词法分析
(3. 手写词法分析器)

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digit	→	[0-9]
digits	→	$digit^+$
number	→	*digits* (. *digits*)? (**E** [+-]? *digits*)?
letter	→	[A-Za-z]
id	→	*letter* (*letter* | *digit*)*
if	→	`if`
then	→	`then`
else	→	`else`
relop	→	< | > | <= | >= | = | <>

digit	→	[0-9]
digits	→	*digit*$^+$
number	→	*digits* (. *digits*)? (**E** [+-]? *digits*)?
letter	→	[A-Za-z]
id	→	*letter* (*letter* | *digit*)*
if	→	if
then	→	then
else	→	else
relop	→	< | > | <= | >= | = | <>

DragonLexerGrammar.g4

识别字符串 s 中符合**某种**词法单元模式的**所有**词素

识别字符串 s 中符合**特定**词法单元模式的**前缀**词素

识别字符串 s 中符合**某种**词法单元模式的**所有**词素

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识别字符串 s 中符合**特定**词法单元模式的**前缀**词素

分支：先判断属于哪一类，然后进入特定词法单元的前缀词素匹配流程

识别字符串 s 中符合**某种**词法单元模式的**前缀**词素

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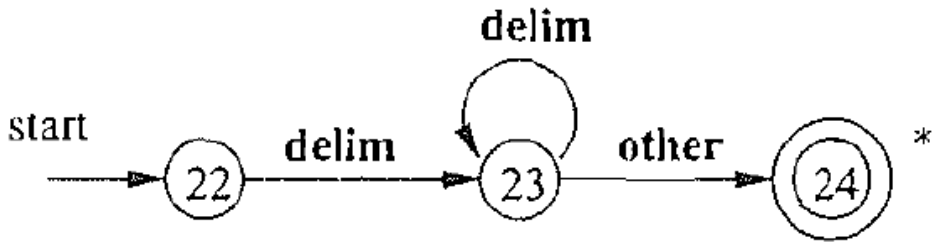
分支: 先判断属于哪一类, 然后进入特定词法单元的前缀词素匹配流程

识别字符串 s 中符合**某种**词法单元模式的**前缀**词素

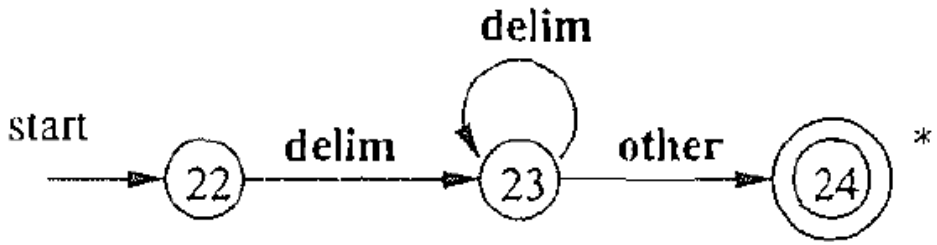
循环: 返回当前识别出来的词法单元与词素, 继续识别下一个前缀词素

识别字符串 s 中符合**某种**词法单元模式的**所有**词素

用于识别 ws 的状态转移图

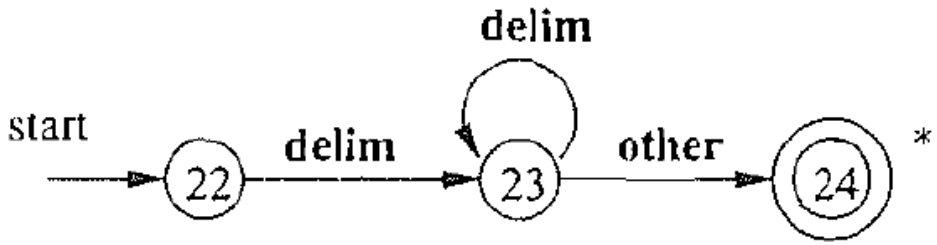


用于识别 ws 的状态转移图



*: 识别出的空白符**不包含**当前 peek 指向的字符

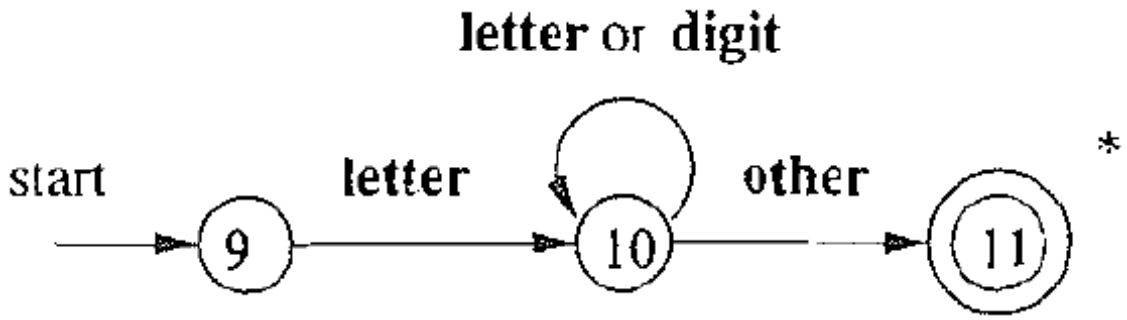
用于识别 ws 的状态转移图



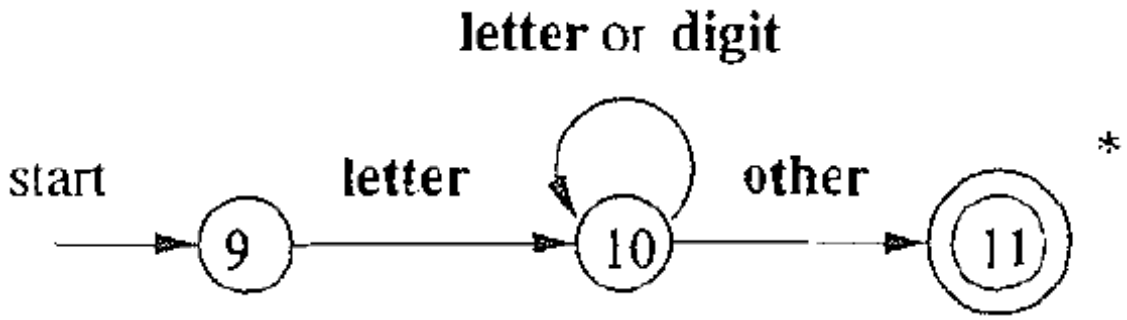
*: 识别出的空白符**不包含**当前 peek 指向的字符

22 : 碰到 other 怎么办?

