Experiment - 7 Finding follow of a grammar

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#Source Code

```
__author__ = 'Shadab Shaikh'
__title__ = 'Finding follow of a set from a grammar'
__date__ = '01-03-2019'
__version__ = '1.0'

print('Author          : ' + __author__)
print('Title           : ' + __title__)
print('Date            : ' + __date__)
print('Version         : ' + __version__)

grammararr=[]               #stores the grammar maintaining the index
flw=[]                      #stores the final result of follow set
inputs=""                   #taking input from user
inputm=""                   #continuity of production
s1=""                       #acting as a pointer to compare and find the left most variable


flw2=[]                             #Stores the variable production which has to be
replaced with following epsilon
flw3=[]                             #Stores the variable production which has to be
replaced with following epsilon after end iteration
index1=[]                           #used to remove unwanted production for flw2
index2=[]                           #used to remove unwanted production for flw3
index3=[]                           #used to remove unwanted production for final iteration
flwcopy=[]                          #storing the left out variable
fincap=[]                           #getting the left out follow
fincap1=[]                          #storing the left out follow
j1=""

while(inputs!='no'):
        grammar = input("\nEnter the grammar left should be variable following with ->
format eg: S->a\n")
        grammar=grammar.replace(" ","")     #replacing whitespaces with none
        if(grammar[0].islower()):
                grammar[0].upper()          #making left most as variable
        grammararr.append(grammar)          #storing into list
        inputs = input("\nPress no to stop writing productions or write anything to continue")
                                            #asking for the continuity of grammar
```

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def searchepsi(c1,grammararr,v,w):
    """function for espilon production condition."""
    if(grammararr[v][w]==c1):
        try:
            flw3.append("follow{"+grammararr[v][w-1]+"}="+grammararr[v]
            [w+1]) #if epsilon is found, moving the next element and storing in flw
                #list
        except:
            flw3.append("follow{"+grammararr[v][w-1]+"}="+grammararr[v][0])
            #if element is not present leftmost become the follower and storing in
            #flw list
    else:
        w+=1
        if(w<len(grammararr[v])):
            searchepsi(c1,grammararr,v,w)
                    #recursively calling determining each element
        else:
            w=0
            v+=1
            if(v<len(grammararr)):
                searchepsi(c1,grammararr,v,w)

def searchprodcap(grammararr,n1,s1,k,n):
    """function to check if the element is variable the finding first of it."""
    if(grammararr[k][0]==n1):
        if(grammararr[k][3].isupper()):          #checking if the 3rd index
                                                 #element is uppercase
            n1=grammararr[k][3]                  #if yes then reassigning n1
            searchprodcap(grammararr,n1,s1,k,n)#recursively calling with updated
                                                 #n1
        if(grammararr[k][3]=='#'):    #if epsilon is found calling searchepsi function
            c1=grammararr[k][0]  #updating c1 for comparison to searchepsi
            searchepsi(c1,grammararr,0,3)
        else:
            flw.append("follow{"+s1+"}="+grammararr[k][3])
            #else appending it to final follow list
    k+=1                                         #incrementing k by 1
    if(k<len(grammararr)):                       #until k is less than grammar list
        searchprodcap(grammararr,n1,s1,k,n)

def searchprodright(flw,x,y):
    """function to replace variable with corresponding follow element."""
    if(flw[y][10].isupper()):          #Checking if flw list has variables
        if(flw[x][7]==flw[y][10]):     #finding variables follow
            flw2.append("follow{"+flw[y][7]+"}="+flw[x][10])#updating flw2 list
            x+=1
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                    if(x<len(flw)):
                        searchprodright(flw,x,y)
                else:
                    x+=1
                    if(x<len(flw)):
                        searchprodright(flw,x,y)
        x=0
        y+=1
        if(y<len(flw)):
            searchprodright(flw,x,y)            #recursively checking for each index

