ADVANCED ALGORİTHM LAB ASSİGNMENT 1 REPORT

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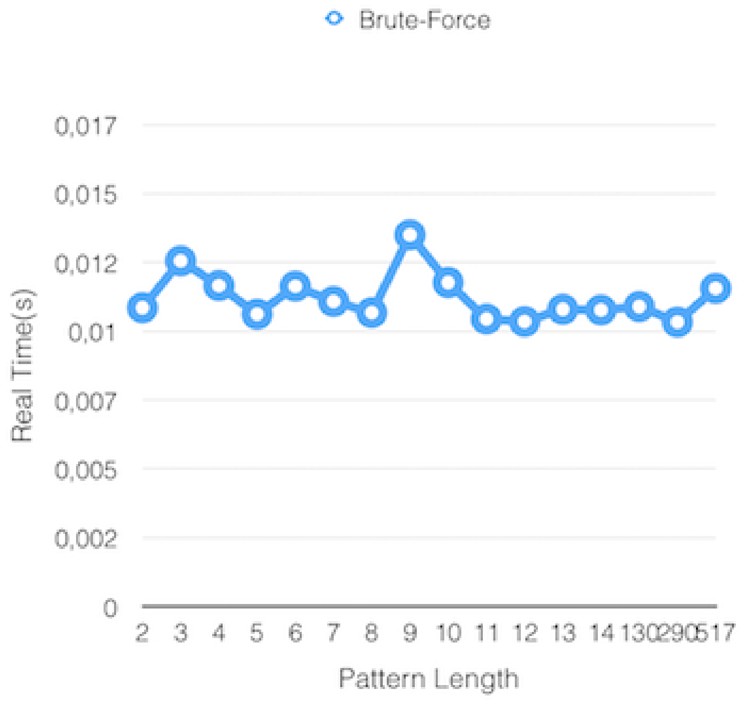
Brute-force

The simplest algorithm for string matching is a brute force algorithm, where we simply try to match the first character of the pattern with the first character of the text, and if we succeed, try to match the second character, and so on; if we hit a failure point, slide the pattern over one character and try again. When we find a match, return its starting location.
The Brute Force algorithm compares the pattern to the text, one character at a time, until unmatching characters are found:

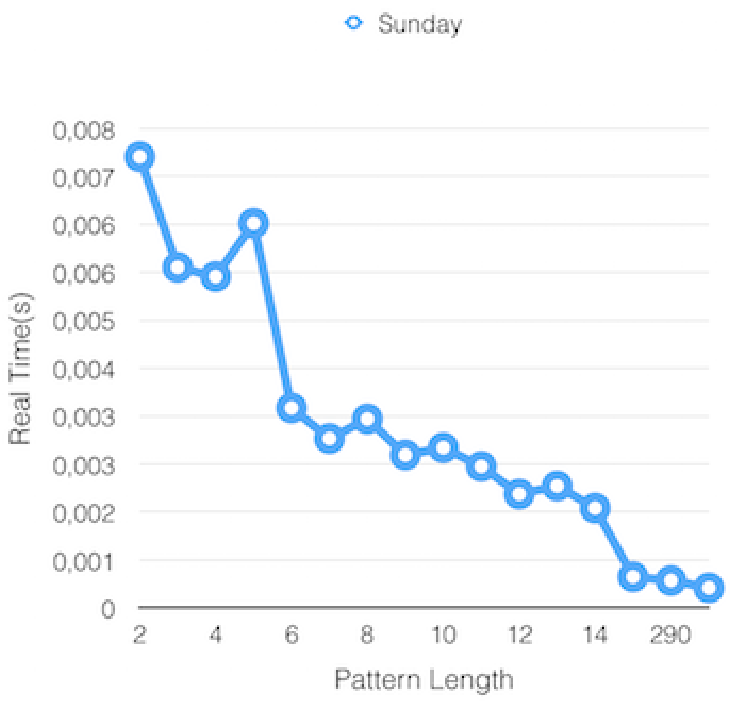
Time complexity: O(n*m) where n = length of text, m = length of pattern



Sunday

The idea of the Sunday algorithm is, Start with the first character of the text string s, and compare it with that of the pattern string T, and if it is equal, then the main string and the pattern string are moved back one character to continue the comparison. If not the same, then the text string to participate in matching the last character of the lowest character and pattern string inverse match. If the pattern string is not matched, the pattern string is skipped, that is, the moving digit = match string length + 1. If the pattern string matches the character, the same character in the pattern string is moved to the text string under the character, aligned with the character. The number of bits moved = the distance at the far right end of the pattern string is +1.