用于识别 id 的状态转移图

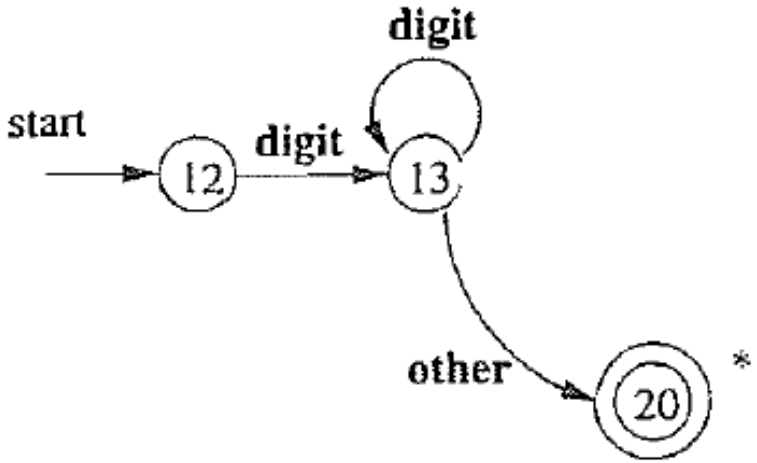


用于识别 id 的状态转移图

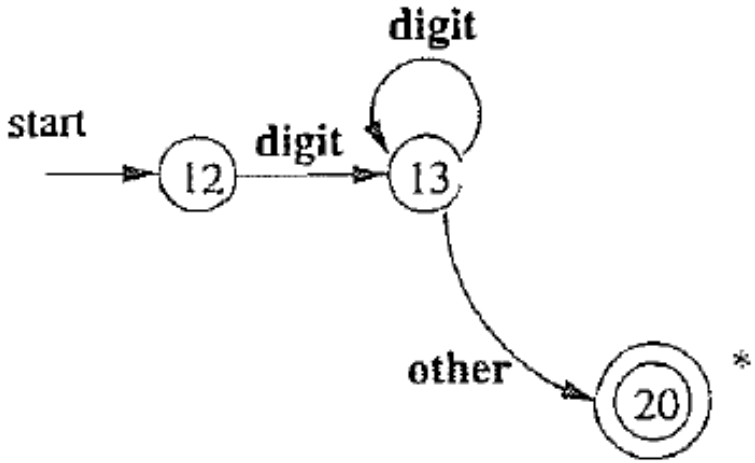


9：碰到 other 怎么办?

用于识别 int 的状态转移图

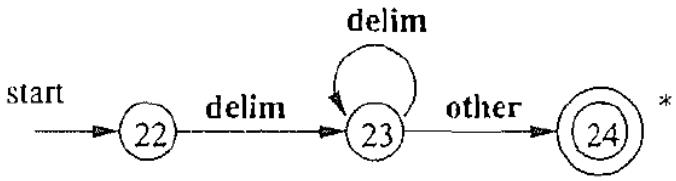


用于识别 int 的状态转移图

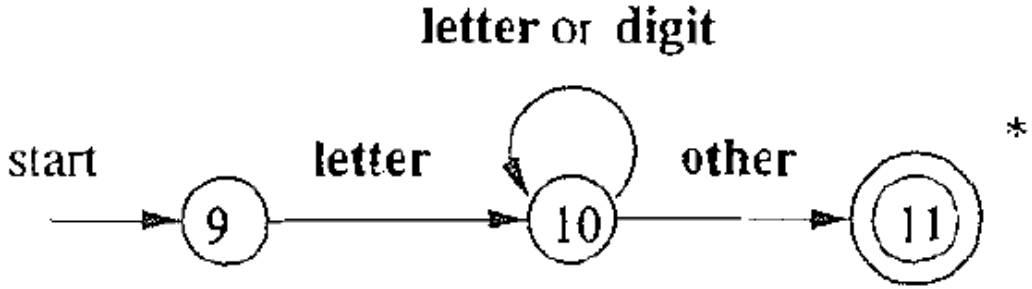


12：碰到 other 怎么办?

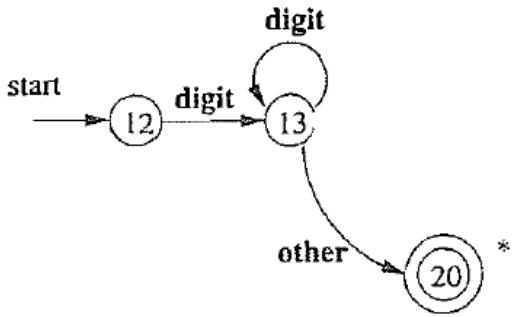
识别字符串 s 中符合**某种**词法单元模式的**前缀**词素 (nextToken())



ws: 空白符



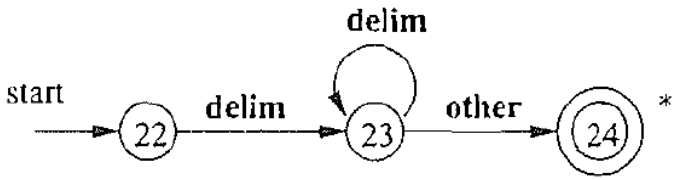
id: 标识符



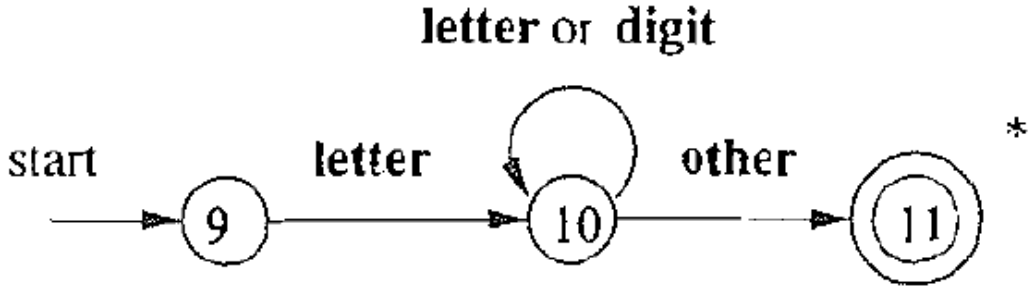
int: 整数

错误处理模块

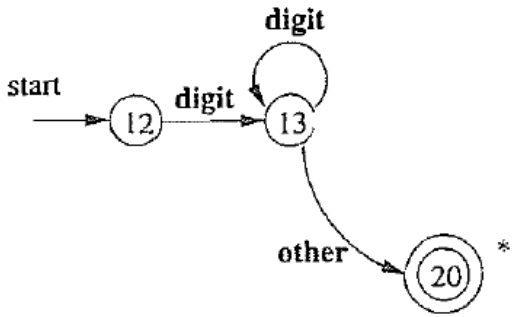
识别字符串 s 中符合**某种**词法单元模式的**前缀**词素 (nextToken())



