

Date: .....

	#	O	P	E	R	A	T	I	O	N
#	0	1	2	3	4	5	6	7	8	9
C	1	1.5	1.75	2.75	3.75	4.75	5.75	6.75	7.75	8.75
R	2	2.5	2.25	3.25	2.75	3.75	4.75	5.75	6.75	7.75
E	3	2.5	3.25	2.25	3.25	3.25	4.25	5.25	6.25	7.25
A	4	3.5	4	3.25	3.75	3.25	4.25	4.75	5.75	6.75
T	5	4.5	4.25	4.25	4	4.25	3.25	4.25	5.25	6.25
I	6	5.5	5.25	4.75	5	4.5	4.25	3.25	4.25	5.25
O	7	6	6.25	5.75	6	5.5	5.25	4.25	3.25	4.25
N	8	7	6.75	6.75	6.5	6.5	6.25	5.25	4.25	3.25

C R E A T I O N  
O P E R A T I O N

$$s(c \rightarrow o) + s(r \rightarrow p) + i(r)$$

$$1.5 + 0.75 + 1 = \underline{3.25}$$

$$\textcircled{1} s(c \rightarrow o) = 1.5$$

consonant vowel

$$\textcircled{2} s(r \rightarrow p) = 0.75$$

r & p are consonants

$$\textcircled{3} i(r) = 1$$

# 0  
C 1 ins 1.5  
sub 1 del 1

$$dp[1][1] = \min(\text{ins}, \text{del}, \text{sub}) = \min(1+1, 1+1, 0+1.5) = 1.5$$

ALBA



# National University of Computer and Emerging Sciences, Islamabad Campus



Course:	Natural Language Processing	Course Code:	CS-4063
Program:	BS(Computer Science)	Semester:	Fall 25
Duration:	20 Minutes	Total Marks:	15
Paper Date:	01-Sep-2025	Name:	
Section:		Roll No:	
Exam:	Quiz-1		

## Question — Minimum Edit Distance

Not all spelling mistakes are equal — confusing “a” with “e” feels closer than confusing “a” with “t”.

Weighted edit distance models this by giving smaller costs to similar edits and higher costs to unlikely ones.

Compute the **minimum edit cost** between the following two strings:

“creation”

“operation”

Use the following operation costs:

- Insertion = 1
- Deletion = 1
- Substitution:
  - 0 if identical (e.g., r → r)
  - 0.5 if both are vowels (a, e, i, o, u) (e.g., a → e)
  - 0.75 if both are consonants (all other letters) (e.g., s → z)
  - 1.5 if one is a vowel and the other is a consonant (e.g., a → t)

### Tasks:

- Construct the dynamic programming table step by step under these costs.
- Clearly state the **minimum edit cost** between the two strings.

### Bonus (5 pts):

Backtrack through your DP table to show one possible **optimal alignment** (the actual sequence of edit operations).

	#	O	P	E	R	A	T	I	O	N
#	0	1	2	3	4	5	6	7	8	9
C	1	1.5	1.75	2.75	3.75	4.75	5.75	6.75	7.75	8.75
R	2	2.5	2.25	3.25	2.75	3.75	4.75	5.75	6.75	7.75
E	3	2.5	3.25	2.25	3.25	3.25	4.25	5.25	6.25	7.25
A	4	3.5	4.0	3.25	3.75	3.25	4.25	4.75	5.75	6.75
T	5	4.5	4.25	4.25	4.0	4.25	3.25	4.25	5.25	6.25
I	6	5.5	5.25	4.75	5.0	4.5	4.25	3.25	4.25	5.25
O	7	6	6.25	5.75	6.0	5.5	5.25	4.25	3.25	4.25
N	8	7	6.75	6.75	6.5	6.5	6.25	5.25	4.25	3.25



## Rubric:

DP Table — 12 marks

initialisation — 3 marks

correct sequence — 3 marks

step-by-step filling — 6 marks.

minimum Edit cost — 3 marks

correct final wst = 3.25 — 2 marks

explicitly stated — 1 mark

## Bonus:

correct sequence of edits — 3 marks

proper alignment shown — 2 marks.