PROJECT REPORT

TOPIC : COMPARING IMAGES USING STRING COMPRESSION AND LCS LOGIC

NAME: Aditya Sharma

Description of project :

Idea:

In today's world comparison of images has many applications in various sectors like sign verification, online identification etc.

For ex coursera requires applicant to upload his photo and recognized identity card and compares photo on this card with photo previously submitted. If they match then applicant is verified.

To do this image compression job in less time is a need, as images are of high quality, comparison may take a long amount of time therefore image and string compression plays an important role.

In our project we have step wise achieved this task of image comparison and demonstrated it using flask web app.

1. **Task 1: Image compression:**
    a. In this step we create PIL object of the images given by the user and resize it to 80x80 sizes.
2. **Task 2:Converting image to String:**
    a. In this step images are converted to 64 bit string format using base 64 library in python.
    b. We basically store image in a buffer and pass it to base64.b64encode function which returns the string of image in byte format

c. The base 64 library works differently with different image formats and our code supports jpeg and png formats.

d. Bytes are encoded to string UTF-8 format.

3. **Task 3: String Compression:**

a. In this step Strings of compressed images are obtained and then we have applied string compression using the Z-lib library in python which returns the compressed string.

b. Syntax :zlib.compress("String") => compressed String

4. **Task 4:Comparing images with LCS**[longest common subsequence logic]

a. Longest common subsequence algorithm is applied on strings obtained from two images

b. Which returns the longest sequence common to both the strings.

C. (Lcs length)**/**(avg length of string) =percentage image similarity/match.

d. Lcs Algorithm:

```
Algorithm: LCS-Length-Table-Formulation (X, Y)
    m := length(X)
    n := length(Y)
    for i = 1 to m do
             C[i, 0] := 0
    for j = 1 to n do
             C[0, j] := 0
    for i = 1 to m do
             for j = 1 to n do
                      if xi = yj
                               C[i, j] := C[i - 1, j - 1] + 1
                               B[i, j] := 'D'
                      else
                               if C[i -1, j] ≥ C[i, j -1]
                                        C[i, j] := C[i - 1, j] + 1
                                        B[i, j] := 'U'
                               else
                                        C[i, j] := C[i, j - 1]
                                        B[i, j] := 'L'
```

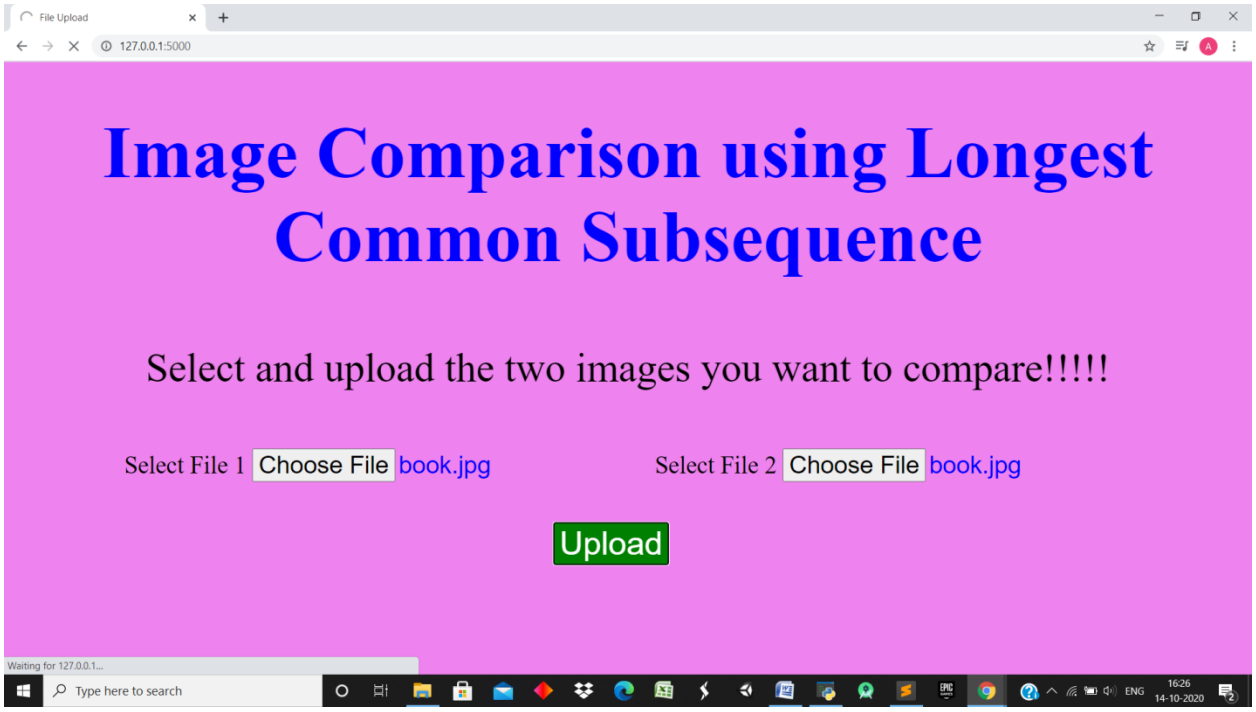
```
    return C and B


Algorithm: Print-LCS (B, X, i, j)
    if i = 0 and j = 0
       return
    if B[i, j] = 'D'
       Print-LCS(B, X, i-1, j-1)
       Print(xi)
    else if B[i, j] = 'U'
       Print-LCS(B, X, i-1, j)
    else
       Print-LCS(B, X, i, j-1)
```