ws: 空白符



id: 标识符



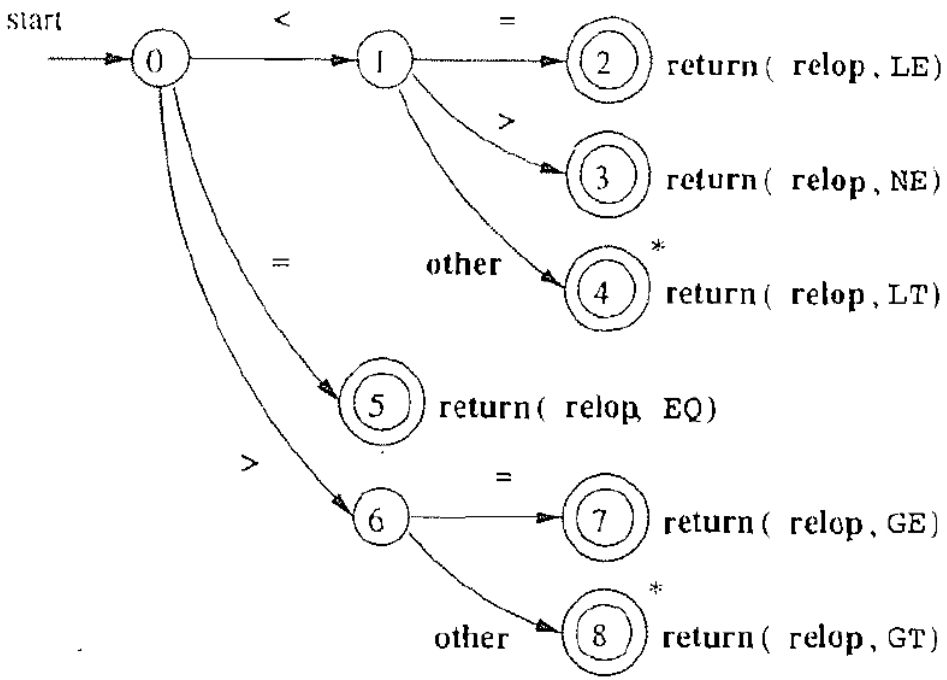
int: 整数

错误处理模块

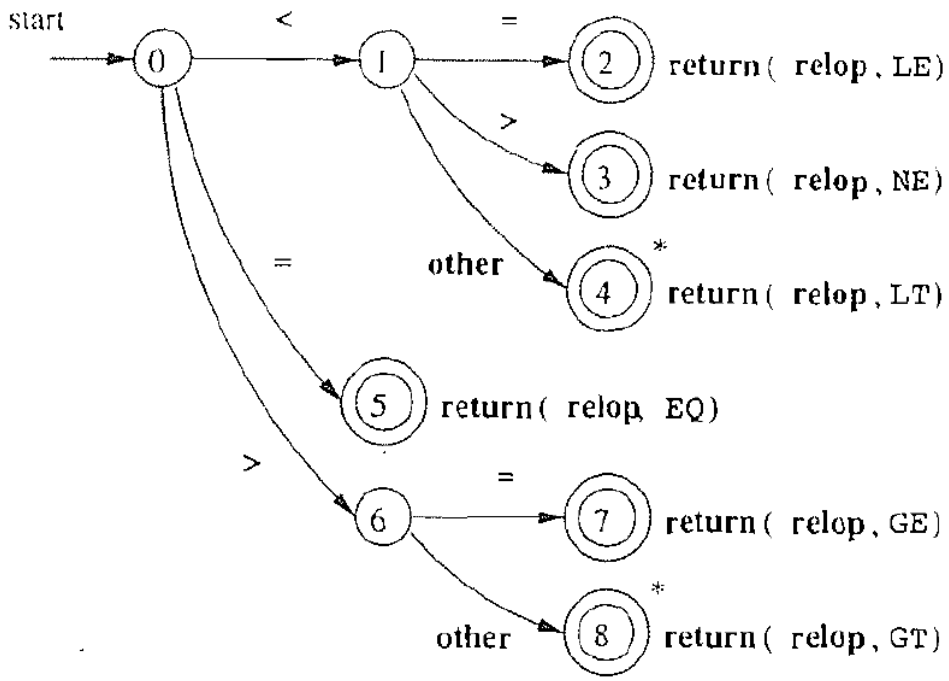
关键点: 合并 22, 12, 9, 根据**下一个字符**即可判定词法单元的类型

