项目二测试报告

一、测试项目名称

项目二：语法分析和语法树生成测试

二、测试内容

对 TINY 和 mini-c 语言的 BNF 文法进行语法分析，并根据单词编码生成分析表和语法树。

三、测试用例

1）mini-c 语法.txt

2）mini-c.lex

3）TINY 语法.txt

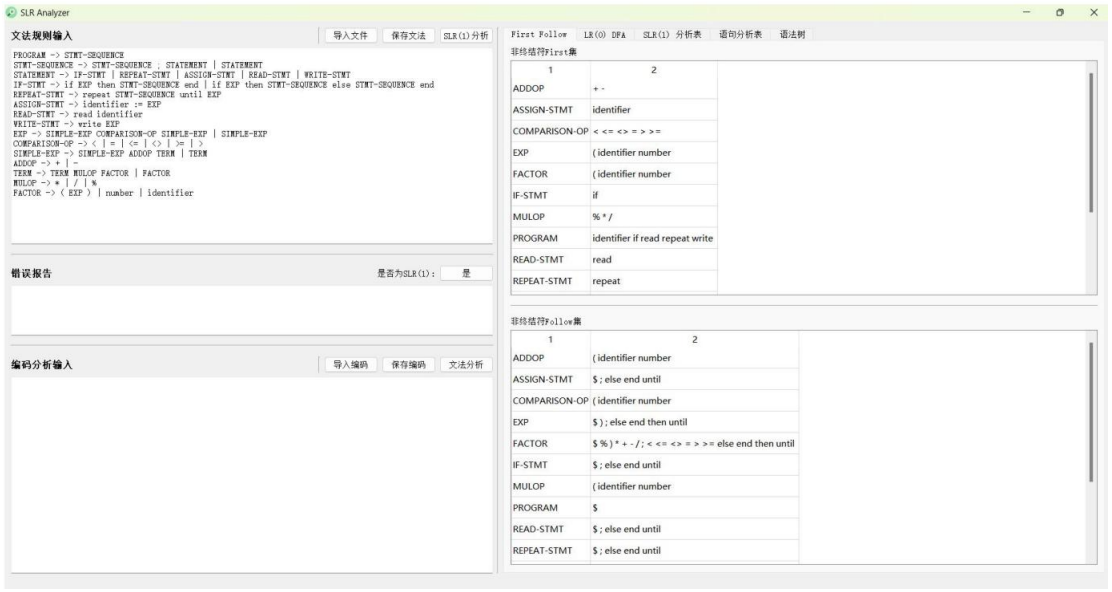
4）TINY.lex

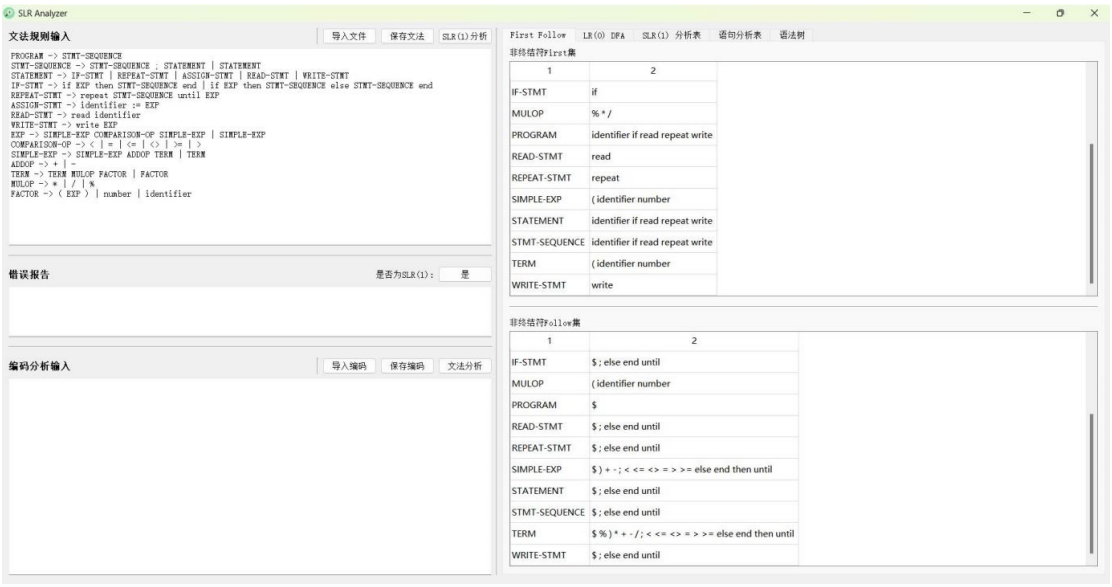
四、测试结果

由于状态过多，分析表过长，部分板块无法展示完全，因此只展示部分，若要查看所有信息，可通过可执行程序进行测试。

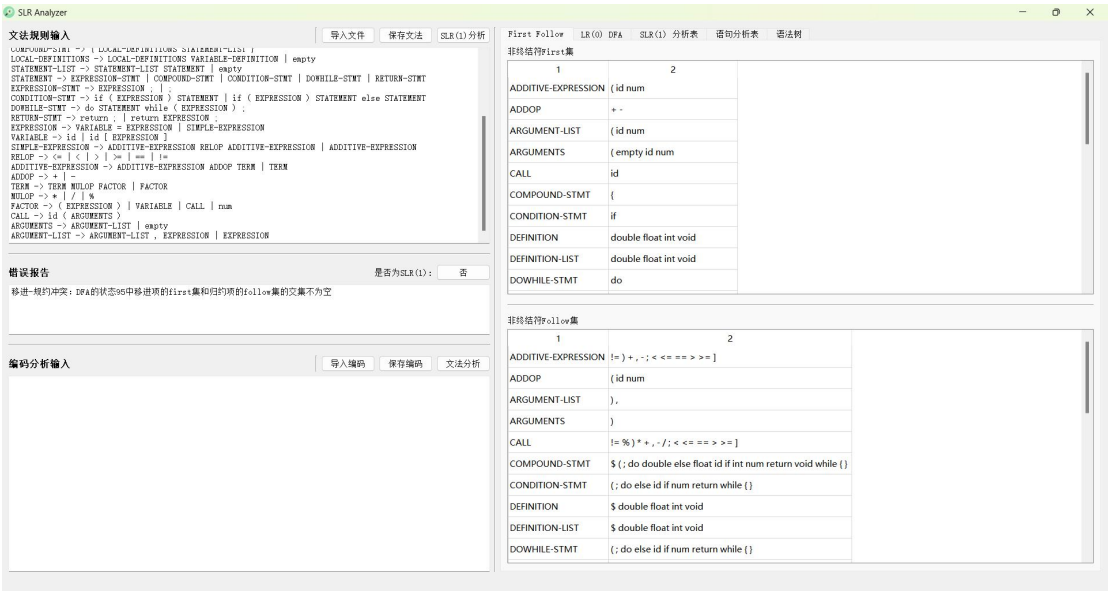
4.1 First 集 Follow 集

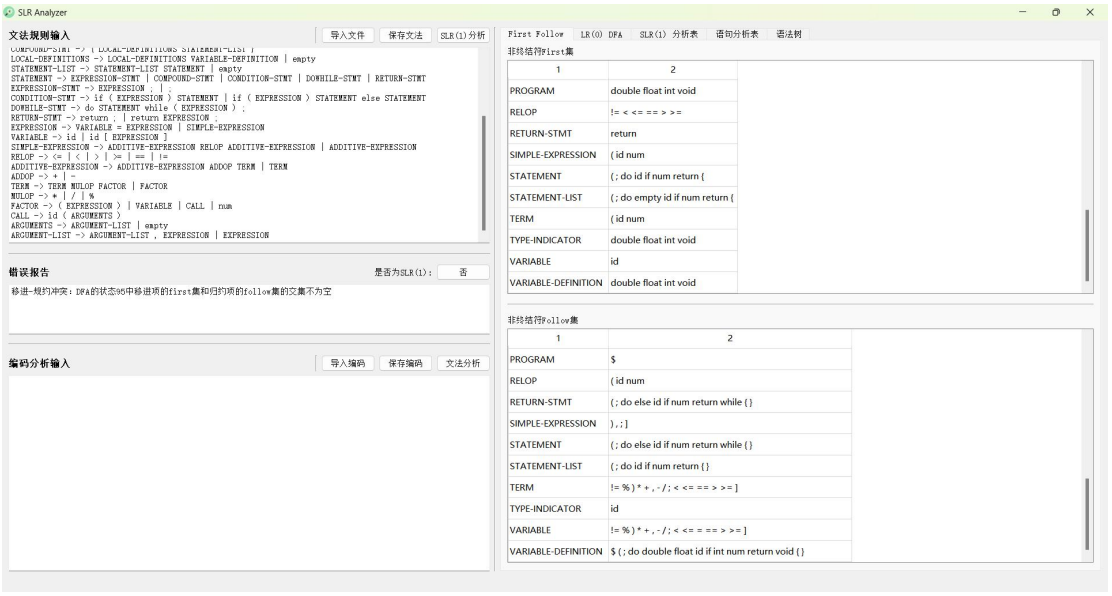
TINY





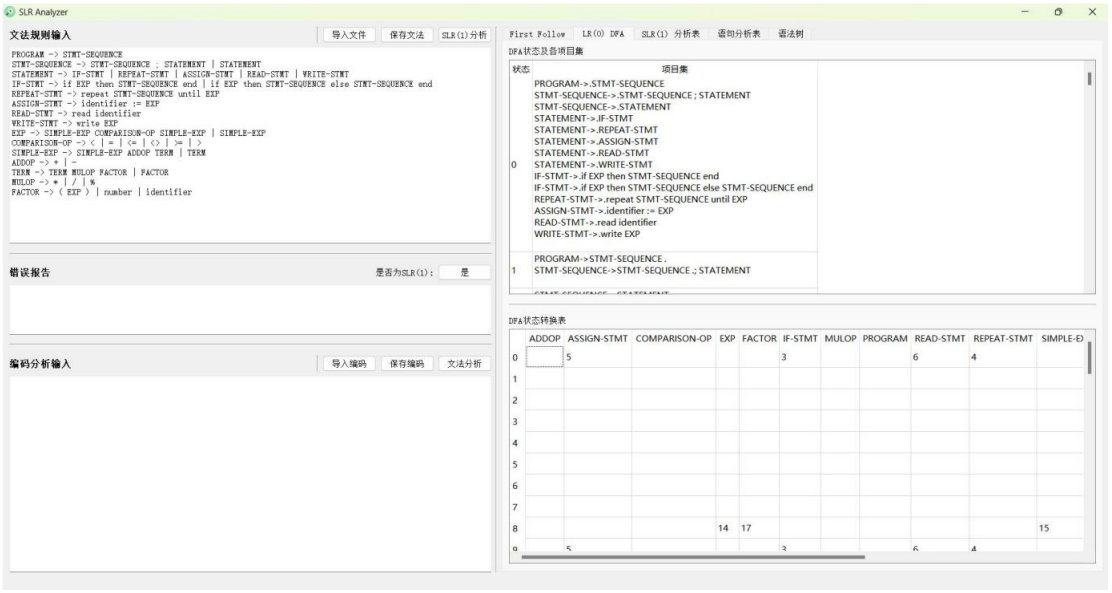
mini-c

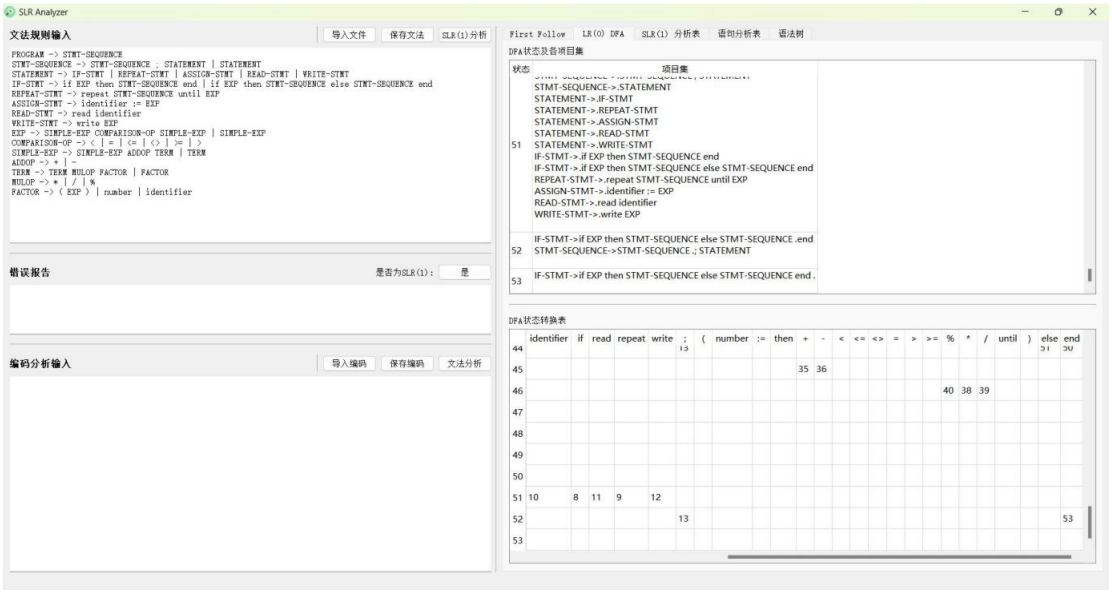

SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
COMPOUND-STMT -> { LOCAL-DEFINITIONS STATEMENT-LIST }
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION ; | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return ; | return EXPRESSION ;
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
错误报告
是否为SLR(1)：
否
移进-规约冲突：DFA的状态95中移进项的first集和归约项的follow集的交集不为空
编码分析输入
导入编码
保存编码
文法分析
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
非终结符First集
1
2
ADDITIVE-EXPRESSION
(id num
ADDOP
+ -
ARGUMENT-LIST
(id num
ARGUMENTS
(empty id num
CALL
id
COMPOUND-STMT
{
CONDITION-STMT
if
DEFINITION
double float int void
DEFINITION-LIST
double float int void
DOWHILE-STMT
do
非终结符Follow集
1
2
ADDITIVE-EXPRESSION
!=) + , - ; < <= == > >=]
ADDOP
(id num
ARGUMENT-LIST
) ,
ARGUMENTS
)
CALL
!= %) * + , - / ; < <= == > >=]
COMPOUND-STMT
$ (; do double else float id if int num return void while { }
CONDITION-STMT
(; do else id if num return while { }
DEFINITION
$ double float int void
DEFINITION-LIST
$ double float int void
DOWHILE-STMT
(; do else id if num return while { }