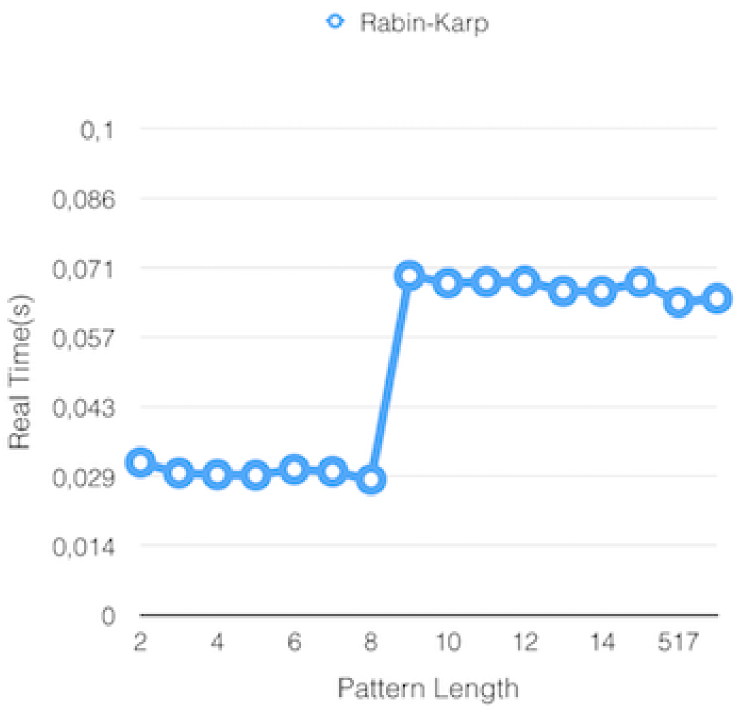
Time complexity: O(n/m) where n = length of text, m = length of pattern



Rabin-Karp

this algorithm calculates hash value for text and pattern to compare them. If the hash values do not match, the algorithm calculate hash value for next text sequence. If it matches, algorithm compare text subsequence with the pattern.
The Karp-Rabin algorithm searches for a pattern in a text by hashing. So we preprocess p by computing its hashcode, then compare that hash code to the hash code of each substring in t. If we find a match in the hash codes, we go ahead and check to make sure the strings actually match (in case of collisions).

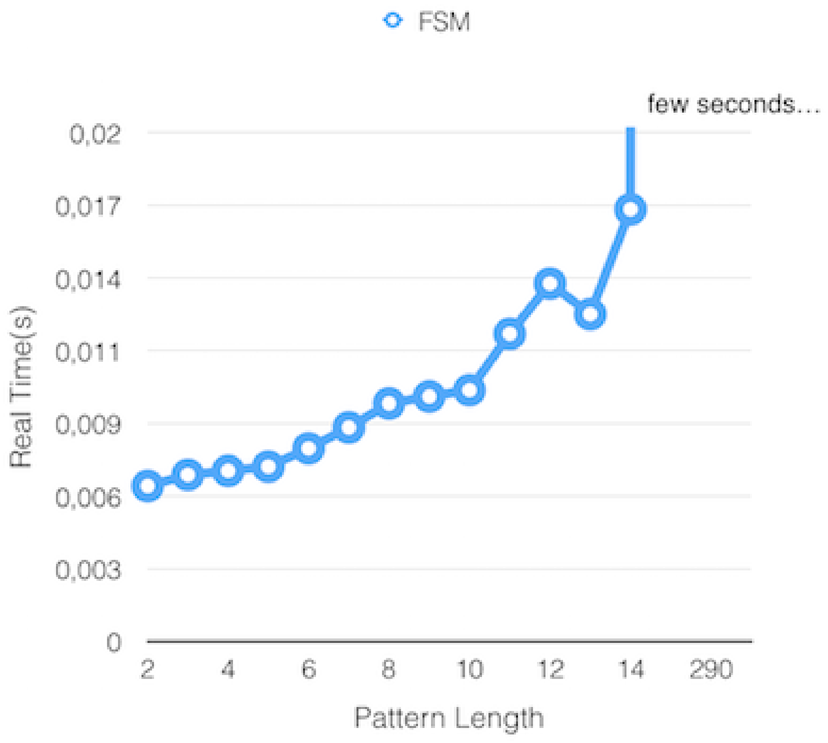
Time complexity: O(n+m) – best(average) case, O(n*m) – worst case where n – length of text, m length of pattern



FSM(Finite State Machine)

to search pattern in the string by using this algorithm we should build FA or Finite State. In search, we are just start from first state of FA and the first character of text. By moving FA in every step we consider next character of text. Once it reaches final state, the pattern is matched.