否则, 调用错误处理模块 (对应 `other`), 报告**该字符有误**, 并忽略该字符

用于识别 relop 的状态转移图

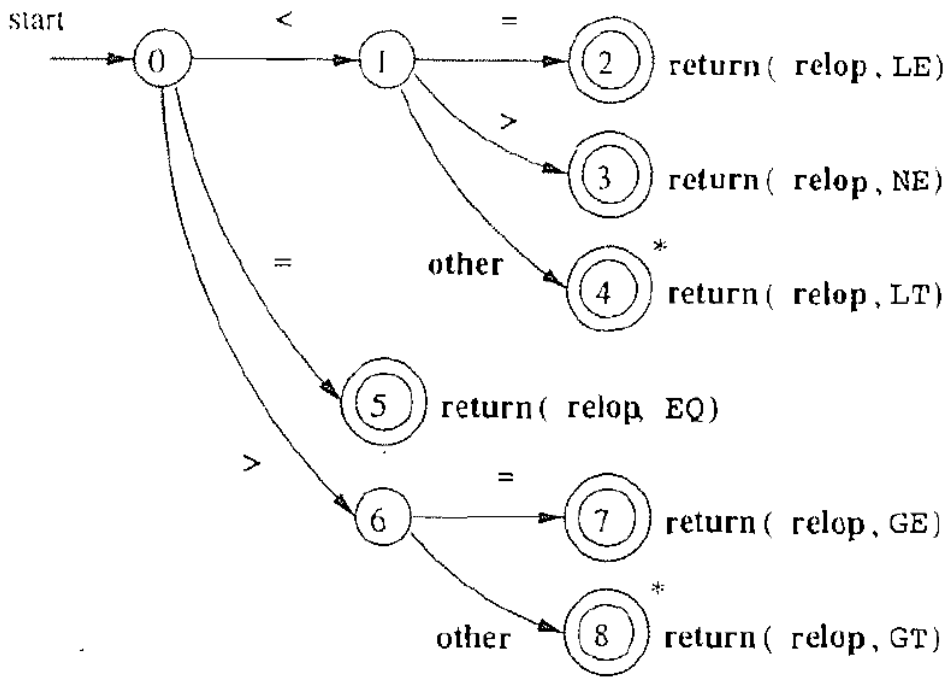


用于识别 relop 的状态转移图



“最长优先原则”: 例如, 识别出 <=, 而不是 < 与 =

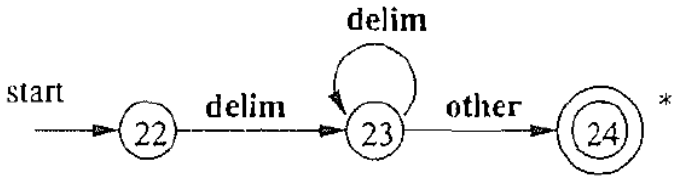
用于识别 relop 的状态转移图

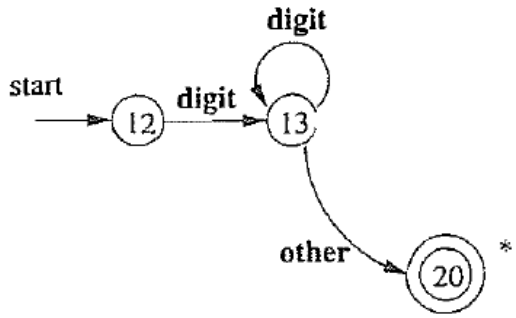


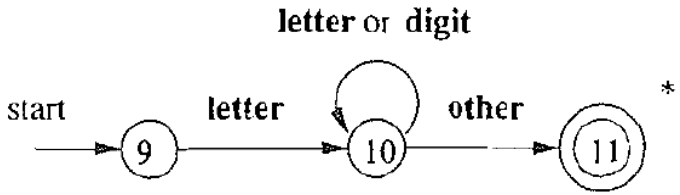
“最长优先原则”：例如，识别出 <=，而不是 < 与 =

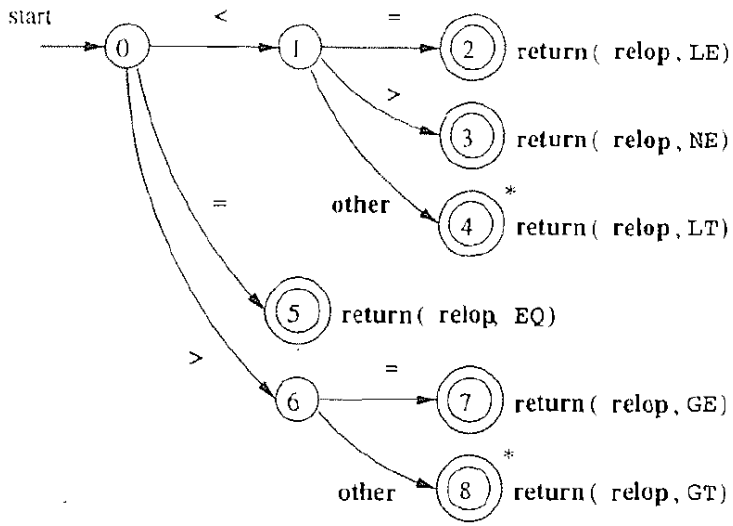
0：碰到 other 怎么办？

识别字符串 s 中符合**某种**词法单元模式的**前缀**词素 (nextToken())

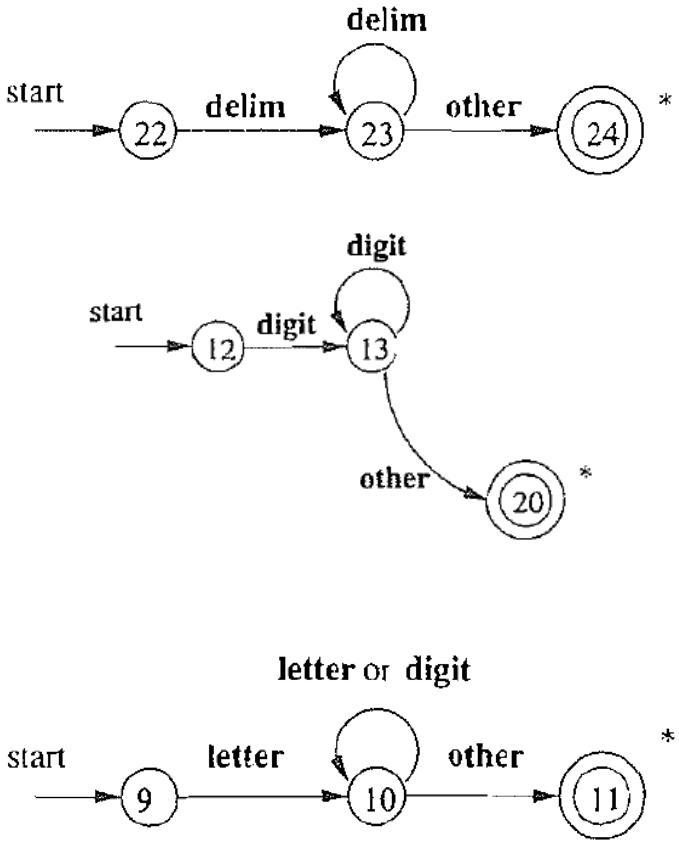


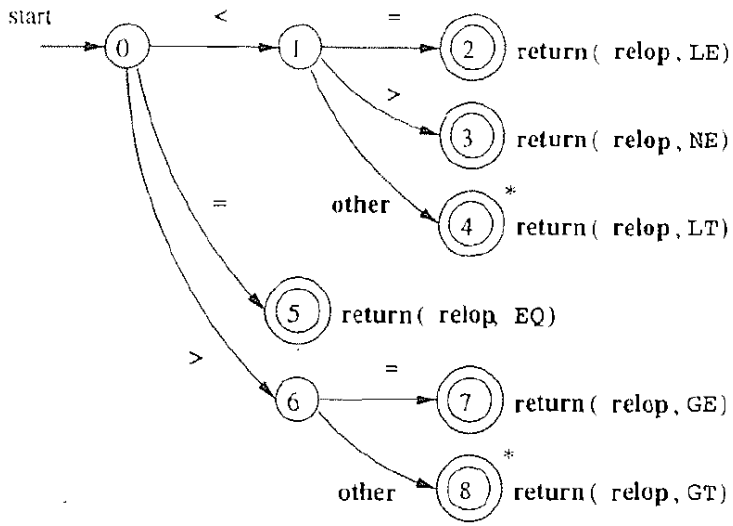






识别字符串 s 中符合**某种**词法单元模式的**前缀**词素 (nextToken())





