Space Saving DPs

Monday, April 9, 2018 6:38 PM

Real World LCS 35 Billion Base pairs

strings $(35 \text{ billion})^2$ memory

not going to work on most machines

$32 \times 1\text{bil} \approx 2^5 \times 2^{30} \rightarrow$ bits $= 5 + 30$

35 bits

$n^2 =$ 35 + 35 bits

70 bits!

		A	G	A	T
	A				
	C				←
	G	2	2	1	1	0
→	T	1	1	(1)	1	0 ←
		0	0	0	0	0

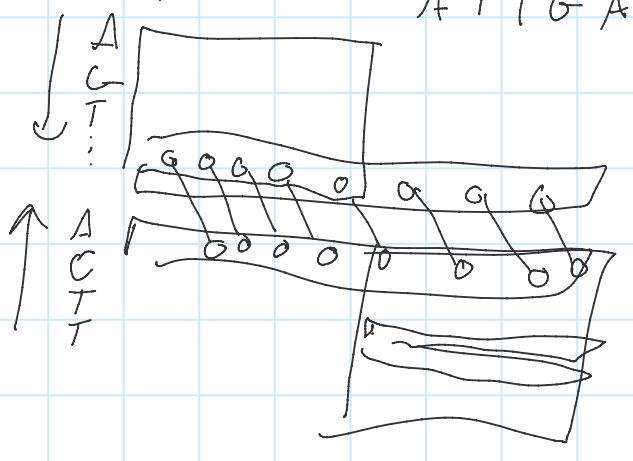
we only need the previous row to compute the next row we can reduce our memory to $O(|N| + |M|)$

Build back is tricky (Divide and Conquer)

1) Compute the middle two rows going forward backwards.

2) Find pair the maximizes the sum

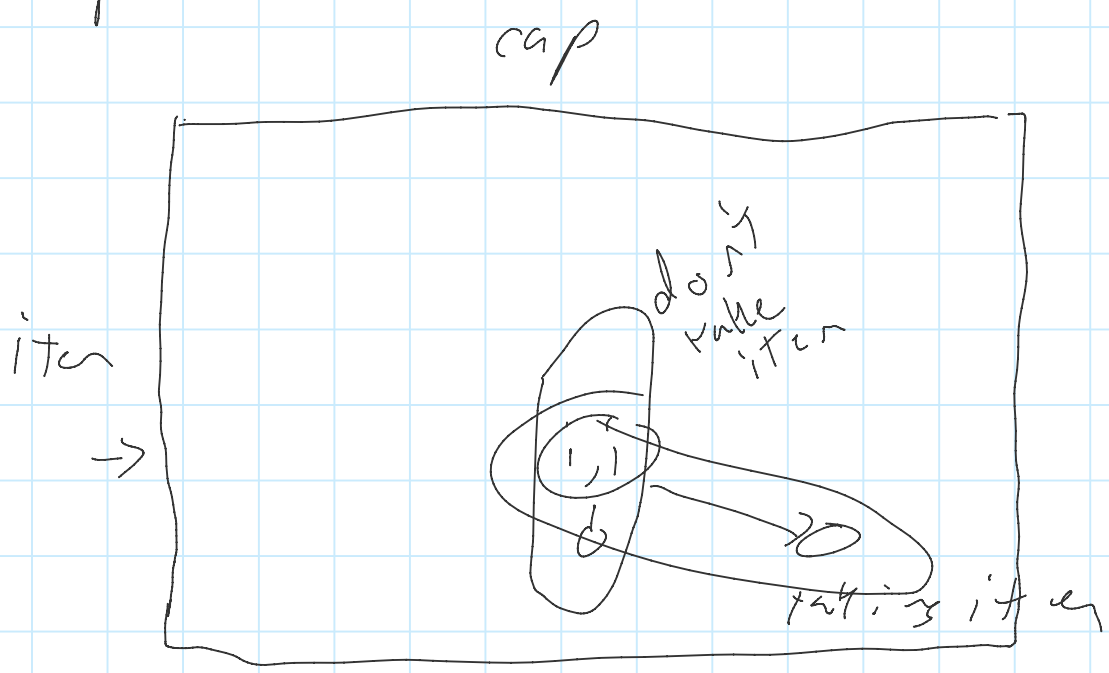
3) Solve the two halves recursively!



/Code as an

advanced exercise

Knapsack



we can remove the item dimension and build up using a capacity array