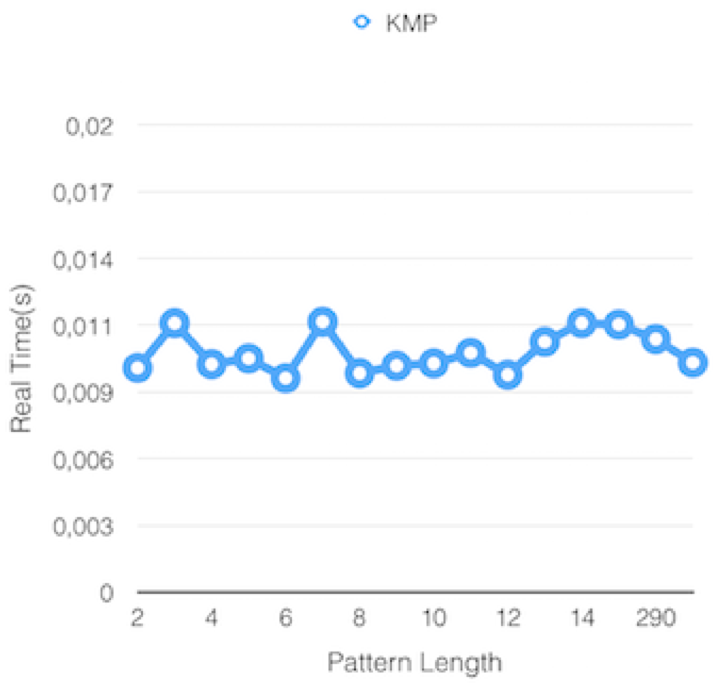
Time complexity:
O(n) – search time, O(m^3*N_CHARS) – time of building FA where n – length of text, m length of pattern



KMP(Knuth-Morris-Pratt)

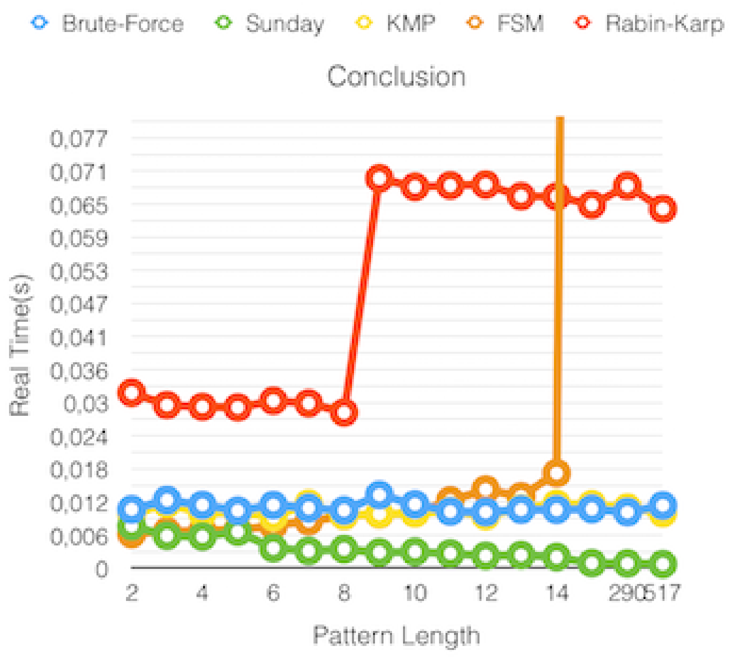
the main idea of this algorithm is that It compute the longest prefix suffix table, which is the longest prefix of pattern is the longest suffix of text and whenever it detects mismatch, It will have sufficient information to determine where the next match could begin.

Time complexity: O(n) – overall complexity time, O(n+m) – worst time, O(m) – time taken for lps creation, where n = length of text, m = length of pattern,



Conclusion

To sum up, easy to say that all algorithms show different results for different patterns and text. FSM algorithm was 1.5 faster than Rabin Karp. FSM is good with a small pattern, but while increasing the length of the pattern FSM is getting slower.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