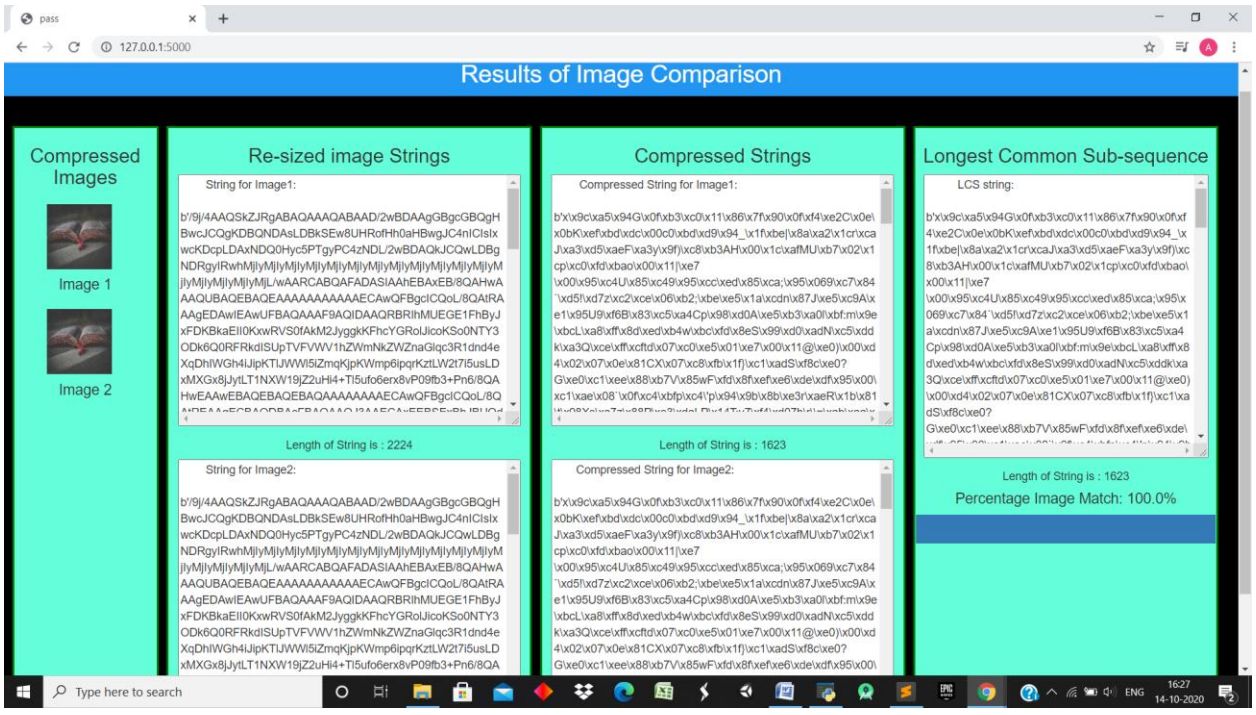
5. **Task 5: Creating a web app to demonstrate the working using flask app.**

