Week 4

Xiaoyuan Xie 谢晓园
xxie@whu.edu.cn
计算机学院E301

Week 4 作业

- **P130 4.2.1** Consider the context-free grammar:

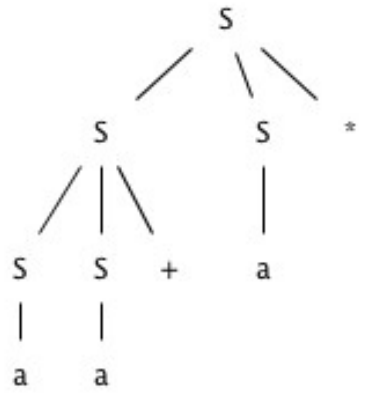
  S -> S S + | S S * | a

  and the string **aa + a*.**

  - 1) Give a leftmost derivation for the string.
    - S =lm=> SS* => SS+S* => aS+S* => aa+S* => aa+a*
  - 2) Give a rightmost derivation for the string.
    - S =rm=> SS* => Sa* => SS+a* => Sa+a* => aa+a*

Week 4 作业

- 3) Give a parse tree for the string.



- 4) Is the grammar ambiguous or unambiguous? Justify your answer.
  - Unambiguous.

- 5) Describe the language generated by this grammar.
  - The set of all postfix expressions consist of addition and multiplication.

Week 4 作业

- **P131 4.2.2(6)**

  S -> a S b S | b S a S | ε

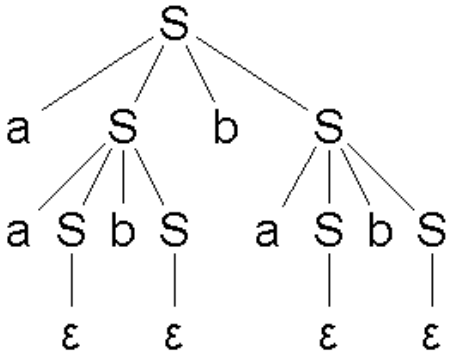
  with string **aabbab.**

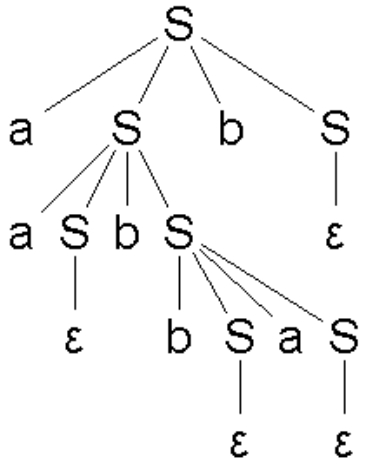
  - 1) S =lm=> aSbS => aaSbSbS => aabSbS => aabbS => aabbaSbS => aabbabS => aabbab

  - 2) S =rm=> aSbS => aSbaSbS => aSbaSb => aSbab => aaSbSbab => aaSbbab => aabbab

Week 4 作业

- 3) Give a parse tree for the string.





- 4) Ambiguous.

- 5) The set of all strings of 'a's and 'b's of the equal number of 'a's and 'b's.

Week 4 作业

- **P131 4.2.3** Design grammars for the following languages:
  - 2) The set of all strings of 0s and 1s that are palindromes; that is, the string reads the same backward as forward.
    - S -> 0S0 | 1S1 | 0 | 1 | ε
  - 5) The set of all strings of 0s and 1s in which 011 does not appear as a substring.
    - S -> 1* ($0^+1?$)*

Week 4 作业

- **P131 4.2.5** Use the braces described in Exercise 4.2.4 to simplify the following grammar for statement blocks and conditional statements:

  stmt -> **if** expr **then** stmt **else** stmt
  | **if** stmt **then** stmt
  | **begin** stmtList **end**

  stmtList -> stmt; stmtList | stmt

  - **Answer:**

    stmt -> **if** expr **then** stmt [**else** stmt]
    | **begin** stmtList **end**

    stmtList -> stmt [; stmtList]

Week 4 作业

- **P137 4.3.3** The following grammar is proposed to remove the "dangling-else ambiguity" discussed in Section 4.3.2:

stmt -> **if** expr **then** stmt
| matchedStmt
matchedStmt -> **if** expr **then** matchedStmt **else** stmt
| **other**

Show that this grammar is still ambiguous.

Week 4 作业

1)

```
if expr
then
        if expr
        then matchedStmt
        else
                if expr
                then matchedStmt
else stmt
```

2)

```
if expr
then
        if expr
        then matchedStmt
        else
                if expr
                then matchedStmt
                else stmt
```

Thank you!