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
COMPOUND-STMT -> { LOCAL-DEFINITIONS STATEMENT-LIST }
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION ; | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return ; | return EXPRESSION ;
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
错误报告
是否为SLR(1)：
否
移进-规约冲突：DFA的状态95中移进项的first集和归约项的follow集的交集不为空
编码分析输入
导入编码
保存编码
文法分析
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
非终结符First集
1
2
PROGRAM
double float int void
RELOP
!= < <= == > >=
RETURN-STMT
return
SIMPLE-EXPRESSION
(id num
STATEMENT
(; do id if num return {
STATEMENT-LIST
(; do empty id if num return {
TERM
(id num
TYPE-INDICATOR
double float int void
VARIABLE
id
VARIABLE-DEFINITION
double float int void
非终结符Follow集
1
2
PROGRAM
$
RELOP
(id num
RETURN-STMT
(; do else id if num return while { }
SIMPLE-EXPRESSION
) , ;]
STATEMENT
(; do else id if num return while { }
STATEMENT-LIST
(; do id if num return { }
TERM
!= %) * + , - / ; < <= == > >=]
TYPE-INDICATOR
id
VARIABLE
!= %) * + , - / ; < <= == > >=]
VARIABLE-DEFINITION
$ (; do double float id if int num return void { }

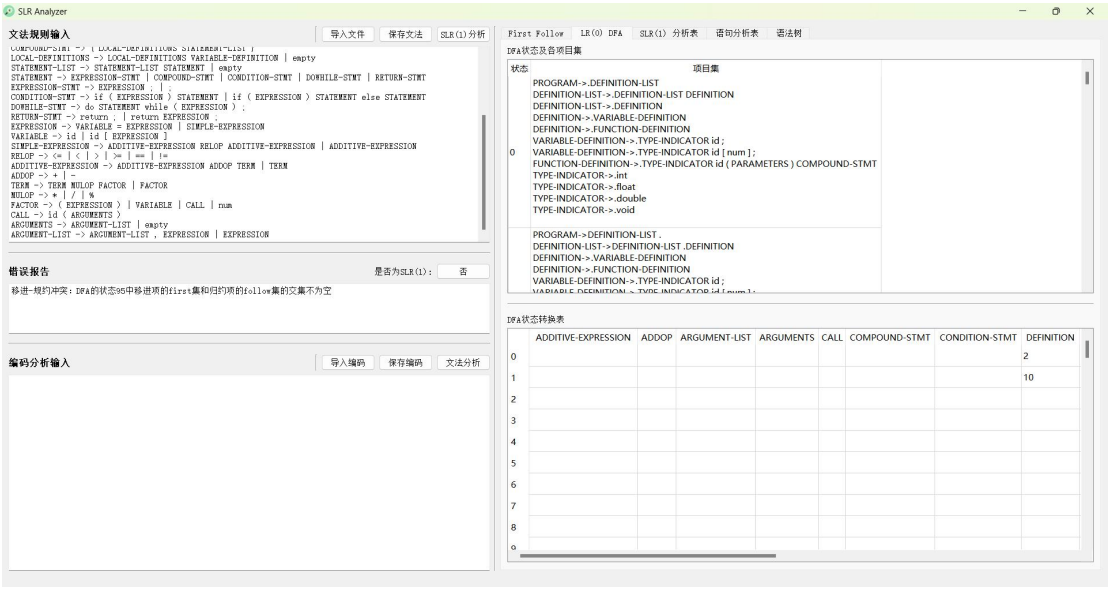
4.2 LR(0) DFA

TINY





mini-c


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION . | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return . | return EXPRESSION .
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
错误报告
是否为SLR(1)：
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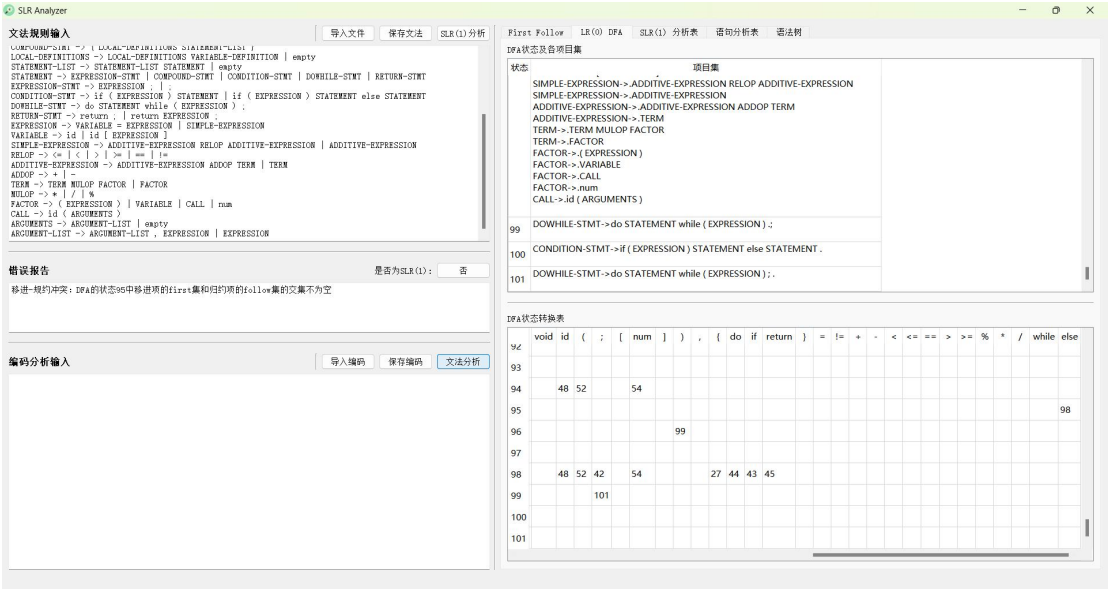
编码分析输入
导入编码
保存编码
文法分析
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
DFA状态及各项目集
状态
项目集
0
PROGRAM->.DEFINITION-LIST
DEFINITION-LIST->.DEFINITION-LIST DEFINITION
DEFINITION-LIST->.DEFINITION
DEFINITION->.VARIABLE-DEFINITION
DEFINITION->.FUNCTION-DEFINITION
VARIABLE-DEFINITION->.TYPE-INDICATOR id ;
VARIABLE-DEFINITION->.TYPE-INDICATOR id [num];
FUNCTION-DEFINITION->.TYPE-INDICATOR id (PARAMETERS) COMPOUND-STMT
TYPE-INDICATOR->.int
TYPE-INDICATOR->.float
TYPE-INDICATOR->.double
TYPE-INDICATOR->.void
PROGRAM->DEFINITION-LIST .
DEFINITION-LIST->DEFINITION-LIST .DEFINITION
DEFINITION->.VARIABLE-DEFINITION
DEFINITION->.FUNCTION-DEFINITION
VARIABLE-DEFINITION->.TYPE-INDICATOR id ;
DFA状态转换表
ADDITIVE-EXPRESSION
ADDOP
ARGUMENT-LIST
ARGUMENTS
CALL
COMPOUND-STMT
CONDITION-STMT
DEFINITION
0
2
1
10