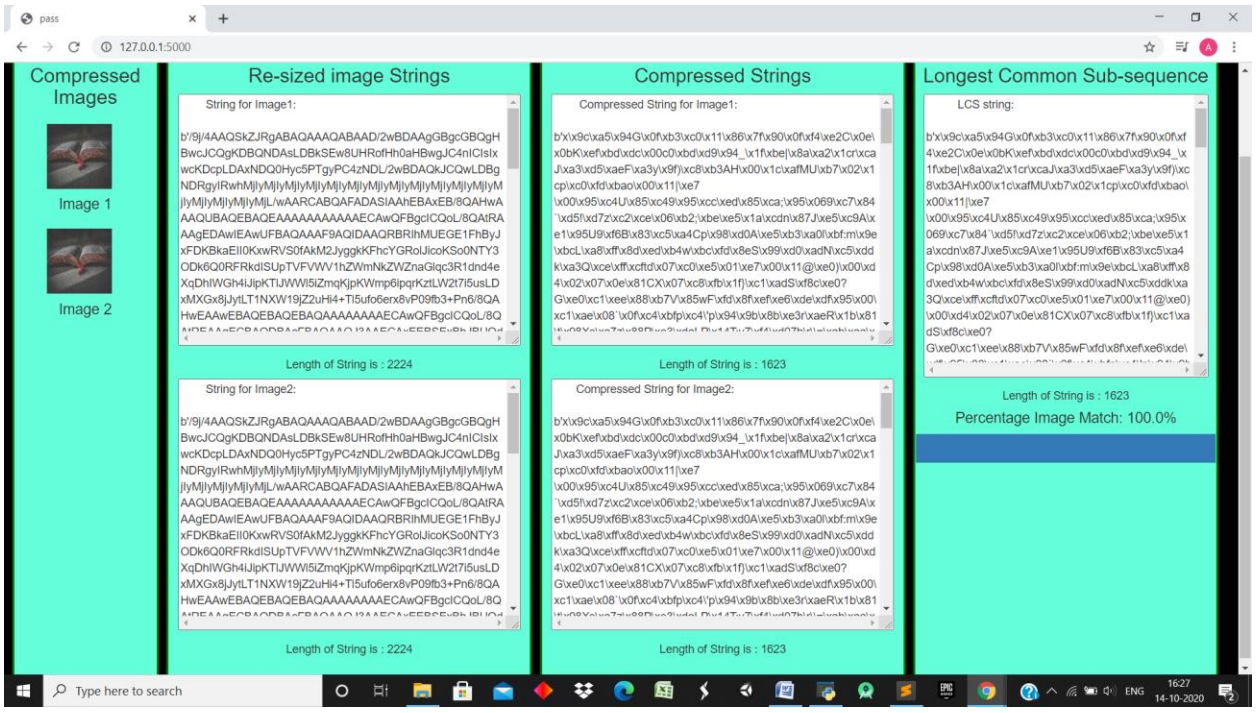
   We have created a flask web app which uses two render files known as index.html and pass.html. We take images from user as an input to a form in index.html and pass it to our backend to python program app.py for processing and calculating results. Then we pass all necessary information from our backend to the result display page which is our pass.html and display the results to the user through pass.html page. We understood about route creation and how to easily communicate between frontend and backend using flask.

WORKING SCREENSHOTS:

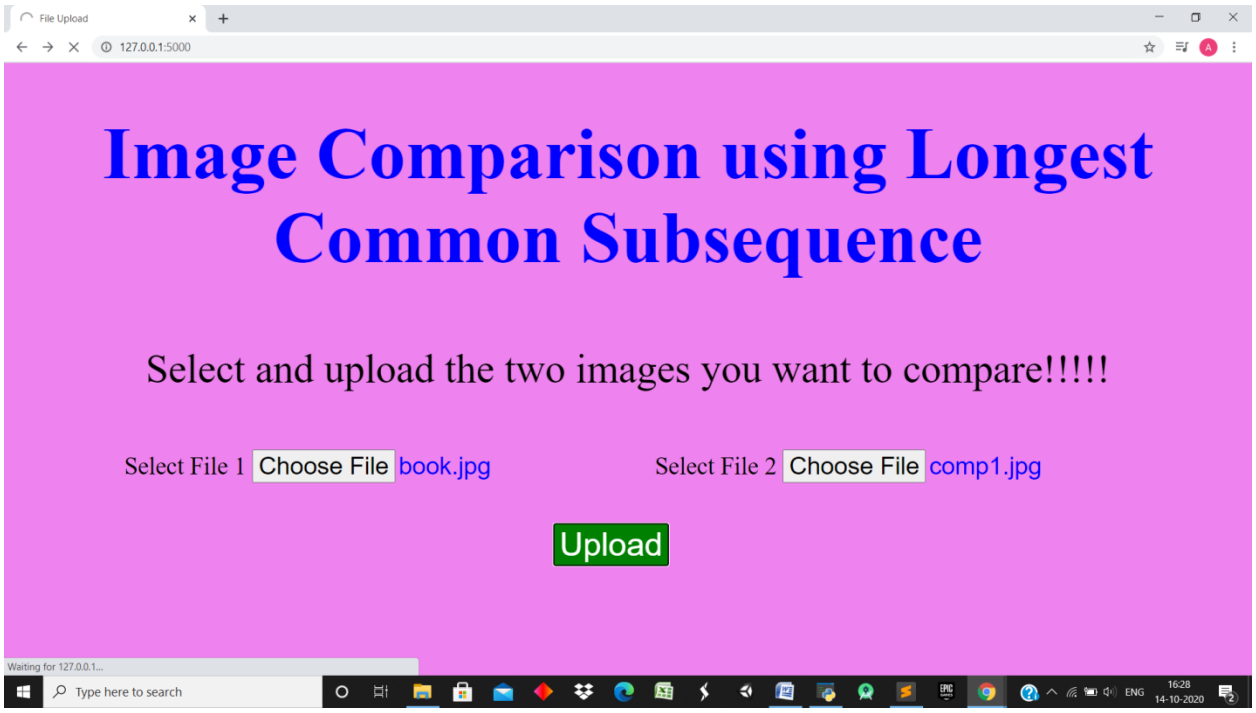
EXAMPLE 1

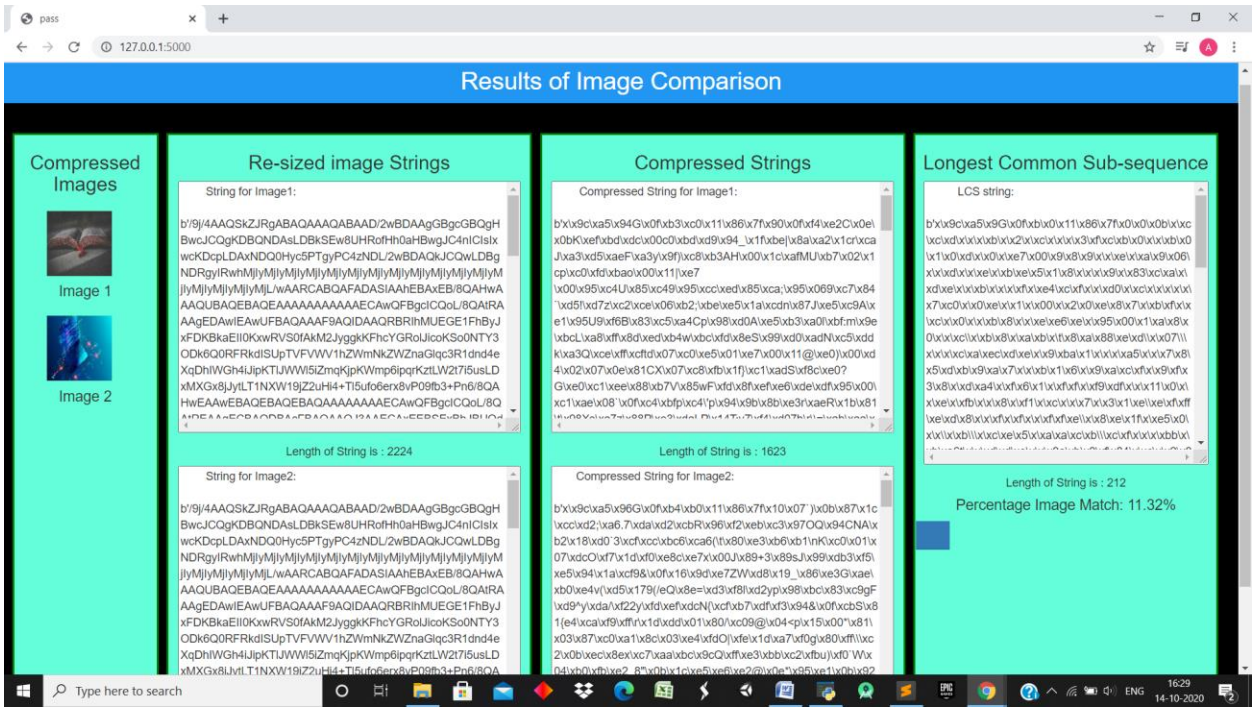

File Upload
127.0.0.1:5000
Image Comparison using Longest Common Subsequence
Select and upload the two images you want to compare!!!!!
Select File 1
Choose File
book.jpg
Select File 2
Choose File
book.jpg
Upload
Waiting for 127.0.0.1...
Type here to search
ENG
16:26
14-10-2020