def searchprodright2(flw,x,y):
        """function to replace variable with corresponding follow element after each iteration
is finished."""
        if(flw[y][10].isupper()):               #Checking if flw list has variables
            if(flw[x][7]==flw[y][10]):      #finding variables follow
                flw3.append("follow{"+flw[y][7]+"}="+flw[x][10])#updating flw3 list
                x+=1
                if(x<len(flw)):
                    searchprodright2(flw,x,y)
            else:
                x+=1
                if(x<len(flw)):
                    searchprodright2(flw,x,y)
        x=0
        y+=1
        if(y<len(flw)):
            searchprodright2(flw,x,y)           #recursively checking for each index

def searchprod(grammararr,s1,i,k,n):
        """function to find the follow element to be taken into consideration."""
        if(grammararr[k][i]==s1):       #checking if element is present in production
            try:
                if(grammararr[k][i+1].isupper()):       #if found then assigning the right
                                                        #adjacent element, if its
                                                        #uppercase
                    n1=grammararr[k][i+1]       #assigning element value to n1
                    searchprodcap(grammararr,n1,s1,k,n)#calling
                                                            #searchprodcap function
                else:
                    flw.append("follow{"+s1+"}="+grammararr[k][i+1])
                                    #if element is terminal then updating flw list
            except:
                                    #searchright(grammararr,previdx)
```

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                    flw.append("follow{"+s1+"}="+grammararr[k][0])
                        #if element is not present in adjacent right the storing leftmost
                        #intoflw list
                    flwcopy.append("follow{"+s1+"}="+grammararr[k][0])
                    #will be used for  final iteration
                    searchprodright(flw,0,0)
                    #calling searchprodright function
        else:
            i+=1
            if(i<len(grammararr[k])):
                searchprod(grammararr,s1,i,k,n)
            else:
                k+=1
                i=3
                if(k<len(grammararr)):
                    searchprod(grammararr,s1,i,k,n)
                    #recursively calling this func until each element is parsed

def findfollow(grammararr,k):
    """function to find follow of a production variable."""
    s1=grammararr[k][0]                     #assigning start variable to s1 initially
    searchprod(grammararr,s1,3,0,1)         #calling the searchprod function
    k+=1                                    #incrementing k by 1
    if(k<len(grammararr)):                  #until k is less than grammar list
        findfollow(grammararr,k)            #recursively calling findfollow funtion

flw.append("follow{"+grammararr[0][0]+"}="+"$")         #updating flw list by $ for
starting production
findfollow(grammararr,0)                    #calling findfollow function

#sorting the list
flw=list(set(flw))                          #getting all the unique results
flw.sort()
flw2=list(set(flw2))                        #getting all the unique results
flw2.sort()
flw3=list(set(flw3))                        #getting all the unique results
flw3.sort()

for i in range(len(flw2)):
    flw.append(flw2[i])                     #appending the result of flw with flw2list

for r in range(len(flw)):
    if(flw[r][10].isupper()):
        index1.append(flw[r])               #checking if there is any variable updating
index1 list
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```
for d in range(len(index1)):
        flw.remove(index1[d])                   #removing corresponding variable list

for i in range(len(flw3)):
        flw.append(flw3[i])                     #appending the result of flw3 with flwlist

searchprodright2(flw,0,0)                       #calling searchprodright2 function

flw3=list(set(flw3))                            #getting all the unique results
flw3.sort()

for i in range(len(flw3)):
        flw.append(flw3[i])                     #appending the result of flw3 with flwlist

searchprodright2(flw,0,0)                       #again calling searchprodrigh2 function

for i in range(len(flw3)):
        flw.append(flw3[i])                     #again appending the result of flw3 with flwlist

for r in range(len(flw)):
        if(flw[r][10].isupper()):
                index2.append(flw[r])           #checking if there is any variable updating
index1 list

for d in range(len(index2)):
        flw.remove(index2[d])                   #removing corresponding variable list

for i in range(len(flwcopy)):
        flw.append(flwcopy[i])                  #appending the final stored iteration element

for c in range(len(flw)):
        if(flw[c][10].isupper()):
                fincap.append(flw[c][7]+flw[c][10])  #checking if any variable in production
                                                     #of flwlist, appending fincap list


if(fincap!=None):
        for i in range(len(flw)):
                for j in range(len(fincap)):
                        if(flw[i][7]==fincap[j][1]):
                                fincap1.append("follow{"+fincap[j][0]+"}="+flw[i][10])
                #finding the corresponding variable follow
```

```
if(fincap1!=None):
        fincap1=list(set(fincap1))                      #getting all the unique results
        fincap1.sort()


        for i in range(len(fincap1)):
                flw.append(fincap1[i])                  #appending result of fincap1 to flw list

        for r in range(len(flw)):
                if(flw[r][10].isupper()):
                        index3.append(flw[r])           #finding variable from flwlist

        for d in range(len(index3)):
                flw.remove(index3[d])           #removing unwanted element from flwlist


flw=list(set(flw))                      #getting all the unique results
flw.sort()
print(*flw, sep = "\n")                 #printing the final result
```