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION . | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return . | return EXPRESSION .
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
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导入编码
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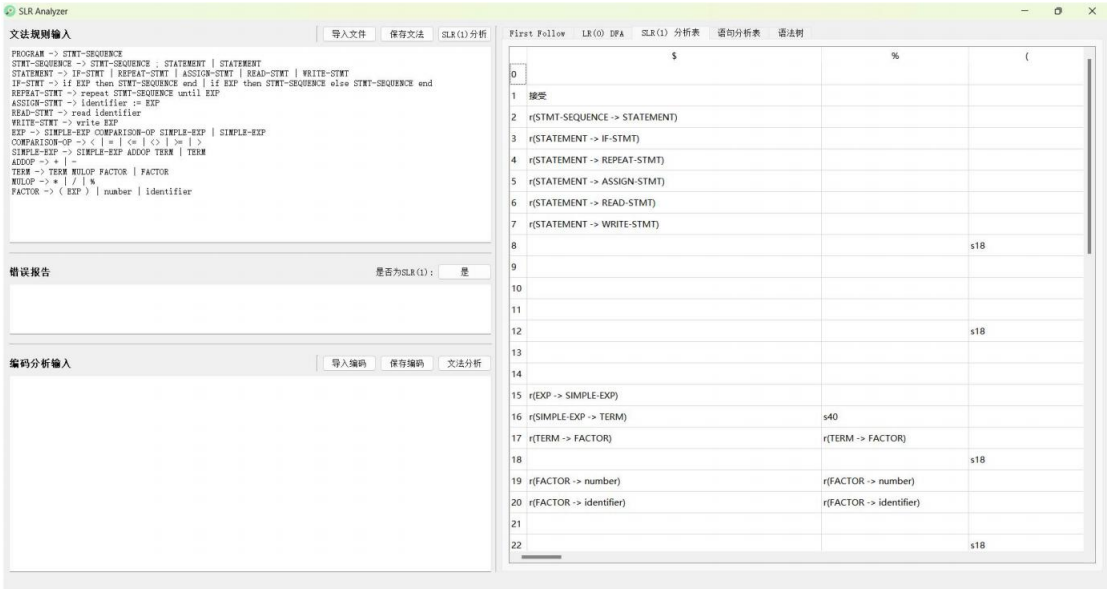
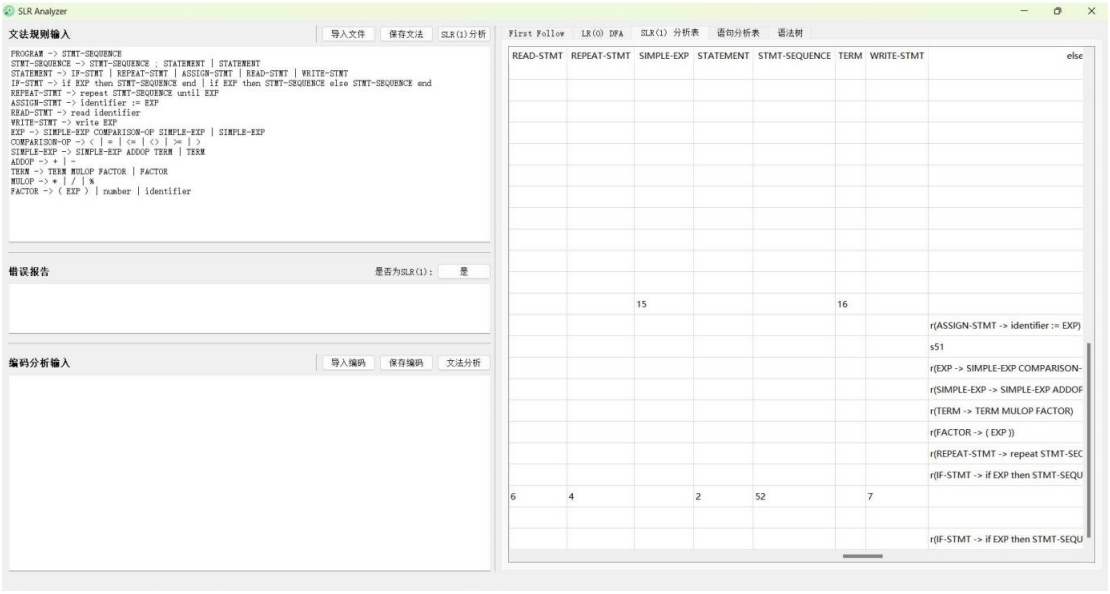
文法分析
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
DFA状态及各项目集
状态
项目集
99
DOWHILE-STMT->do STATEMENT while (EXPRESSION) .;
100
CONDITION-STMT->if (EXPRESSION) STATEMENT else STATEMENT .
101
DOWHILE-STMT->do STATEMENT while (EXPRESSION) ; .
DFA状态转换表
状态
void
id
(
;
[
num
]
)
,
{
do
if
return
}
=
!=
+
-
<
<=
==
>
>=
%
*
/
while
else
93
94
48
52
54
95
98
96
99
97
98
48
52
42
54
27
44
43
45
99
101
100
101

