



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Experiment - 9

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1. Aim: Develop a program and analyze complexity to find all occurrences of a pattern P in a given string.

2. Procedure:

- Define the problem of searching all occurrences of a given pattern P in a text string S.
- Take input for the main string and the pattern to be searched.
- Use a nested loop to compare the pattern with every substring of the main string of equal length.
- For each position, check if all characters of the pattern match the substring.
- If a match is found, record and display the starting index of the occurrence.
- Display all matching positions or indicate if the pattern is not found.

3. Code:

```
#include <iostream>
#include <string>
using namespace std;

void findPattern(string S, string P) {
    int n = S.size();
    int m = P.size();
    bool found = false;
    for (int i = 0; i <= n - m; i++) {
        int j;
        for (j = 0; j < m; j++)
            if (S[i + j] != P[j])
                break;
        if (j == m) {
            cout << "Pattern found at index " << i << endl;
            found = true;
        }
    }
}
```



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```
if (!found)
    cout << "Pattern not found in the string." << endl;
}

int main() {
    string S, P;
    cout << "Enter the main string: ";
    cin >> S;
    cout << "Enter the pattern: ";
    cin >> P;
    findPattern(S, P);
    return 0;
}
```

4. Output:

```
Enter the main string: ababcabcabababd
Enter the pattern: ababd
Pattern found at index 10
```

5. Learning Outcomes:

- Gained understanding of string matching and pattern searching techniques.
- Learned to implement a naive pattern matching algorithm using nested loops.
- Developed knowledge of analyzing time complexity of string algorithms.
- Learned the importance of substring comparison and indexing in text processing.
- Gained practical experience in solving basic string pattern problems using C++.