#Sample Input

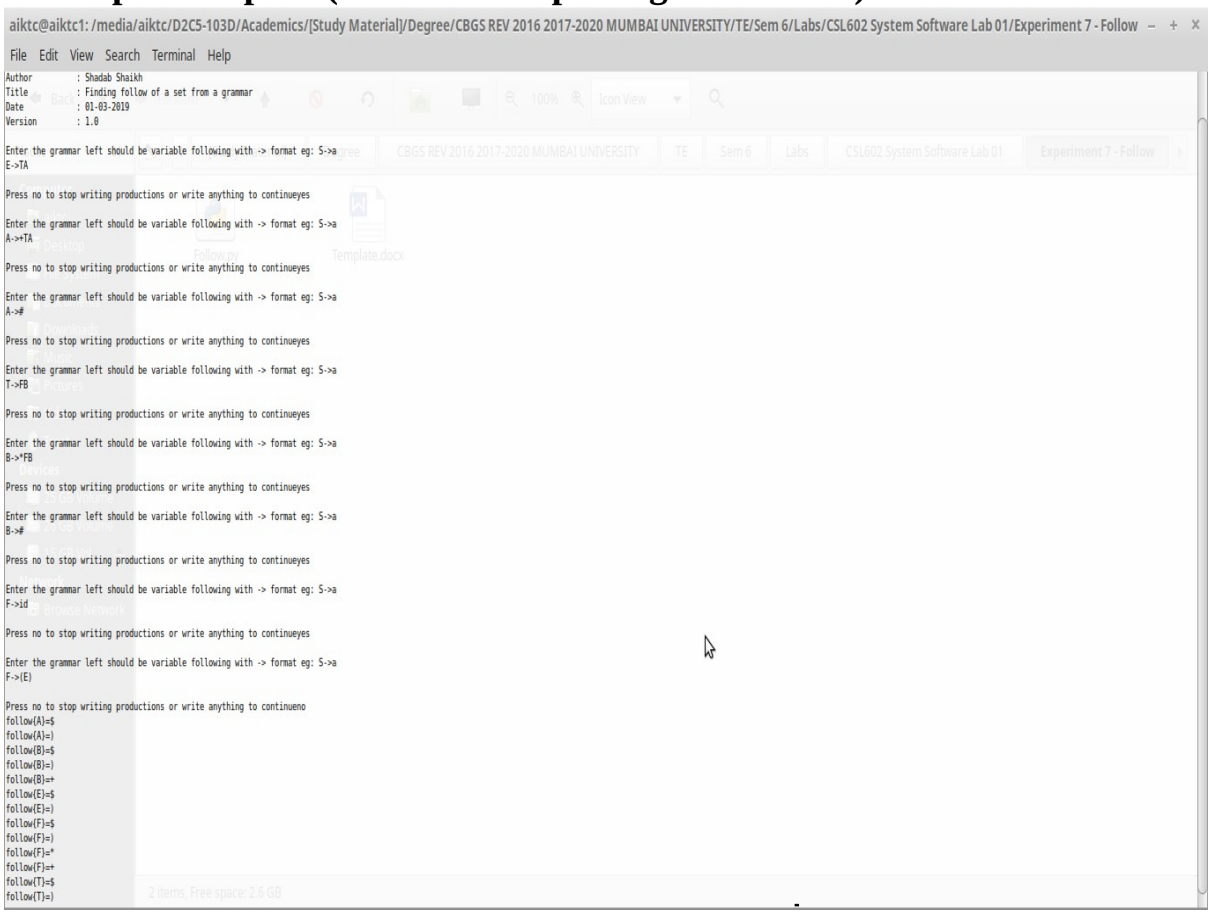
1. E->TA
A->+TA/€
T->FB
B->*FB/€
F->id/(E) #(Case of non-splitting of terminal)

