Count of Palindromic Substrings

We'll cover the following

Problem Statement

Given a string, find the total number of palindromic substrings in it. Please note we need to find the total number of substrings and not subsequences.

Example 1:

```
Input: "abdbca"
Output: 7
Explanation: Here are the palindromic substrings, "a", "b", "d", "b", "c", "a", "b
db".
```

Example 2:

```
Input: = "cddpd"
Output: 7
Explanation: Here are the palindromic substrings, "c", "d", "d", "p", "d", "dd",
"dpd".
```

Example 3:

```
Input: = "pqr"
Output: 3
Explanation: Here are the palindromic substrings,"p", "q", "r".
```

Solution

This problem follows the Longest Palindromic Subsequence (https://www.educative.io/collection/page/5668639101419520/5633779737559040/5748119283171328/) pattern, and can be easily converted to Longest Palindromic Substring (https://www.educative.io/collection/page/5668639101419520/5633779737559040/5661601461960704/). The only difference is that instead of calculating the longest palindromic substring, we will instead count all the palindromic substrings.

Let's jump directly to the bottom-up dynamic programming solution:

Java JS Python3 C++

```python
def count_PS(st):
  n = len(st)
  # dp[i][j] will be 'true' if the string from index 'i' to index 'j' is a palindrome
  dp = [[False for _ in range(n)] for _ in range(n)]
  count = 0

  # every string with one character is a palindrome
  for i in range(n):
    dp[i][i] = True
    count += 1

  for startIndex in range(n - 1, -1, -1):
    for endIndex in range(startIndex + 1, n):
      if st[startIndex] == st[endIndex]:
        # if it's a two character string or if the remaining string is a palindrome too
        if endIndex - startIndex == 1 or dp[startIndex + 1][endIndex - 1]:
          dp[startIndex][endIndex] = True
          count += 1

  return count


def main():
  print(count_PS("abdbca"))
  print(count_PS("cddpd"))
  print(count_PS("pqr"))
  print(count_PS("qqq"))


main()
```

The time and space complexity of the above algorithm is $O(n^2)$, where 'n' is the length of the input string.

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Longest Palindromic Substring

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