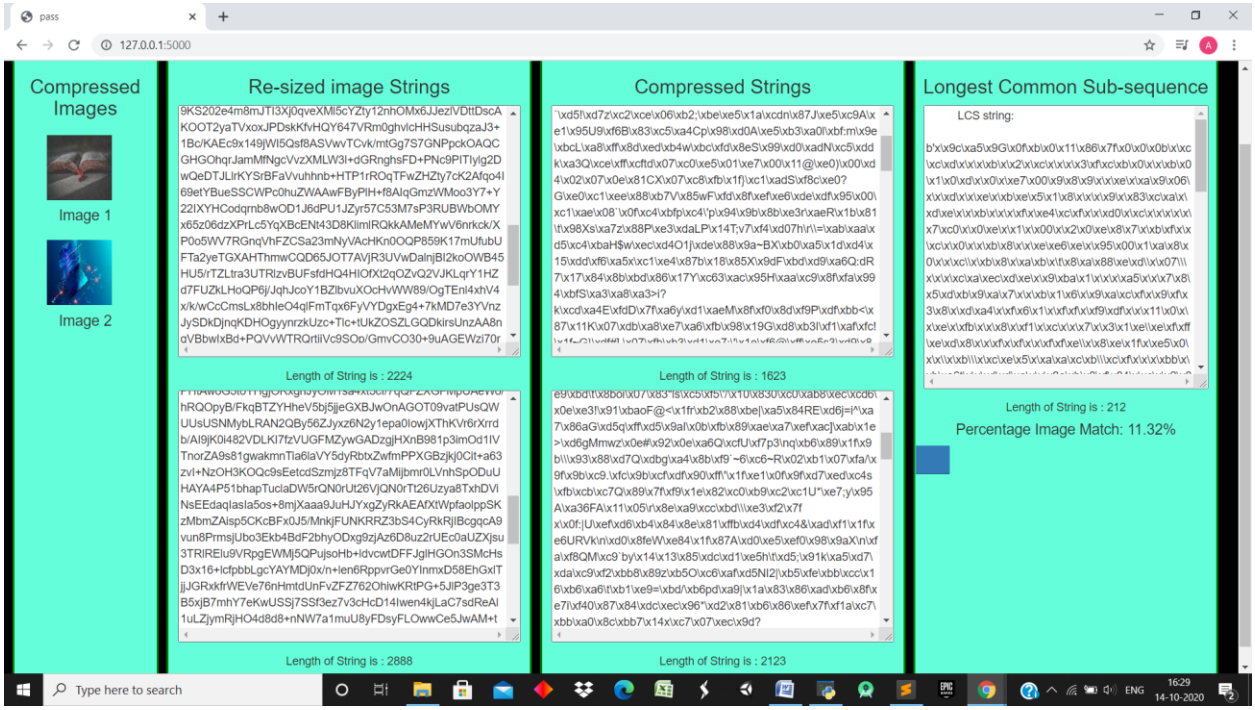

pass
127.0.0.1:5000
Results of Image Comparison
Compressed Images
Image 1
Image 2
Re-sized image Strings
String for Image1:
Length of String is : 2224
String for Image2:
Compressed Strings
Compressed String for Image1:
Length of String is : 1623
Compressed String for Image2:
Longest Common Sub-sequence
LCS string:
Length of String is : 1623
Percentage Image Match: 100.0%
Type here to search
ENG
16:27
14-10-2020


pass
127.0.0.1:5000
Compressed Images
Image 1
Image 2
Re-sized image Strings
String for Image1:
String for Image2:
Length of String is : 2224
Length of String is : 2224
Compressed Strings
Compressed String for Image1:
Compressed String for Image2:
Length of String is : 1623
Length of String is : 1623
Longest Common Sub-sequence
LCS string:
Length of String is : 1623
Percentage Image Match: 100.0%
Type here to search
ENG
16:27
14-10-2020

EXAMPLE 2


File Upload
127.0.0.1:5000
Image Comparison using Longest Common Subsequence
Select and upload the two images you want to compare!!!!!
Select File 1
Choose File
book.jpg
Select File 2
Choose File
comp1.jpg
Upload
Waiting for 127.0.0.1...
Type here to search
ENG
16:28
14-10-2020


