AA_LAB_04_Assignment

CE_054

Aim :- Implementation of Rabin-Karp String Matching Algorithm!

1. Implementation of Rabin-Karp String matching Algorithm using python.

   Code: -

```
# -*- coding: utf-8 -*-
"""
Created on Fri Aug  7 19:49:35 2020

@author: DHRUV
"""
total_char = 256

def search(pat, txt, q):

        len_pattern = len(pat)
        len_string = len(txt)
        flag, j, value, temp, hash_ = 0, 0, 0, 0, 1
        for i in range(len_pattern-1):
                hash_ = (hash_ * total_char) % q

        for i in range(len_pattern):
                value = (total_char * value + ord(pat[i])) % q
                temp = (total_char * temp + ord(txt[i])) % q

        for i in range(len_string - len_pattern + 1):
                if value == temp:
                        for j in range(len_pattern):
                                if txt[i + j] != pat[j]:
                                        break

                        j += 1
                        if j == len_pattern:
                                print (f"Pattern found at index {i}" )
                                flag = 1

                if i < len_string - len_pattern:
                        temp = (total_char * (temp - ord(txt[i]) * hash_) + ord(txt[i +
                         len_pattern])) % q
```

```
                    if temp < 0:
                        temp = temp + q
            else:
                if (flag == 0):
                    print("pattern not found!")


if __name__ == "__main__":
        txt = input("Enter the string : ")
        pat = input("Enter the pattern : ")
        q = 103
        search(pat,txt,q)
```

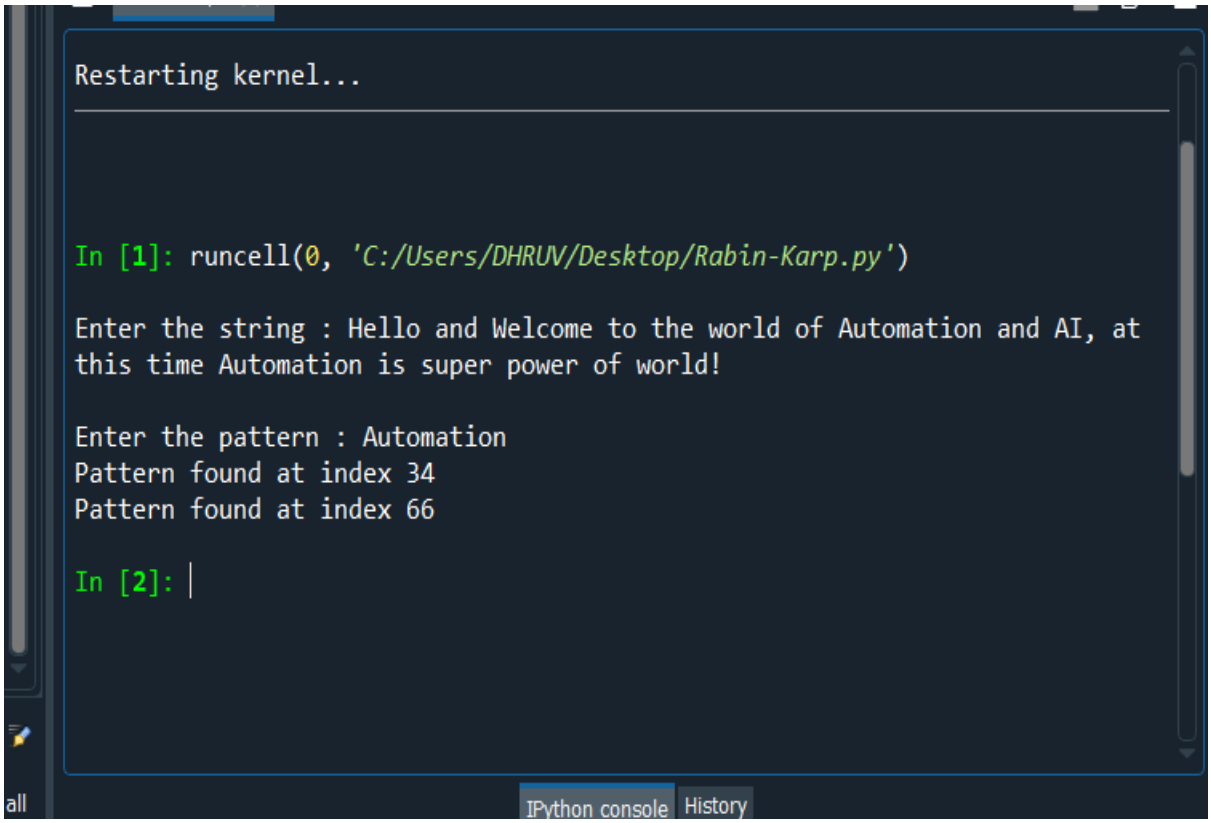
Output :-

Enter the string : Hello and Welcome to the world of Automation and AI, at this time Automation is super power of world!

