

DP in the Nussinov Algorithm

- let $\delta(i, j) = \begin{cases} 1 & \text{if } x_i \text{ and } x_j \text{ are complementary} \\ 0 & \text{otherwise} \end{cases}$

- initialization:

$$\gamma(i, i-1) = 0 \quad \text{for } i = 2 \text{ to } L$$

$$\gamma(i, i) = 0 \quad \text{for } i = 1 \text{ to } L$$

- recursion

max # of
paired bases in
subsequence $[i, j]$

$$\gamma(i, j) = \max \begin{cases} \gamma(i+1, j) \\ \gamma(i, j-1) \\ \gamma(i+1, j-1) + \delta(i, j) \\ \max_{i < k < j} [\gamma(i, k) + \gamma(k+1, j)] \end{cases}$$

Nussinov Algorithm

Task: Use the Nussinov algorithm to fill in the remainder of this table. The bifurcation case (fourth option in the Nussinov algorithm) only needs to be calculated where the square is light grey. Use the space on the right to draw the RNA's folded structure based on the trace back.

	A	A	A	U	C	C	C	A	G	G	A
A	0	0	0	1	1	1	1	1	2	3	3
A	0	0	0	1	1	1	1	1	2	3	3
A		0	0	1	1	1	1	1	2	3	3
U			0	0	0	0	0	1	1	2	3
C				0	0	0	0	0	1	2	2
C					0	0	0	0	1	2	2
C						0	0	0	1	1	1
A							0	0	0	0	0
G								0	0	0	0
G									0	0	0
A										0	0