pass
127.0.0.1:5000
Results of Image Comparison
Compressed Images
Image 1
Image 2
Re-sized image Strings
String for Image1:
b'/9j/4AAQSkZJRgABAQAAAQABAAD/2wBDAAgGBgcGBQgH
BwcJCQgKDBQNDAsLDBkSEw8UHRofHh0aHBwgJC4nICIsIx
wcKDcpLDAxNDQ0Hyc5PTgyPC4zNDL/2wBDAQkJCQwLDBg
NDRgyIRwhMjIyMjIyMjIyMjIyMjIyMjIyMjIyMjIyMjIyM
jIyMjIyMjIyMjL/wAARCABQAFADASIAAhEBAxEB/8QAHwA
AAQUBAQEBAQEAAAAAAAAAAAECAwQFBgcICQoL/8QAtRA
AAgEDAwIEAwUFBAQAAAF9AQIDAAQRBRIhMUEGE1FhByJ
xFDKBkaEII0KxwRVS0fAkM2JyggkKFhcYGRolJicoKSo0NTY3
ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4e
XqDhIWGh4iJipKTlJWWl5iZmqKjpKWmp6ipqrKztLW2t7i5usLD
xMXGx8jJytLT1NXW19jZ2uHi4+Tl5ufo6erx8vP09fb3+Pn6/8QA
HwEAAwEBAQEBAQEBAQAAAAAAAAECAwQFBgcICQoL/8Q
Length of String is : 2224
String for Image2:
b'/9j/4AAQSkZJRgABAQAAAQABAAD/2wBDAAgGBgcGBQgH
BwcJCQgKDBQNDAsLDBkSEw8UHRofHh0aHBwgJC4nICIsIx
wcKDcpLDAxNDQ0Hyc5PTgyPC4zNDL/2wBDAQkJCQwLDBg
NDRgyIRwhMjIyMjIyMjIyMjIyMjIyMjIyMjIyMjIyMjIyM
jIyMjIyMjIyMjL/wAARCABQAFADASIAAhEBAxEB/8QAHwA
AAQUBAQEBAQEAAAAAAAAAAECAwQFBgcICQoL/8QAtRA
AAgEDAwIEAwUFBAQAAAF9AQIDAAQRBRIhMUEGE1FhByJ
xFDKBkaEII0KxwRVS0fAkM2JyggkKFhcYGRolJicoKSo0NTY3
ODk6Q0RFRkdISUpTVFVWV1hZWmNkZWZnaGlqc3R1dnd4e
XqDhIWGh4iJipKTlJWWl5iZmqKjpKWmp6ipqrKztLW2t7i5usLD
xMXGx8jJytLT1NXW19jZ2uHi4+Tl5ufo6erx8vP09fb3+Pn6/8QA
Length of String is : 2224
Compressed Strings
Compressed String for Image1:
b'x\x9c\xa5\x94G\x0f\xb3\xc0\x11\x86\x7f\x90\x0f\xf4\xe2C\x0e\
x0bK\xef\xbd\xdc\x00c0\xbd\xd9\x94_\x1f\xbe|\x8a\xa2\x1cr\xca
J\xa3\xd5\xaeF\xa3y\x9f)\xc8\xb3AH\x00\x1c\xaffMU\xb7\x02\x1
cp\xc0\xfd\xbao\x00\x11[\xe7
\x00\x95\xc4U\x85\xc49\x95\xcc\xed\x85\xca;\x95\x069\xc7\x84
`\xd5f\xd7z\xc2\xce\x06\xb2;\xbe\xe5\x1a\xcdn\x87J\xe5\xc9A\x
e1\x95U9\xf6B\x83\xc5\xa4Cp\x98\xd0A\xe5\xb3\xa0l\xbf;m\x9e
\xbcL\xa8\xff\x8d\xed\xb4w\xbc\xfd\x8eS\x99\xd0\xadN\xc5\xdd
k\xa3Q\xce\xff\xcftd\x07\xc0\xe5\x01\xe7\x00\x11@\xe0)\x00\xd
4\x02\x07\x0e\x81CX\x07\xc8\xfb\x1f}\xc1\xadS\xf8c\xe0?
G\xe0\xc1\xee\x88\xb7V\x85wF\xfd\x8f\xef\xe6\xde\xdf\x95\x00\
xc1\xae\x08`\x0f\xc4\xbfp\xc4\'p\x94l\x9b\x8b\xe3r\xaeR\x1b\x81
