test. E.g.: "aabaa" (accepted), "abba" (accepted), "aaabba" (should not be accepted).

Output:

The states and stack configurations through which this string was accepted.

Note: If you are implementing a non-deterministic PDA (NPDA), you should show only one instance of the decision tree that takes the finite machine to the accepting state with the given input string. There is no need to show the states of all the other branches of the decision tree. You may use a different stack for each branch of the decision tree.

3 Submission Instructions

You may use any language of your choice (preferably C, C++, Python or Java). Provide as many coding comments as possible (at least one line for each function/method and data structure used). Provide a Readme.txt file describing how to run your code from a terminal window/command prompt. Copy both the code files to a PDF file and submit it with the assignment to blackboard. **Failure to submit the PDF will cause 20% of point deduction from the final grade. These code will be tested for plagiarism. Please don't submit code borrowed from the internet or a friend.**