关键点: 合并 $22, 12, 9, 0$, 根据**下一个字符**即可判定词法单元的类型

否则, 调用错误处理模块 (对应 `other`), 报告**该字符有误**, 并忽略该字符

但是, 词法分析器的设计并没有这么容易

ws　if　else　id　int　relop

根据**下一个/两个字符**即可判定词法单元的类型

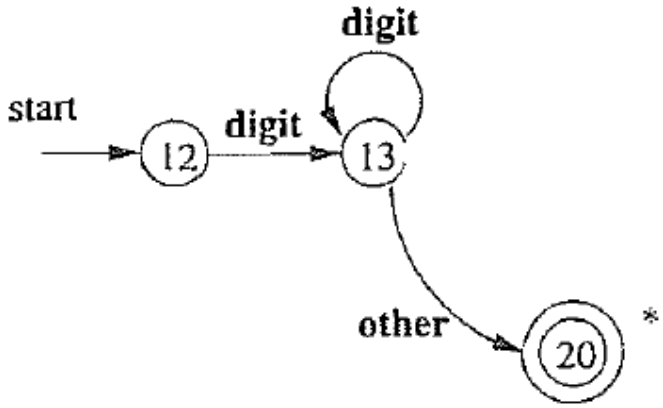
每个状态转移图的每个状态要么是**接受状态**, 要么带有 `other` **边**

ws **if** **else** **id** **int** **relop**

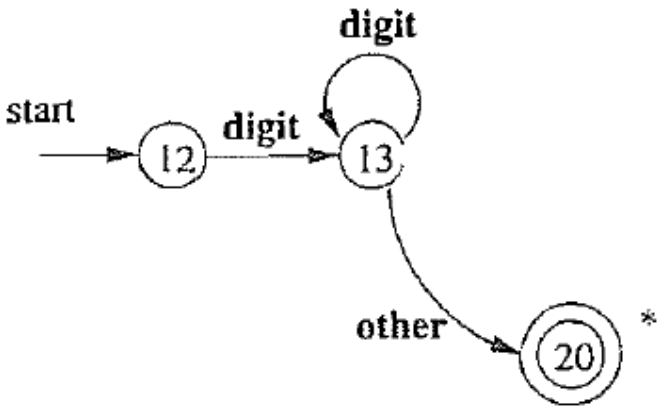
根据**下一个/两个字符**即可判定词法单元的类型

每个状态转移图的每个状态要么是**接受状态**, 要么带有 **other 边**

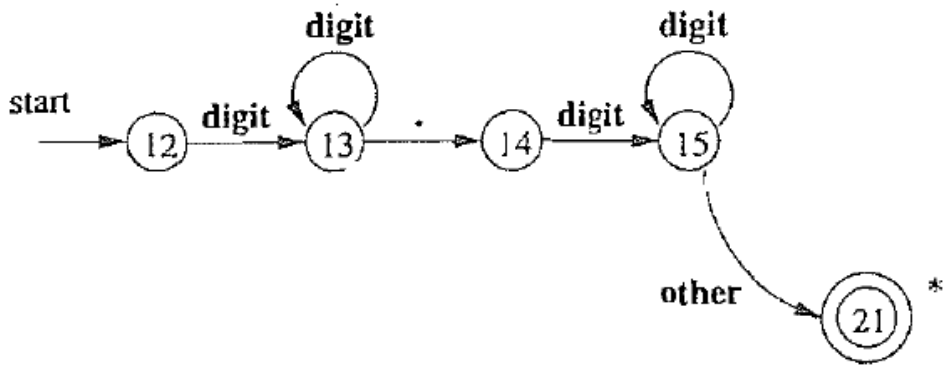
如何同时识别 **int**、**real** 与 **sci**?



