# ROUGE-L Score Calculation - Detailed Example

## 🔹 ROUGE-L Score: Definition

ROUGE-L (Recall-Oriented Understudy for Gisting Evaluation – Longest Common Subsequence)
measures the longest common subsequence (LCS) between a candidate and a reference text. It emphasizes the sequence of words, not necessarily consecutive but in order, making it useful for summarization and free-form generation tasks.

## 🔸 ROUGE-L Formula

Let:
- LCS(X, Y) = length of longest common subsequence between reference X and candidate Y
- m = length of reference
- n = length of candidate

Then we compute:
- Precision (P): P = LCS(X, Y) / n
- Recall (R): R = LCS(X, Y) / m
- F-measure (ROUGE-L):
  $F = (1 + \beta^2) * P * R / (R + \beta^2 * P)$, where $\beta = 1$ by default (F1 Score)

## 🔹 Example

Reference: "a cat is sitting on the mat"

Candidate: "cat is sitting on mat"

## 🔸 Step-by-Step Calculation

1. Find LCS between reference and candidate

Reference: a cat is sitting on the mat

Candidate: cat is sitting on mat

LCS = "cat is sitting on mat" → Length = 5

2. Compute Precision (P)

P = LCS / Candidate length = 5 / 5 = 1.0

3. Compute Recall (R)

R = LCS / Reference length = 5 / 7 ≈ 0.714

4. Compute F1 Score (ROUGE-L)

$F = 2 * P * R / (P + R) = 2 * 1.0 * 0.714 / (1.0 + 0.714) \approx 0.833$

## Final ROUGE-L Score ≈ 0.833

### 🔸 Summary Table

| Metric | Value |
|---|---|
| LCS Length | 5 |
| Precision (P) | 1.0 |
| Recall (R) | 0.714 |
| ROUGE-L (F1) | 0.833 |