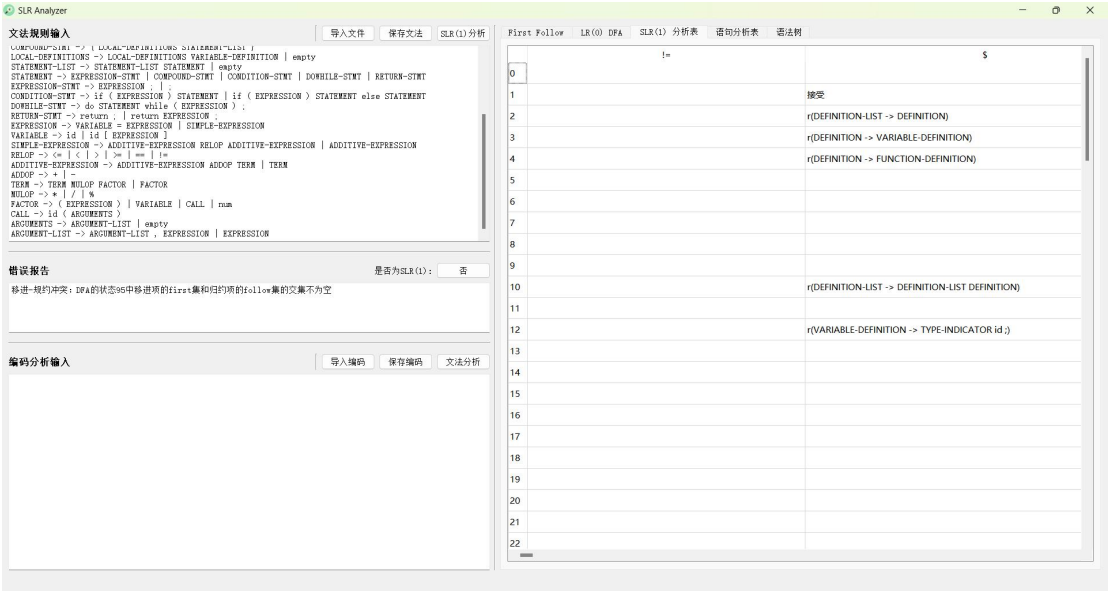
4.3 SLR(1)分析表

TINY





mini-c


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION ; | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return ; | return EXPRESSION ;
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
错误报告
是否为SLR(1)：
否
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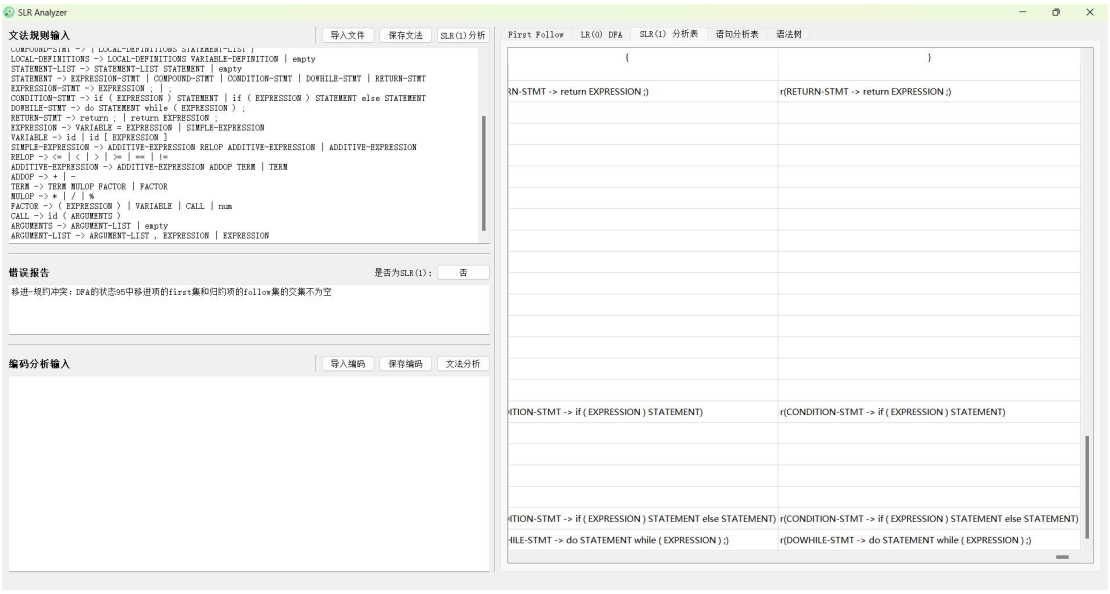
编码分析输入
导入编码
保存编码
文法分析
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
!=
$
0
1
接受
2
r(DEFINITION-LIST -> DEFINITION)
3
r(DEFINITION -> VARIABLE-DEFINITION)
4
r(DEFINITION -> FUNCTION-DEFINITION)
5
6
7
8
9
10
r(DEFINITION-LIST -> DEFINITION-LIST DEFINITION)
11
12
r(VARIABLE-DEFINITION -> TYPE-INDICATOR id ;)
13
14
15
16
17
18
19
20
21
22


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION ; | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return ; | return EXPRESSION ;
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
错误报告
是否为SLR(1)：
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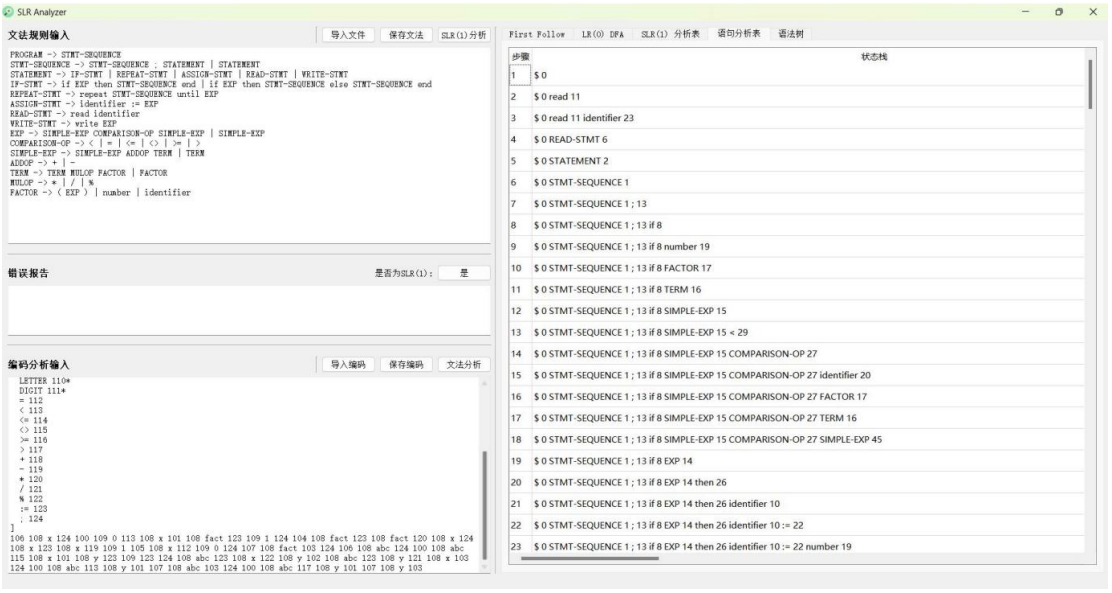
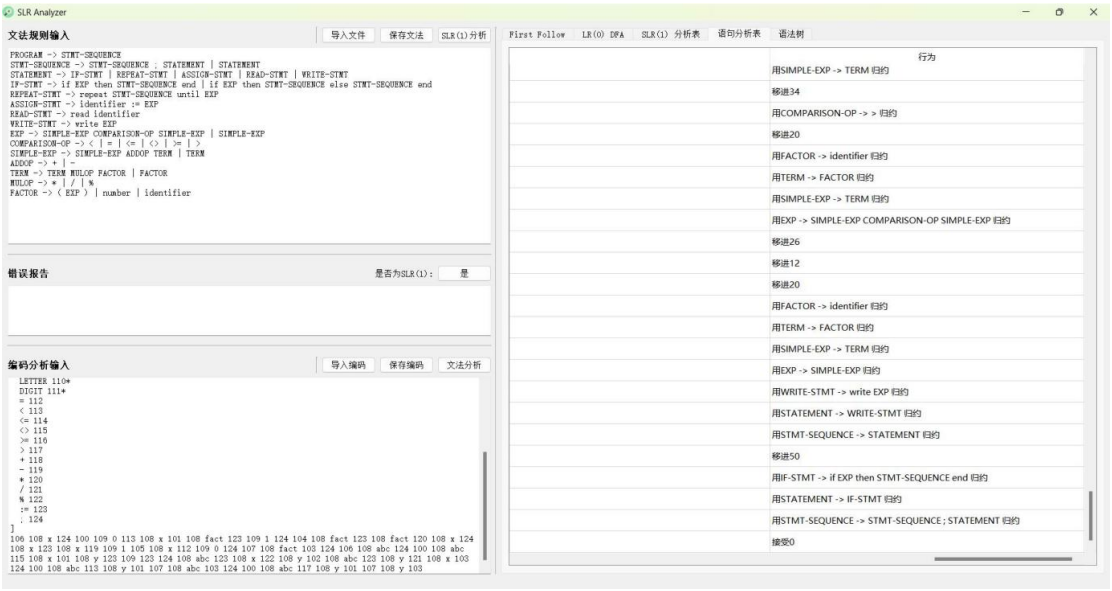
编码分析输入
导入编码
保存编码
文法分析
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
{
}
RN-STMT -> return EXPRESSION ;)
r(RETURN-STMT -> return EXPRESSION ;)
ITION-STMT -> if (EXPRESSION) STATEMENT)
r(CONDITION-STMT -> if (EXPRESSION) STATEMENT)
ITION-STMT -> if (EXPRESSION) STATEMENT else STATEMENT)
r(CONDITION-STMT -> if (EXPRESSION) STATEMENT else STATEMENT)
HILE-STMT -> do STATEMENT while (EXPRESSION) ;)
r(DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;)