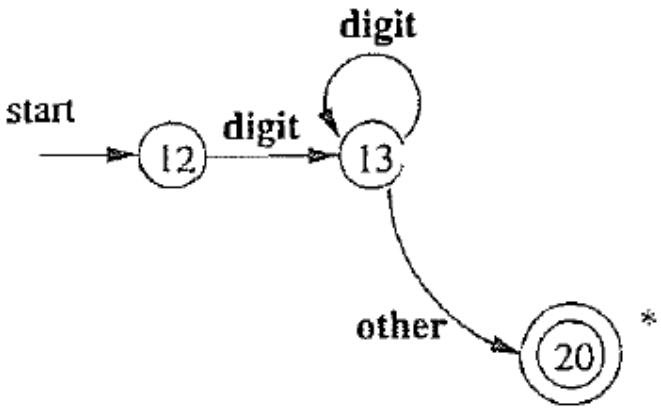
int: 整数



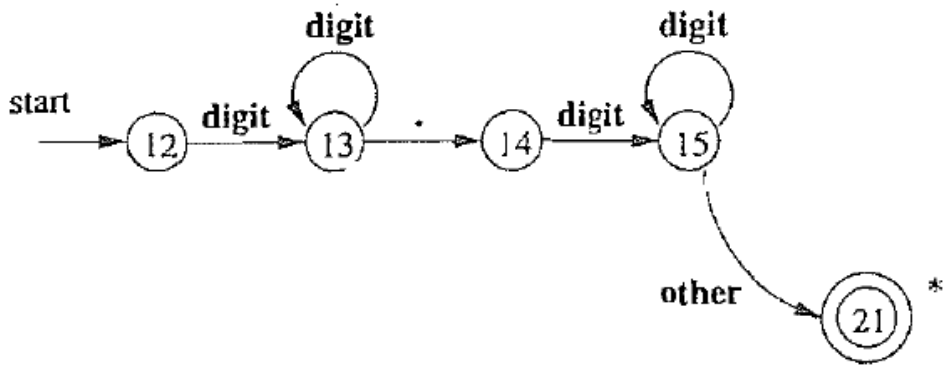
int: 整数



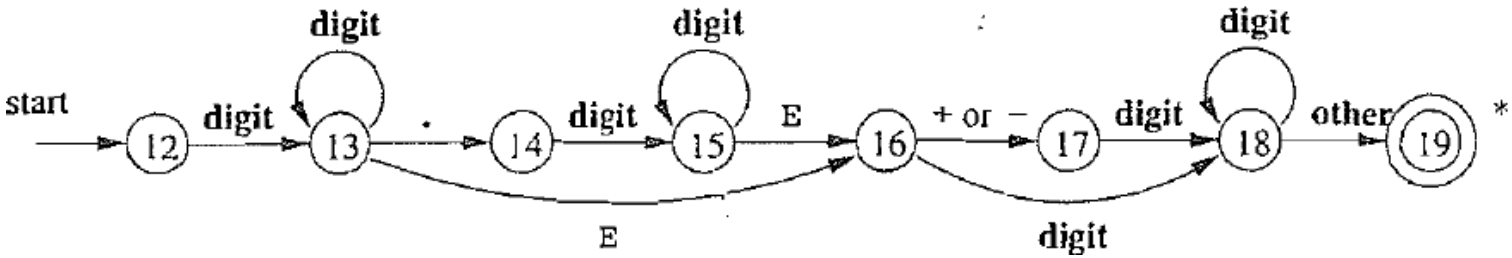
real: 浮点数 (无科学计数法)
(不识别 2.)



int: 整数



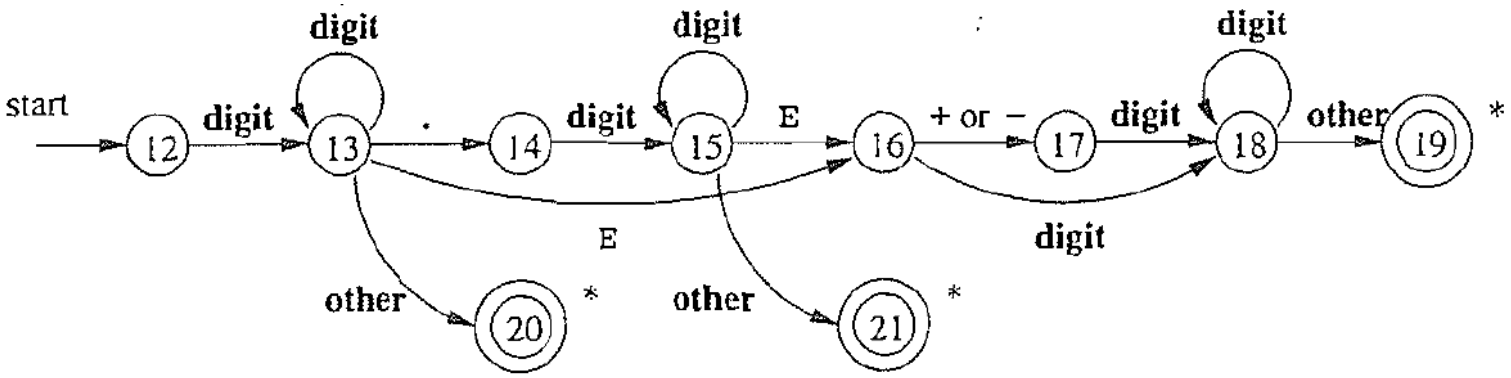
real: 浮点数 (无科学计数法)
(不识别 2.)



sci: 带科学计数法的浮点数
(2.99792458E8 3E8)

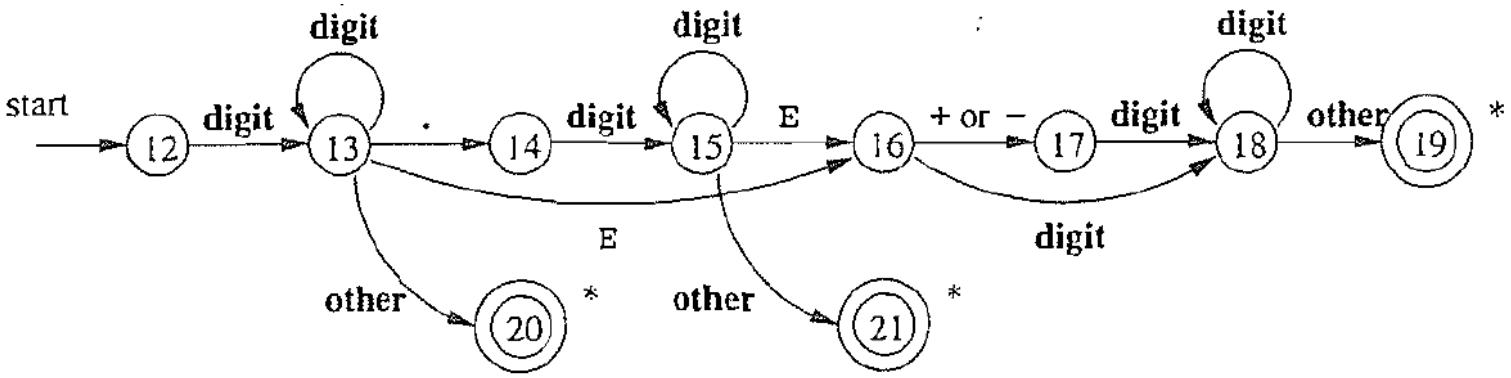
num: 整数部分[. 可选的小数部分][E[可选的 +-] 可选的指数部分]

num: 整数部分[. 可选的小数部分][E[可选的 +-] 可选的指数部分]



19, 20, 21：代表了不同的数字类型

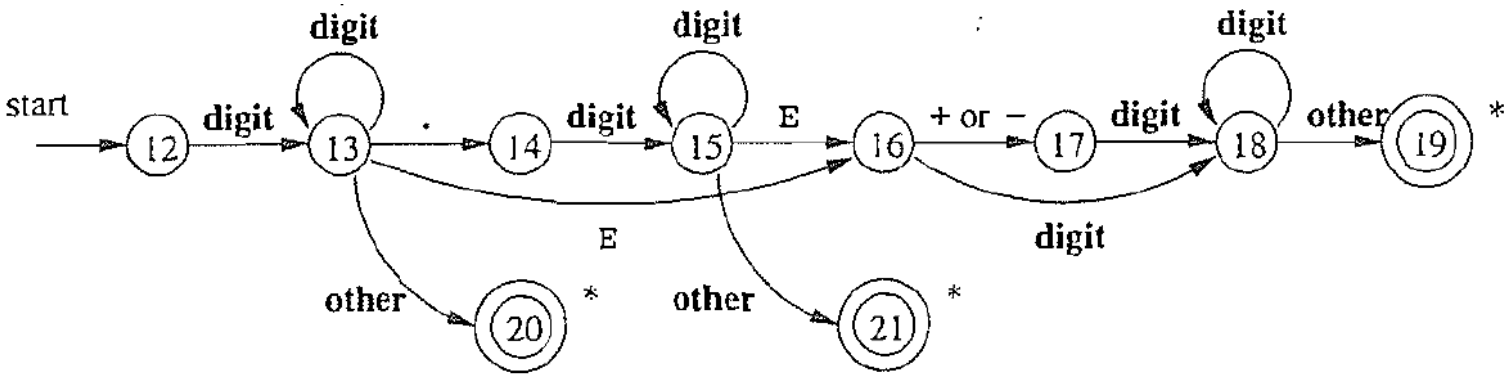
num: 整数部分[. 可选的小数部分][E[可选的 +-] 可选的指数部分]



19, 20, 21：代表了不同的数字类型

12：碰到 `other` 怎么办?

