17-Mar-22

Experiment 8 - Computation of leading and trailing

Dhawal Patil
RA1911003010575
CSE A2

Aim:

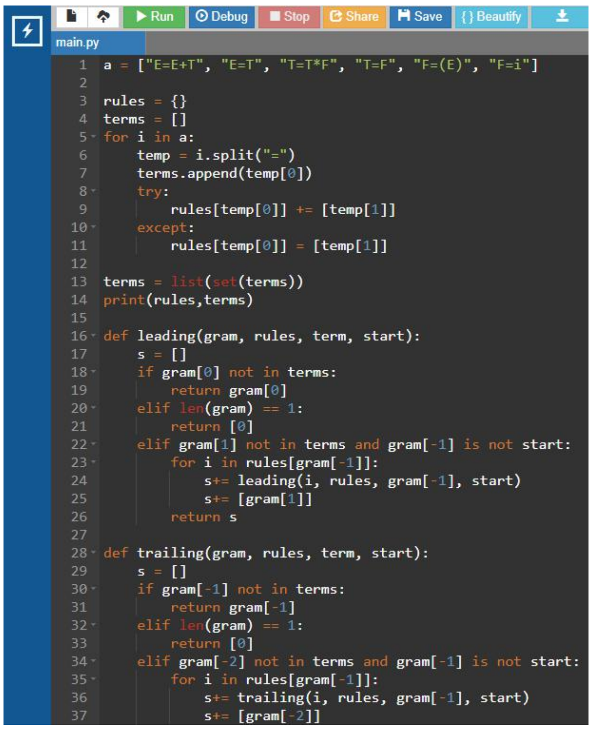
To write a program to show Computation of leading and trailing using Python language.

Algorithm:

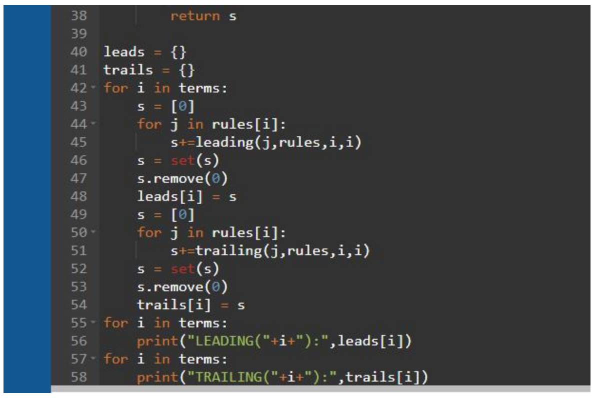
1. For Leading, check for the first non-terminal.
2. If found, print it.
3. Look for next production for the same non-terminal.
4. If not found, recursively call the procedure for the single non-terminal present before the comma or End Of Production String.
5. Include it's results in the result of this non-terminal.
6. For trailing, we compute same as leading but we start from the end of the production to the beginning.
7. Stop

Code:

```
a = ["E=E+T", "E=T", "T=T*F", "T=F", "F=(E)", "F=i"]

rules = {}
terms = []
for i in a:
    temp = i.split("=")
    terms.append(temp[0])
    try:
        rules[temp[0]] += [temp[1]]
    except:
        rules[temp[0]] = [temp[1]]

terms = list(set(terms))
print(rules,terms)

def leading(gram, rules, term, start):
    s = []
    if gram[0] not in terms:
        return gram[0]
    elif len(gram) == 1:
        return [0]
    elif gram[1] not in terms and gram[-1] is not start:
        for i in rules[gram[-1]]:
            s+= leading(i, rules, gram[-1], start)
            s+= [gram[1]]
        return s

def trailing(gram, rules, term, start):
    s = []
    if gram[-1] not in terms:
        return gram[-1]
    elif len(gram) == 1:
        return [0]
    elif gram[-2] not in terms and gram[-1] is not start:
        for i in rules[gram[-1]]:
            s+= trailing(i, rules, gram[-1], start)
            s+= [gram[-2]]
        return s

leads = {}
trails = {}
for i in terms:
    s = [0]
    for j in rules[i]:
        s+=leading(j,rules,i,i)
    s = set(s)
    s.remove(0)
    leads[i] = s
    s = [0]
    for j in rules[i]:
        s+=trailing(j,rules,i,i)
    s = set(s)
    s.remove(0)
    trails[i] = s
for i in terms:
    print("LEADING("+i+"):",leads[i])
for i in terms:
    print("TRAILING("+i+"):",trails[i])
```

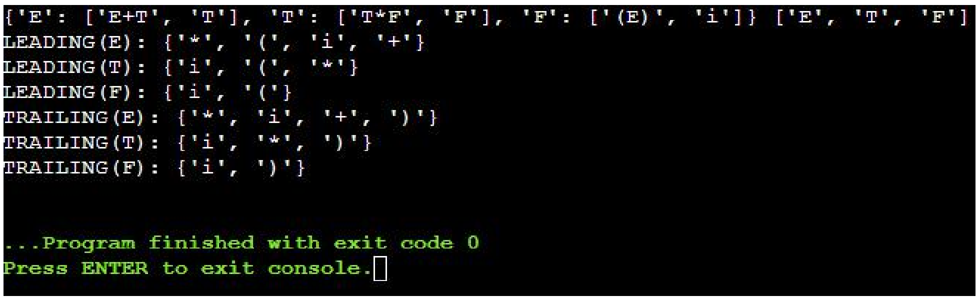


```
a = ["E=E+T", "E=T", "T=T*F", "T=F", "F=(E)", "F=i"]

rules = {}
terms = []
for i in a:
    temp = i.split("=")
    terms.append(temp[0])
    try:
        rules[temp[0]] += [temp[1]]
    except:
        rules[temp[0]] = [temp[1]]

terms = list(set(terms))
print(rules,terms)

def leading(gram, rules, term, start):
    s = []
    if gram[0] not in terms:
        return gram[0]
    elif len(gram) == 1:
        return [0]
    elif gram[1] not in terms and gram[-1] is not start:
        for i in rules[gram[-1]]:
            s+= leading(i, rules, gram[-1], start)
            s+= [gram[1]]
        return s

def trailing(gram, rules, term, start):
    s = []
    if gram[-1] not in terms:
        return gram[-1]
    elif len(gram) == 1:
        return [0]
    elif gram[-2] not in terms and gram[-1] is not start:
        for i in rules[gram[-1]]:
            s+= trailing(i, rules, gram[-1], start)
            s+= [gram[-2]]
```



```python
        return s

leads = {}
trails = {}
for i in terms:
    s = [0]
    for j in rules[i]:
        s+=leading(j,rules,i,i)
    s = set(s)
    s.remove(0)
    leads[i] = s
    s = [0]
    for j in rules[i]:
        s+=trailing(j,rules,i,i)
    s = set(s)
    s.remove(0)
    trails[i] = s
for i in terms:
    print("LEADING("+i+"):",leads[i])
for i in terms:
    print("TRAILING("+i+"):",trails[i])
```

Output:



```
{'E': ['E+T', 'T'], 'T': ['T*F', 'F'], 'F': ['(E)', 'i']} ['E', 'T', 'F']
LEADING(E): {'*', '(', 'i', '+'}
LEADING(T): {'i', '(', '*'}
LEADING(F): {'i', '('}
TRAILING(E): {'*', 'i', '+', ')'}
TRAILING(T): {'i', '*', ')'}
TRAILING(F): {'i', ')'}


...Program finished with exit code 0
Press ENTER to exit console.
```

Result:

A program for Computation of leading and trailing was run successfully.