4.4 语句分析表

TINY





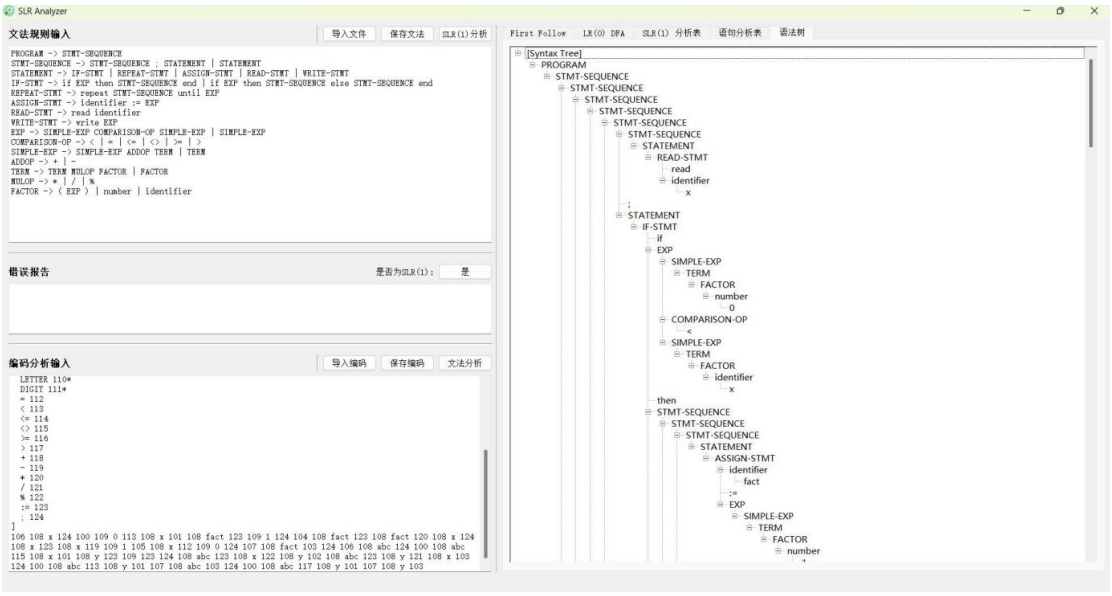
mini-c

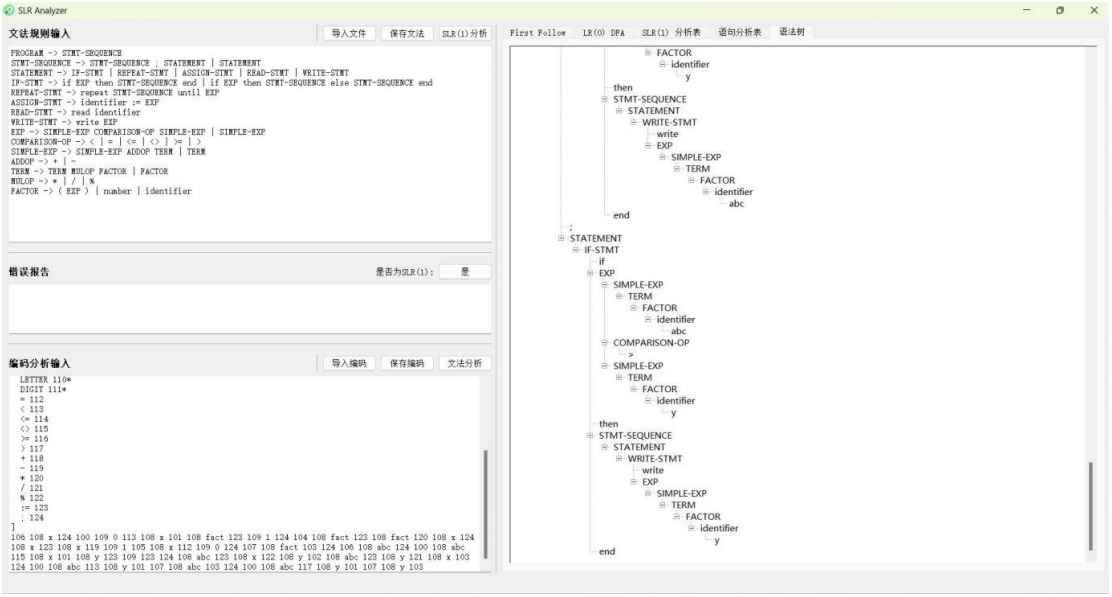

SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
COMPOUND-STMT -> { LOCAL-DEFINITIONS STATEMENT-LIST }
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION ; | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return ; | return EXPRESSION ;
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
错误报告
是否为SLR(1)：
否
移进-规约冲突：DFA的状态95中移进项的first集和归约项的follow集的交集不为空
编码分析输入
导入编码
保存编码
文法分析
+ 122
- 123
= 124
; 125
, 126
(127
) 128
[129
] 130
{ 131
} 132
102 109 number 125 104 109 result 125 103 109 arr 129 110 10 130 125 102 109 factorial 127 102 109 n 126 102 109 a 129 130 128 131 102 109 _ts01a 125 109 _ts01a 124 110 3.14 125 109 a 124 109 arr 125 101 127 109 a 129 110 0 130 116 110 3.2 128 131 109 a 129 110 0 130 124 110 5 121 110 1 125 132 107 131 109 _ts01a 124 109 result 119 109 n 125 109 n 124 109 n 123 110 1 125 132 108 127 109 n 118 110 1 128 125 105 109 _ts01a 125 132 102 109 main 127 106 128 131 109 number 124 110 5 125 109 result 124 109 factorial 127 109 number 128 125 109 arr 129 110 1 130 124 109 arr 129 110 3 120 127 110 1 122 110 2 128 130 125 101 127 109 result 113 110 100 128 131 105 110 1 125 132 100 131 105 110 1.234 125 132 132
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
步骤
状态
1 $ 0
2 $ 0 int 6
3 $ 0 TYPE-INDICATOR 5
4 $ 0 TYPE-INDICATOR 5 id 11
5 $ 0 TYPE-INDICATOR 5 id 11 ; 12
6 $ 0 VARIABLE-DEFINITION 3
7 $ 0 DEFINITION 2
8 $ 0 DEFINITION-LIST 1
9 $ 0 DEFINITION-LIST 1 double 8
10 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5
11 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5 id 11
12 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5 id 11 ; 12
13 $ 0 DEFINITION-LIST 1 VARIABLE-DEFINITION 3
14 $ 0 DEFINITION-LIST 1 DEFINITION 10
15 $ 0 DEFINITION-LIST 1
16 $ 0 DEFINITION-LIST 1 float 7
17 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5
18 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5 id 11
19 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5 id 11 [13
20 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5 id 11 [13 num 15
21 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5 id 11 [13 num 15] 21
22 $ 0 DEFINITION-LIST 1 TYPE-INDICATOR 5 id 11 [13 num 15] 21 ; 25
23 $ 0 DEFINITION-LIST 1 VARIABLE-DEFINITION 3


