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Time Complexity

Step	Description	Time
Suffix array	Constructed by DC3	**O(n)**
LCP array	Kasai's algorithm	**O(n)**
Finding repeated substrings	Single pass over LCP	**O(n)**
Total		**O(n)** overall

Data Structure	Size	Purpose
suffix_array	O(n) integers	indices of suffix starts
rank + lcp	O(n)	helper arrays
repeated	≤ O(n) substrings	distinct repeated substrings
Total	**O(n)**	minimal additional space

Data Structures Used and Why

Structure	Purpose	Reason for Choice
Suffix Array	Stores all suffixes in sorted order	Enables substring grouping and lexicographic adjacency
LCP Array	Length of common prefix between adjacent suffixes	Detects repetition efficiently
Set	Stores unique repeated substrings	Ensures uniqueness with O(1) insertion

Example Output:

For "banana":

Found 2 repeated sequences of length 2
Sample repeated sequences of length 2:
an
na

Found 1 repeated sequences of length 3
Sample repeated sequences of length 3:
ana

C:\Users\Yoni\AppData\Local\Programs\Python\Python313\python.exe
C:\Users\Yoni\Desktop\Lab4\main.py
Found 3 repeated sequences of length 20
TGCTAACTAGTATCGTGGTA', 'CTGCTAACTAGTATCGTGGT', '}
{"GCTAACTAGTATCGTGGTAA
Found 0 repeated sequences of length 30
()set
Found 0 repeated sequences of length 40
()set
Found 0 repeated sequences of length 50
()set
Found 0 repeated sequences of length 100
()set

:Sample repeated sequences of length 20
TGCTAACTAGTATCGTGGTA
CTGCTAACTAGTATCGTGGT
GCTAACTAGTATCGTGGTAA

:Sample repeated sequences of length 30

:Sample repeated sequences of length 40

:Sample repeated sequences of length 50

:Sample repeated sequences of length 100

Process finished with exit code 0