2. S->(S)/ €

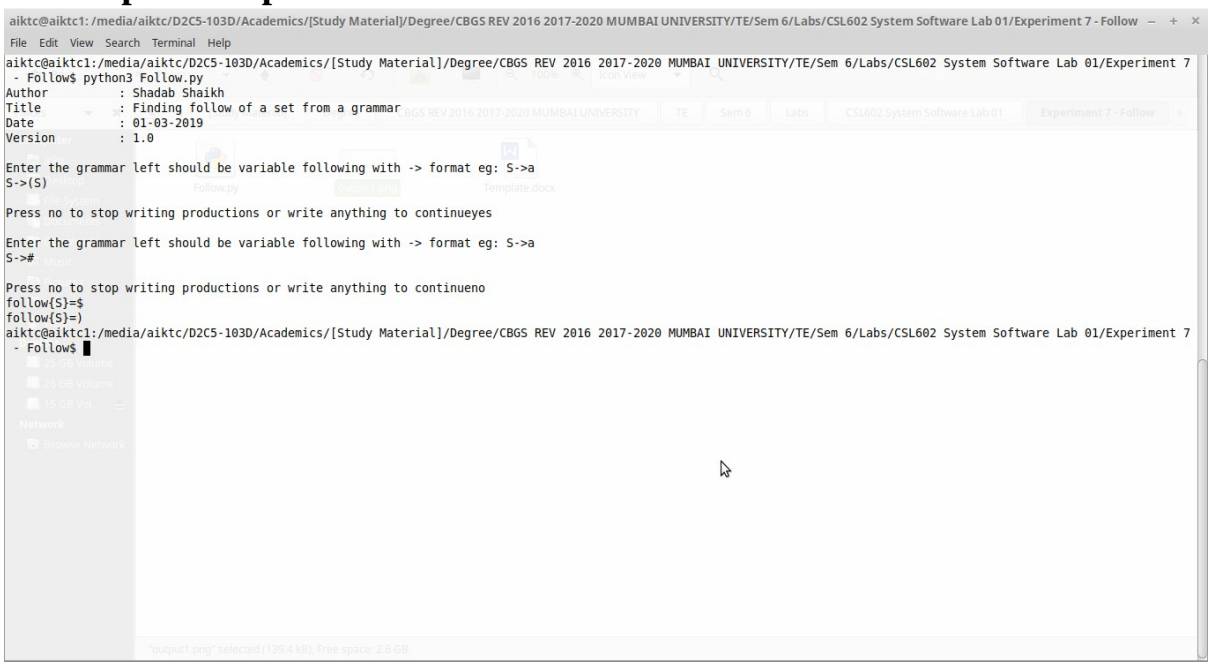
3. S->aABb
A->C/€
B->d/€

#Output

1. Sample 1st input #(Case of non-splitting of terminal)



2. Sample 2nd input



3. Sample 3rd input