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
COMPOUND-STMT -> { LOCAL-DEFINITIONS STATEMENT-LIST }
LOCAL-DEFINITIONS -> LOCAL-DEFINITIONS VARIABLE-DEFINITION | empty
STATEMENT-LIST -> STATEMENT-LIST STATEMENT | empty
STATEMENT -> EXPRESSION-STMT | COMPOUND-STMT | CONDITION-STMT | DOWHILE-STMT | RETURN-STMT
EXPRESSION-STMT -> EXPRESSION ; | ;
CONDITION-STMT -> if (EXPRESSION) STATEMENT | if (EXPRESSION) STATEMENT else STATEMENT
DOWHILE-STMT -> do STATEMENT while (EXPRESSION) ;
RETURN-STMT -> return ; | return EXPRESSION ;
EXPRESSION -> VARIABLE = EXPRESSION | SIMPLE-EXPRESSION
VARIABLE -> id | id [EXPRESSION]
SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION RELOP ADDITIVE-EXPRESSION | ADDITIVE-EXPRESSION
RELOP -> <= | < | > | >= | == | !=
ADDITIVE-EXPRESSION -> ADDITIVE-EXPRESSION ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXPRESSION) | VARIABLE | CALL | num
CALL -> id (ARGUMENTS)
ARGUMENTS -> ARGUMENT-LIST | empty
ARGUMENT-LIST -> ARGUMENT-LIST , EXPRESSION | EXPRESSION
错误报告
是否为SLR(1)：
否
移进-规约冲突：DFA的状态95中移进项的first集和归约项的follow集的交集不为空
编码分析输入
导入编码
保存编码
文法分析
+ 122
- 123
= 124
; 125
, 126
(127
) 128
[129
] 130
{ 131
} 132
102 109 number 125 104 109 result 125 103 109 arr 129 110 10 130 125 102 109 factorial 127 102 109 n 126 102 109 a 129 130 128 131 102 109 _ts01a 125 109 _ts01a 124 110 3.14 125 109 a 124 109 arr 125 101 127 109 a 129 110 0 130 116 110 3.2 128 131 109 a 129 110 0 130 124 110 5 121 110 1 125 132 107 131 109 _ts01a 124 109 result 119 109 n 125 109 n 124 109 n 123 110 1 125 132 108 127 109 n 118 110 1 128 125 105 109 _ts01a 125 132 102 109 main 127 106 128 131 109 number 124 110 5 125 109 result 124 109 factorial 127 109 number 128 125 109 arr 129 110 1 130 124 109 arr 129 110 3 120 127 110 1 122 110 2 128 130 125 101 127 109 result 113 110 100 128 131 105 110 1 125 132 100 131 105 110 1.234 125 132 132
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
行为
移进45
移进54
用FACTOR -> num 归约
用TERM -> FACTOR 归约
用ADDITIVE-EXPRESSION -> TERM 归约
用SIMPLE-EXPRESSION -> ADDITIVE-EXPRESSION 归约
用EXPRESSION -> SIMPLE-EXPRESSION 归约
移进80
用RETURN-STMT -> return EXPRESSION ; 归约
用STATEMENT -> RETURN-STMT 归约
用STATEMENT-LIST -> STATEMENT-LIST STATEMENT 归约
移进34
用COMPOUND-STMT -> { LOCAL-DEFINITIONS STATEMENT-LIST } 归约
用STATEMENT -> COMPOUND-STMT 归约
用CONDITION-STMT -> if (EXPRESSION) STATEMENT else STATEMENT 归约
用STATEMENT -> CONDITION-STMT 归约
用STATEMENT-LIST -> STATEMENT-LIST STATEMENT 归约
移进34
用COMPOUND-STMT -> { LOCAL-DEFINITIONS STATEMENT-LIST } 归约
用FUNCTION-DEFINITION -> TYPE-INDICATOR id (PARAMETERS) COMPOUND-STMT 归约
用DEFINITION -> FUNCTION-DEFINITION 归约
用DEFINITION-LIST -> DEFINITION-LIST DEFINITION 归约
接受0