\t\x98Xs\xa7z\x88P\xe3\xdaLP\x14T;v7\xf4\xd07h\n\=\xab\xaa\x
d5\xc4\xbaH$w\xec\xd4O1[\xde\x88\x9a~BX\xb0\xa5\x1d\xd4\x
15\xdd\xf6\xa5\xc1\xe4\x87b\x18\x85X\x9dF\xbd\xd9\xa6Q;dR
7\x17\x84\x8b\xbd\x86\x17Y\xc63\xac\x95H\xaa\xc9\x8f\xfa\x99
4\xbfS\xa3\xa8\xa3>I?
k\xcd\xa4E\xfdD\x7f\xa6y\xd1\xaeM\x8f\xf0\x8d\xf9P\xdf\xbb<\x
87\x11K\x07\xdb\xa8\xe7\xa6\xfb\x98\x19G\xd8\xb3\xf1\xaf\xfc!
Length of String is : 1623
Compressed String for Image2:
b'x\x9c\xa5\x96G\x0f\xb4\xb0\x11\x86\x7f\x10\x07`)\x0b\x87\x1c
\xcc\xd2;\xa6.7\xda\xd2\xcbR\x96\xf2\xeb\xc3\x97OQ\x94CNA\x
b2\x18\xd0`3\xcf\xcc\xbc6\xca6(\t\x80\xe3\xb6\xb1\nK\xc0\x01\x
07\xdcO\xf7\x1d\xf0\xe8c\xe7\x\00J\x89+3\x89sJ\x99\xdb3\xf5\
xe5\x94\x1a\xcf9&\x0f\x16\x9d\xe7ZW\xd8\x19_\x86\xe3G\xae\
xb0\xe4v(\xd5\x179/(eQ\x8e=\xd3\xf8l\xd2ypx98\xbc\x83\xc9gF
\xd9^y\xda/\xf22y\xfd\xef\xdcN{\xcf\xb7\xdf\xf3\x94&\x0f\xcbS\x8
1(e4\xca\xf9\xff\r\x1d\xdd\x01\x80/\xc09@\x04<p\x15\x00"\x81\
x03\x87\xc0\xa1\x8c\x03\xe4\xfdO|\xfe\x1d\xa7\xf0g\x80\xff\\xc
2\x0b\xec\x8ex\xc7\xaa\xbc\x9cQ\xff\xe3\xbb\xc2\xfbu)\xf0`W\x
04\xb0\xfb\xe2_8"\x0b\x1c\xe5\xe6\xe2/@\x0e"\x95\xe1\x0b\x92
Length of String is : 1623
Longest Common Sub-sequence
LCS string:
b'x\x9c\xa5\x9G\x0f\xb\x0\x11\x86\x7f\x0\x0\x0b\x\xc
\xc\xd\x\x\xb\x\x2\x\xc\x\x\x\x3\xf\xc\xb\x0\x\x\xb\x0
\x1\x0\xd\x\x0\x\xe7\x00\x9\x8\x9\x\x\xe\x\xa\x9\x06\
x\x\xd\x\x\xe\x\xb\xe\x5\x1\x8\x\x\x\x9\x\x83\xc\xa\x\
xd\xe\x\x\xb\x\x\x\xf\x\xe4\xc\xf\x\x\xd0\x\xc\x\x\x\x\
x7\xc0\x\x0\xe\x\x1\x\x00\x\x2\x0\xe\x8\x7\x\xb\xf\x\x
\xc\x\x0\x\x\xb\x8\x\x\xe\xe6\xe\x\x95\x00\x1\xa\x8\x
0\x\x\xc\x\xb\x8\x\xa\xb\x\f\x8\xa\x88\xe\xd\x\x07\\\
x\x\x\xc\xa\xec\xd\xe\x\x9\xba\x1\x\x\x\xa5\x\x\x7\x8\
x5\xd\xb\x9\xa\x7\x\x\xb\x1\x6\x\x9\xa\xc\xf\x\x9\xf\x
3\x8\x\xd\xa4\x\xf\x6\x1\x\xf\xf\x\xf9\xdf\x\x\x11\x0\x\
x\xe\x\xfb\x\x\x8\x\xf1\x\xc\x\x\x7\x\x3\x1\xe\\xe\xf\xff
\xe\xd\x8\x\x\xf\x\x\xf\xf\xe\\x8\xe\x1f\x\xe5\x0\
x\x\\x\xb\\\x\xc\xe\x5\x\xa\xa\xc\xb\\\xc\xf\x\x\xbb\x\
Length of String is : 212
Percentage Image Match: 11.32%
Type here to search
ENG
16:29
14-10-2020