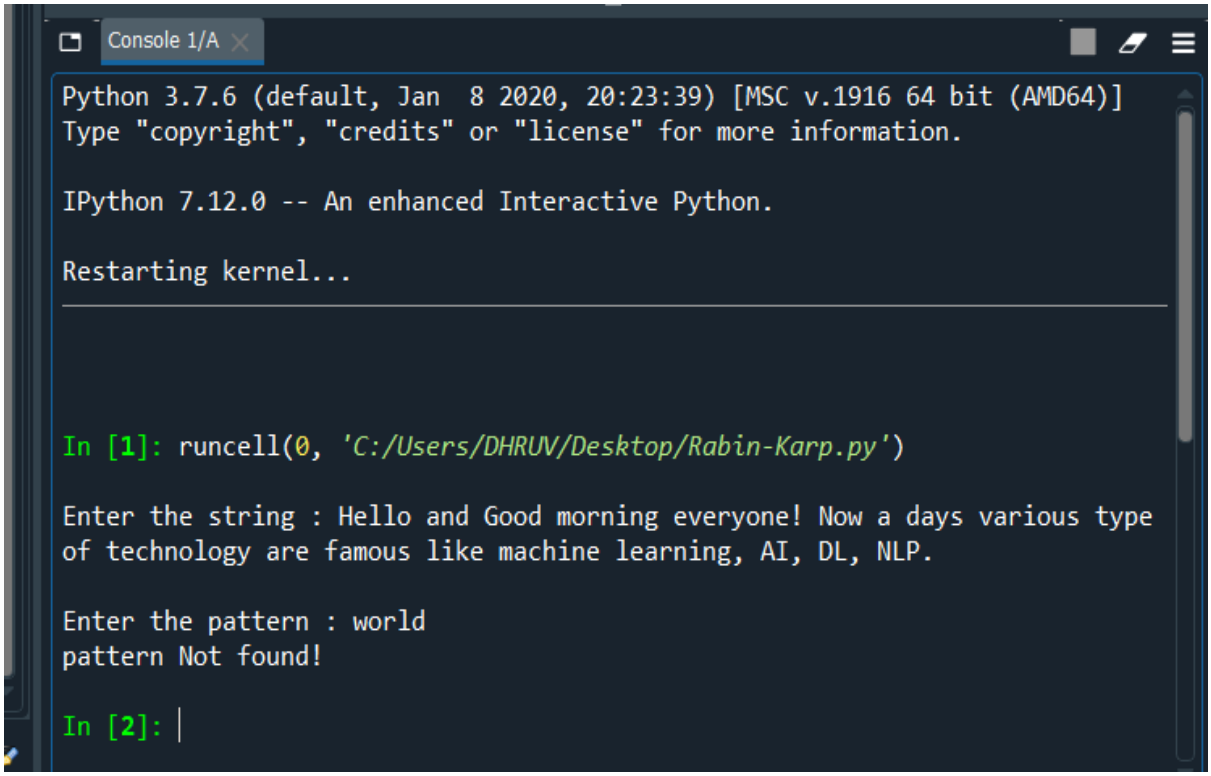
Enter the pattern : Automation

Pattern found at index 34

Pattern found at index 66



- If pattern is not present in String then :-



About Algorithm:-

The Rabin-Karp algorithm is a string-searching algorithm that uses hashing to find patterns in strings. A string is an abstract data type that consists of a sequence of characters. Letters, words, sentences, and more can be represented as strings.

The Rabin-Karp algorithm makes use of hash functions and the rolling hash technique. A hash function is essentially a function that maps one thing to a value. In particular, hashing can map data of arbitrary size to a value of fixed size.

Assume the text is length n and the length of the pattern is m. The best and average case running time of Rabin-Karp is O(m + n).

The worst-case running time of Rabin-Karp is O(nm). This would occur with an extremely awful hash function that resulted in a false positive at each step. Since whenever the

algorithm thinks it found a match, it must verify each of the m letters in the pattern, if there is a collision at each step, m letters will be checked n times resulting in a running time of O(nm) This can be avoided with a good choice of hash function.