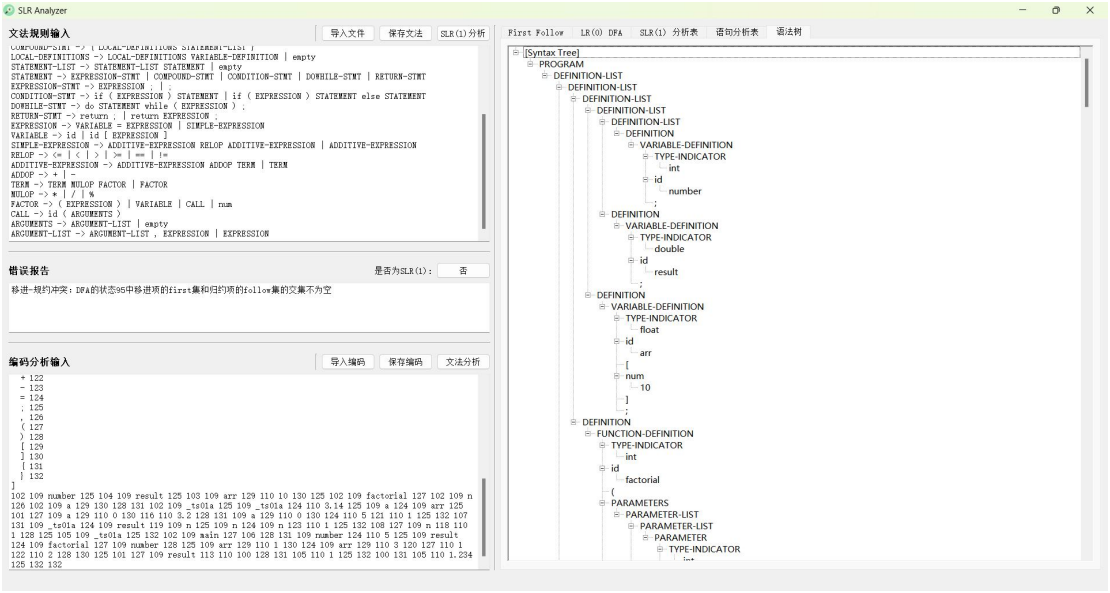
4.5 语法树

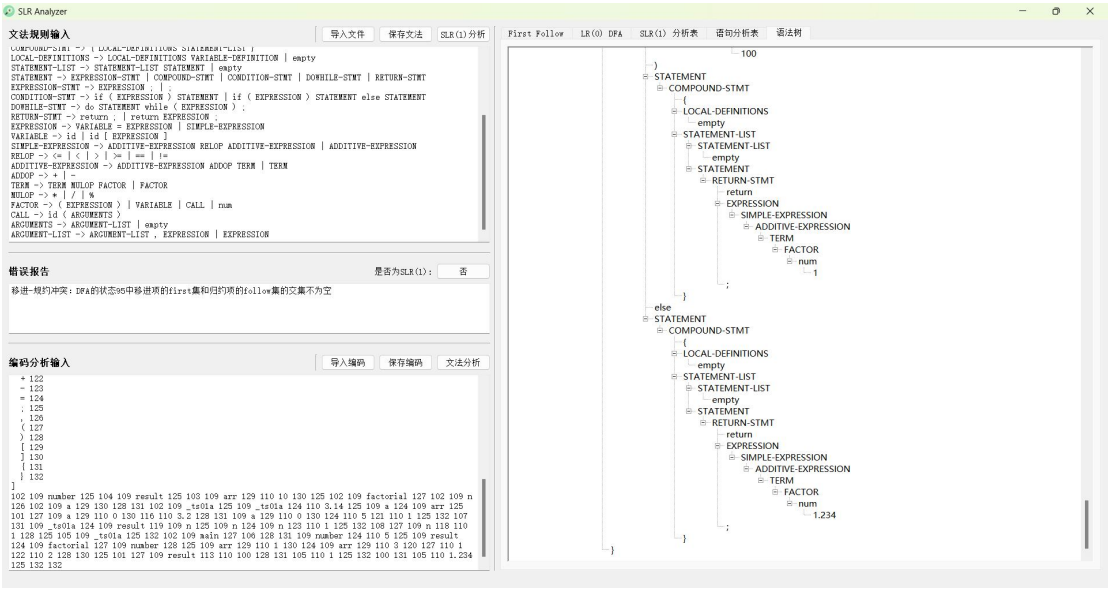
TINY


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
PROGRAM -> STMT-SEQUENCE
STMT-SEQUENCE -> STMT-SEQUENCE ; STATEMENT | STATEMENT
STATEMENT -> IF-STMT | REPEAT-STMT | ASSIGN-STMT | READ-STMT | WRITE-STMT
IF-STMT -> if EXP then STMT-SEQUENCE end | if EXP then STMT-SEQUENCE else STMT-SEQUENCE end
REPEAT-STMT -> repeat STMT-SEQUENCE until EXP
ASSIGN-STMT -> identifier := EXP
READ-STMT -> read identifier
WRITE-STMT -> write EXP
EXP -> SIMPLE-EXP COMPARISON-OP SIMPLE-EXP | SIMPLE-EXP
COMPARISON-OP -> < | = | <= | <> | >= | >
SIMPLE-EXP -> SIMPLE-EXP ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXP) | number | identifier
错误报告
是否为SLR(1):
是
编码分析输入
导入编码
保存编码
文法分析
LETTER 110*
DIGIT 111*
= 112
< 113
<= 114
<> 115
>= 116
> 117
+ 118
- 119
* 120
/ 121
% 122
:= 123
. 124
]
106 108 x 124 100 109 0 113 108 x 101 108 fact 123 109 1 124 104 108 fact 123 108 fact 120 108 x 124
108 x 123 108 x 119 109 1 105 108 x 112 109 0 124 107 108 fact 103 124 106 108 abc 124 100 108 abc
115 108 x 101 108 y 123 109 123 124 108 abc 123 108 x 122 108 y 102 108 abc 123 108 y 121 108 x 103
124 100 108 abc 113 108 y 101 107 108 abc 103 124 100 108 abc 117 108 y 101 107 108 y 103
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
[Syntax Tree]
PROGRAM
STMT-SEQUENCE
STMT-SEQUENCE
STMT-SEQUENCE
STMT-SEQUENCE
STMT-SEQUENCE
STMT-SEQUENCE
STATEMENT
READ-STMT
read
identifier
x
;
STATEMENT
IF-STMT
if
EXP
SIMPLE-EXP
TERM
FACTOR
number
0
COMPARISON-OP
<
SIMPLE-EXP
TERM
FACTOR
identifier
x
then
STMT-SEQUENCE
STMT-SEQUENCE
STMT-SEQUENCE
STATEMENT
ASSIGN-STMT
identifier
fact
:=
EXP
SIMPLE-EXP
TERM
FACTOR
number


SLR Analyzer
文法规则输入
导入文件
保存文法
SLR(1)分析
PROGRAM -> STMT-SEQUENCE
STMT-SEQUENCE -> STMT-SEQUENCE ; STATEMENT | STATEMENT
STATEMENT -> IF-STMT | REPEAT-STMT | ASSIGN-STMT | READ-STMT | WRITE-STMT
IF-STMT -> if EXP then STMT-SEQUENCE end | if EXP then STMT-SEQUENCE else STMT-SEQUENCE end
REPEAT-STMT -> repeat STMT-SEQUENCE until EXP
ASSIGN-STMT -> identifier := EXP
READ-STMT -> read identifier
WRITE-STMT -> write EXP
EXP -> SIMPLE-EXP COMPARISON-OP SIMPLE-EXP | SIMPLE-EXP
COMPARISON-OP -> < | = | <= | <> | >= | >
SIMPLE-EXP -> SIMPLE-EXP ADDOP TERM | TERM
ADDOP -> + | -
TERM -> TERM MULOP FACTOR | FACTOR
MULOP -> * | / | %
FACTOR -> (EXP) | number | identifier
错误报告
是否为SLR(1):
是
编码分析输入
导入编码
保存编码
文法分析
LETTER 110*
DIGIT 111*
= 112
< 113
<= 114
<> 115
>= 116
> 117
+ 118
- 119
* 120
/ 121
% 122
:= 123
. 124
]
106 108 x 124 100 109 0 113 108 x 101 108 fact 123 109 1 124 104 108 fact 123 108 fact 120 108 x 124
108 x 123 108 x 119 109 1 105 108 x 112 109 0 124 107 108 fact 103 124 106 108 abc 124 100 108 abc
115 108 x 101 108 y 123 109 123 124 108 abc 123 108 x 122 108 y 102 108 abc 123 108 y 121 108 x 103
124 100 108 abc 113 108 y 101 107 108 abc 103 124 100 108 abc 117 108 y 101 107 108 y 103
First Follow
LR(0) DFA
SLR(1) 分析表
语句分析表
语法树
FACTOR
identifier
y
then
STMT-SEQUENCE
STATEMENT
WRITE-STMT
write
EXP
SIMPLE-EXP
TERM
FACTOR
identifier
abc
end
;
STATEMENT
IF-STMT
if
EXP
SIMPLE-EXP
TERM
FACTOR
identifier
abc
COMPARISON-OP
>
SIMPLE-EXP
TERM
FACTOR
identifier
y
then
STMT-SEQUENCE
STATEMENT
WRITE-STMT
write
EXP
SIMPLE-EXP
TERM
FACTOR
identifier
y
end

mini-c





五、评价

5.1 软件能力

该软件能够对多种编程语言的文法进行语法分析，并生成相应的分析信息；能够根据单词编码，生成分析表和相应的语法树。

5.2 缺陷与限制

该软件的缺陷之一在于对输入的规范与否的检查并不严格，若输入的文法和编码不符合规范，软件可能不会提示错误信息，而是继续执行分析过程，这可能导致软件中断运行。

5.3 建议

加强在输入时对输入内容格式的检查，并在输入有误时产生提示并中断分析。

5.4 测试结论

软件能够正确分析出 First、Follow 集，生成正确的 LR(0) DFA 状态、转换和 SLR(1)分析表；将项目一生成的单词编码输入后，能够执行正确的文法分析并生成语法树。