Algorithm: shortestPalindrome

Input: A string s.

Output: The shortest palindrome obtained by adding characters to the beginning of the input string.

Steps:

* Check Null or Empty:
* If the input string s is null or empty, return the input string as it is already a palindrome.
* Reverse the String:
* Reverse the input string to create a new string called reversed.
* Combine Strings:
* Concatenate the original and reversed strings with a special character (#) in between to form a new string called combined.
* Compute LPS Array:
* Compute the Longest Prefix Suffix (LPS) array for the combined string using the computeLPS method.
* Determine Prefix Length:
* Determine the length of the longest prefix in the combined string that is also a suffix. Store this in prefixLength.
* Extract Suffix:
* Extract the suffix from the original string based on the prefixLength.
* Reverse Suffix:
* Reverse the suffix to obtain the required prefix.
* Concatenate and Return:
* Concatenate the prefix and the original string to form the shortest palindrome.
* Return the result.

Algorithm: computeLPS

Input: A string s.

Output: An array lps representing the Longest Prefix Suffix array for the given string.

Steps:

* Initialize Variables:
* Initialize variables n as the length of the string, lps as an array of size n, len as the length of the previous longest prefix suffix, and i as the current index.
* Iterate Through the String:
* Iterate through the string using a while loop with the condition i < n.
* Inside the loop:
* If characters at indices i and len are equal, increment len and update the LPS array at index i.
* If characters are not equal and len is not 0, update len using the LPS value of the previous index.
* If characters are not equal and len is 0, set the LPS value at index i to 0.
* Increment i.
* Return LPS Array:
* Return the computed LPS array.

Algorithm: main

Steps:

User Input: Prompt the user to enter a string.

Function Call: Call the shortestPalindrome method with the user input.

Display Result: Display the result obtained from the shortestPalindrome method.