

Solution 1

```
1 // Copyright © 2020 AlgoExpert, LLC. All rights reserved.
2
3 package main
4
5 // O(n + m) time | O(m) space
6 func KnuthMorrisPrattAlgorithm(str, substr string) bool {
7     pattern := buildPattern(substr)
8     return doesMatch(str, substr, pattern)
9 }
10
11 func buildPattern(substr string) []int {
12     pattern := make([]int, len(substr))
13     for i := range substr {
14         pattern[i] = -1
15     }
16     i, j := 1, 0
17     for i < len(substr) {
18         if substr[i] == substr[j] {
19             pattern[i] = j
20             i, j = i+1, j+1
21         } else if j > 0 {
22             j = pattern[j-1] + 1
23         } else {
24             i += 1
25         }
26     }
27     return pattern
28 }
29
30 func doesMatch(str, substr string, pattern []int) bool {
31     i, j := 0, 0
32     for i+len(substr)-j <= len(str) {
33         if str[i] == substr[j] {
34             if j == len(substr)-1 {
35                 return true
36             }
37             i, j = i+1, j+1
38         } else if j > 0 {
39             j = pattern[j-1] + 1
40         } else {
41             i += 1
42         }
43     }
44     return false
45 }
46
```

