Longest Common Subsequence (LCS)

- Y= “ABCE”
- X=“ABEC”

- Longest common substring=AB
- Longest Common subsequence = ABC or ABE

Y =	A	B	E	J

X =	A	J	B	C	E

X, i

	0	1	2	3	4
0	**0**	**0**	**0**	**0**	**0**
1	**0**				
2	**0**				
3	**0**				
4	**0**				
5	**0**				

Cost Matrix (c)

Y, j

	0	1	2	3	4
0	**0**	**0**	**0**	**0**	**0**
1	**0**				
2	**0**				
3	**0**				
4	**0**				
5	**0**				

Direction Matrix (b)

1 = Diagonal (NW) [if X_i=Y_j]

2 = Up (N)[if upper value is greater or equal to left value]

3 = Left (W) [if left value is greater than upper value]

```
LCS-Length(X, Y)

    m <- length[X]
    n <- length[Y]

    for i <- 1 to m
        c[i,0] <- 0
    for j <- 1 to n
        c[0,j] <- 0

    for i <- 1 to m
        for j <- 1 to n
            if (x_i == y_j) {
               c[i,j] <- c[i-1,j-1] + 1
               b[i,j] <- NW
               }
            else if (c[i-1,j] >= c[i,j-1]) {
               c[i,j] <- c[i-1,j]
               b[i,j] <- N
               }
            else {
               c[i,j] <- c[i,j-1]
               b[i,j] <- W
               }
```

Y =	**A**	**B**	**E**	**J**

X =	**A**	**J**	**B**	**C**	**E**

X, i

	0	1A	2 B	3E	4J
0	**0**	**0**	**0**	**0**	**0**
1A	**0**	**1**	**1**	**1**	**1**
2J	**0**	**1**	**1**	**1**	**2**
3B	**0**	**1**	**2**	**2**	**2**
4C	**0**	**1**	**2**	**2**	**2**
5E	**0**	**1**	**2**	**3**	**3**

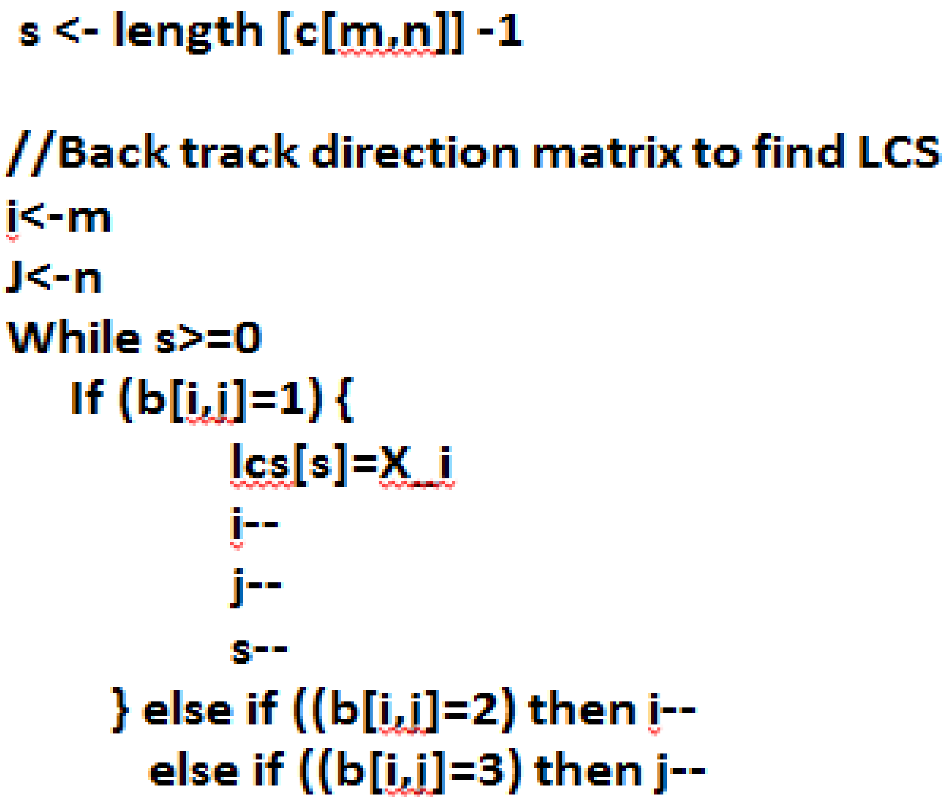
Cost Matrix (c)

Y, j

	0	1	2	3	4
0	**0**	**0**	**0**	**0**	**0**
1	**0**	**NW**	**W**	**W**	**W**
2	**0**	**N**	**N**	**N**	**NW**
3	**0**	**N**	**NW**	**W**	**N**
4	**0**	**N**	**N**	**N**	**N**
5	**0**	**N**	**N**	**NW**	**W**

Direction Matrix (b)

1 = Diagonal (NW), 2 = Up (N), 3 = Left (W)



```
 s <- length [c[m,n]] -1

//Back track direction matrix to find LCS
i<-m
J<-n
While s>=0
    If (b[i,j]=1) {
              lcs[s]=X_i
              i--
              j--
              s--
      } else if ((b[i,j]=2) then i--
        else if ((b[i,j]=3) then j--
```