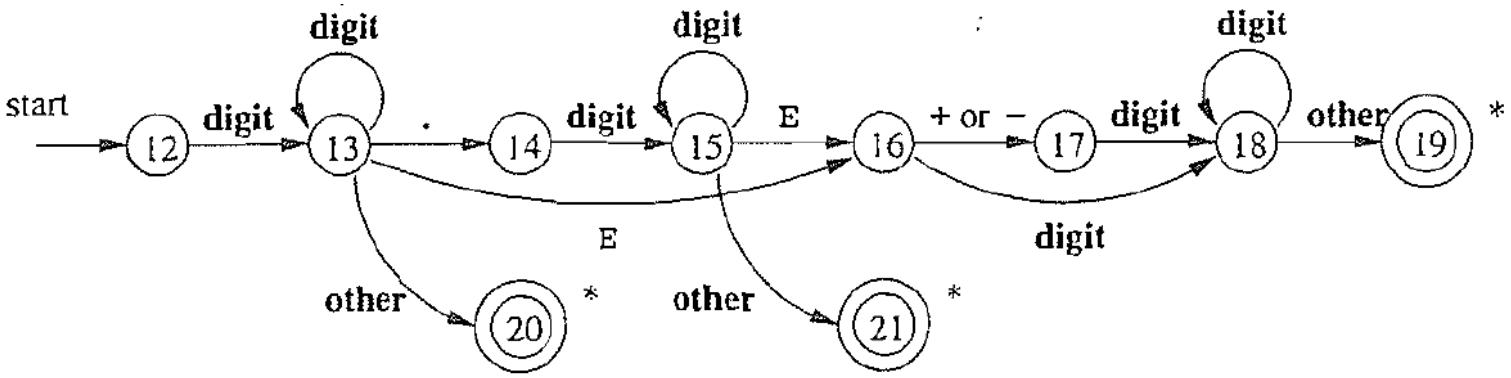
num: 整数部分[. 可选的小数部分][E[可选的 +-] 可选的指数部分]



19, 20, 21：代表了不同的数字类型

12：碰到 `other` 怎么办? (尝试其它词法单元或进入错误处理模块)

num: 整数部分[. 可选的小数部分][E[可选的 +-] 可选的指数部分]

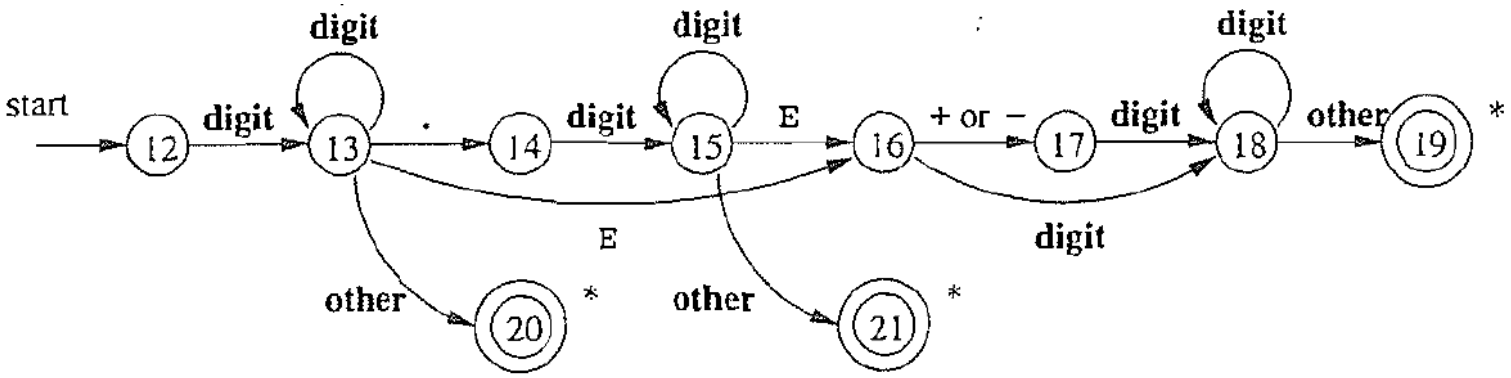


19, 20, 21 : 代表了不同的数字类型

12 : 碰到 `other` 怎么办? (尝试其它词法单元或进入错误处理模块)

14, 16, 17 : 碰到 `other` 怎么办?

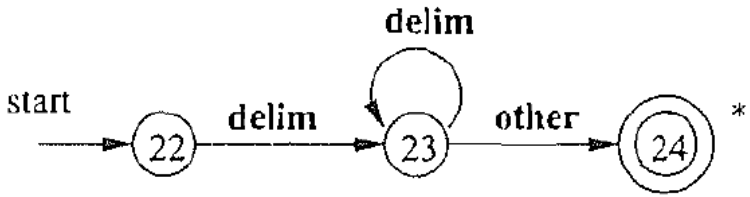
num: 整数部分[. 可选的小数部分][E[可选的 +-] 可选的指数部分]

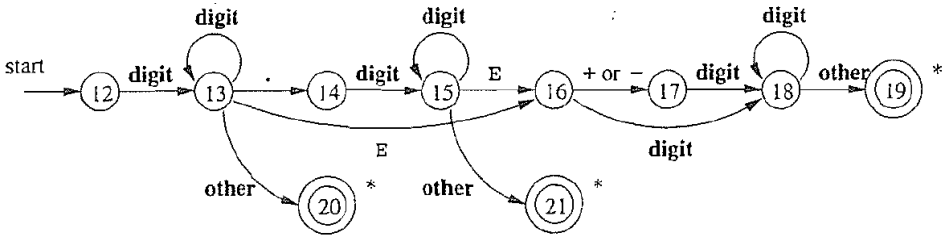


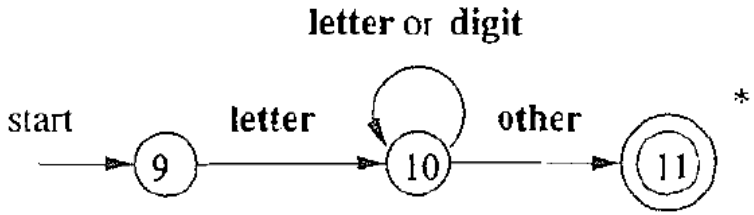
19, 20, 21 : 代表了不同的数字类型

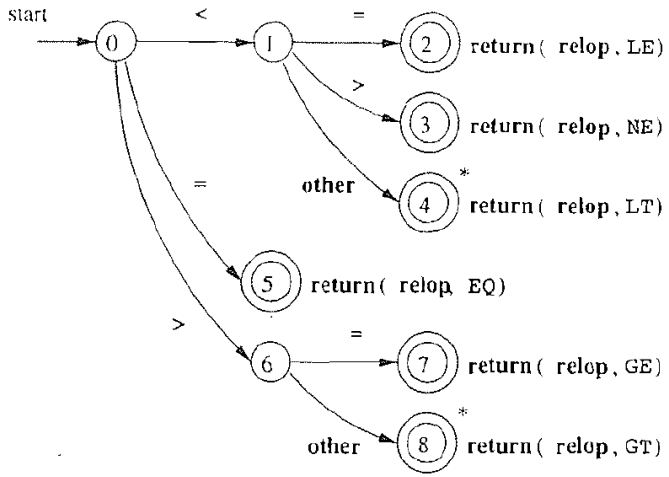
12 : 碰到 other 怎么办? (尝试其它词法单元或进入错误处理模块)

14, 16, 17 : 碰到 other 怎么办? (回退, 寻找**最长匹配**)

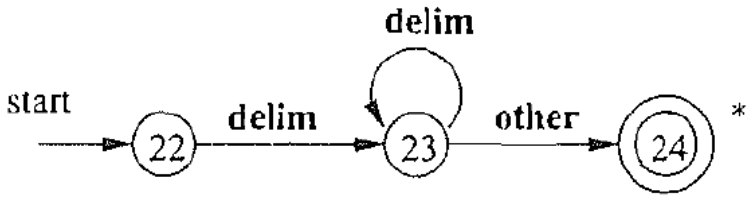

delim
start
delim
other
22
23
24
*

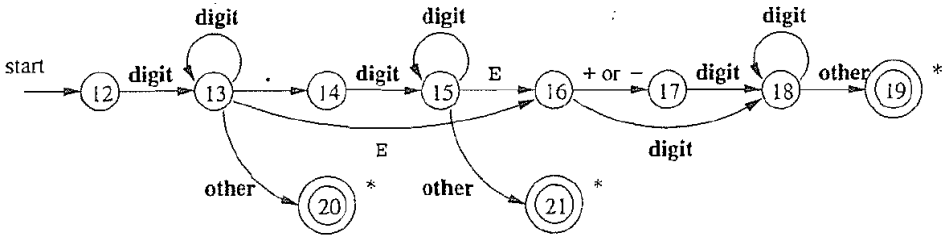

start
digit
digit
digit
digit
digit
other
.
E
+ or −
E
digit
other
other
12
13
14
15
16
17
18
19
20
21
*
*
*

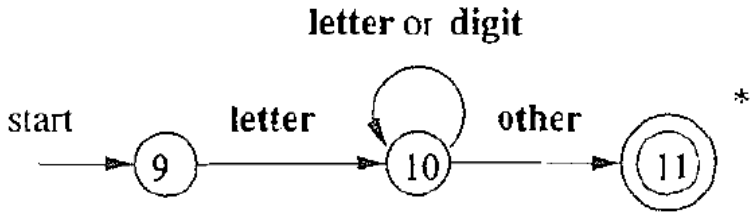

letter or digit
start
letter
other
9
10
11
*

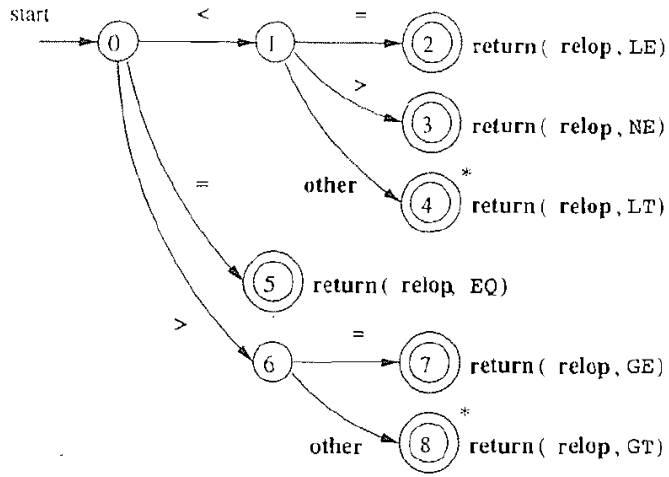

start
0
<
1
=
2
return(relop, LE)
>
3
return(relop, NE)
other
4
return(relop, LT)
=
5
return(relop, EQ)
>
6
=
7
return(relop, GE)
other
8
return(relop, GT)
*
*


ERROR







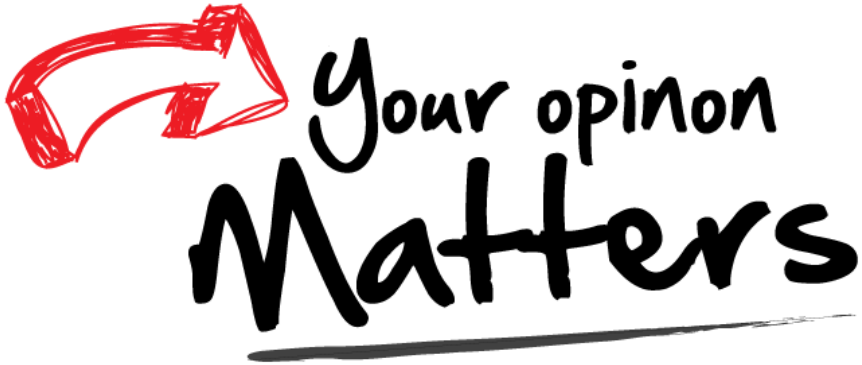


关键点: 合并 22, 12, 9, 0, 根据**下一个字符**即可判定词法单元的类型

否则, 调用错误处理模块 (对应 `other`), 报告**该字符有误**, 忽略该字符。

注意, 在 **real** 与 **sci**中, 有时需要**回退**, 寻找最长匹配。


Thank
You!



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