pass
127.0.0.1:5000
Compressed Images
Image 1
Image 2
Re-sized image Strings
9KS202e4m8mJTi3Xj0qveXMl5cYZty12nhOMx6JJezlVDttDscA
KOOT2yaTVxoxJPDskKfvHQY647VRm0ghvlcHHSusubqzaJ3+
1Bc/KAEc9x149jWl5Qsf8ASVwvTCvk/mtGg7S7GNPpckOAQC
GHGOhqrJamMfNgcVvzXMLW3l+dGRnghsFD+PNc9PlTlylg2D
wQeDTJLrKYSrBFaVvuhhnb+HTP1rRoqTFwZHZty7cK2Afqo4I
69etYBueSSCWPc0huZWAAwFByPIH+f8AlqGmzWMoo3Y7+Y
22IXYHCodqrnb8wOD1J6dPU1JZyr57C53MTsP3RUBWbOMY
x65z06dzXPrLc5YqXBcENt43D8KlimIRQkkAMeMYwV6nrkck/X
P0o5WV7RGnqVhFZCSa23mNyVAcHKn0OQP859K17mUfubU
FTa2yeTGXAHThmwCQD65JOT7AVjR3UVwDalnjBI2koOWB45
HU5/rTZLtra3UTRlzvBUFsfdHQ4HlOfXt2qOZvQ2VJKLqrY1HZ
d7FUZkLHoQP6j/JqhJcoY1BZlbvuXOcHvWW89/OgTEnl4xhV4
x/k/wCcCmsLx8bhleO4qlFmTqx6FyVYDgxEg4+7kMD7e3YVnz
JySDkDjnqKDHOgyynrzkUzc+Tlc+tUkZOSZLGQDkirsUnzAA8n
qVBbwlxBd+PQVvWTRQrtiiVc9SOp/GmvCO30+9uAGEWzi70r
Length of String is : 2224
hRQOpyB/FkqBTZYHheV5bj5jjeGXBJwOnAGOT09vatPUsQW
UUsUSNMybLRAN2QBy56ZJyxz6N2y1epa0lowjXThKVr6rXrrd
b/AI9jK0i482VDLKI7fzVUGFMZywGADzgjHXnB981p3ImOd1IV
TnorZA9s81gwakmnTia6laVY5dyRbtxZwfmPPXGBzjkj0Clt+a63
zvl+NzOH3KOQc9sEetcdSzmjz8TFqV7aMljbmr0LVnhSpODuU
HAYA4P51bhapTuclaDW5rQN0rUt26VjQN0rTt26Uzya8TxhDVl
NsEEdaqIasIa5os+8mjXaaa9JuHJYxgZyRkAEAfXtWpfaolppSK
zMbmZAlsp5CKcBFx0J5/MnkjFUNKRRZ3bS4CyRkRjlBcgqcA9
vun8PrmsjUbo3Ekb4BdF2bhyODxg9zjAz6D8uz2rUEc0aUZXjsu
3TRlREIu9VRpgEWMj5QPujsoHb+ldvcwtDFFJglHGOn3SMcHs
D3x16+lcfpbbLgcYAYMDj0x/n+ien6RppvrGe0YlnmxD58EhGxIT
jjJGRxkfrWEVe76nHmtdUnFvZFZ762OhiwKRtPG+5JlP3ge3T3
B5xjB7mhY7eKwUSSj7SSf3ez7v3cHcD14lwen4kjLaC7sdReAl
1uLZjymRjHO4d8d8+nNW7a1muU8yFDsyFLOwwCe5JwAM+t
Length of String is : 2888
Compressed Strings
`\xd5f\xd7z\xc2\xce\x06\xb2;\xbe\xe5\x1a\xcdn\x87J\xe5\xc9A\x
e1\x95U9\xf6B\x83\xc5\xa4Cp\x98\xd0A\xe5\xb3\xa0l\xbf;m\x9e
\xbcL\xa8\xff\x8d\xed\xb4w\xbc\xfd\x8eS\x99\xd0\xadN\xc5\xdd
k\xa3Q\xce\xff\xcftd\x07\xc0\xe5\x01\xe7\x00\x11@\xe0)\x00\xd
4\x02\x07\x0e\x81CX\x07\xc8\xfb\x1f}\xc1\xadS\xf8c\xe0?
G\xe0\xc1\xee\x88\xb7V\x85wF\xfd\x8f\xef\xe6\xde\xdf\x95\x00\
xc1\xae\x08`\x0f\xc4\xbfp\xc4\'p\x94l\x9b\x8b\xe3r\xaeR\x1b\x81
\t\x98Xs\xa7z\x88P\xe3\xdaLP\x14T;v7\xf4\xd07h\n\=\xab\xaa\x
d5\xc4\xbaH$w\xec\xd4O1[\xde\x88\x9a~BX\xb0\xa5\x1d\xd4\x
15\xdd\xf6\xa5\xc1\xe4\x87b\x18\x85X\x9dF\xbd\xd9\xa6Q;dR
7\x17\x84\x8b\xbd\x86\x17Y\xc63\xac\x95H\xaa\xc9\x8f\xfa\x99
4\xbfS\xa3\xa8\xa3>I?
k\xcd\xa4E\xfdD\x7f\xa6y\xd1\xaeM\x8f\xf0\x8d\xf9P\xdf\xbb<\x
87\x11K\x07\xdb\xa8\xe7\xa6\xfb\x98\x19G\xd8\xb3\xf1\xaf\xfc!
Length of String is : 1623
e9\xbd\t\x8b0l\x07\x83"ls\xc5\xf5\'/\x10\x830\xc0\xab8\xec\xcd6\
x0e\xe3f\x91\xbaoF@<\x1f\rxb2\x88\xbe|\xa5\x84RE\xd6j=i^\xa
7\x86aG\xd5q\xff\xd5\x9al\x0b\xfb\x89\xae\xa7\xef\xac|\xab\x1e
>\xd6gMmwz\x0e#\x92\x0e\xa6Q\xcf\U\xf7p3\nq\xb6\x89\x1f\x9
b\\\x93\x88\xd7Q\xdbg\xa4\x8b\xf9~6\xc6~R\x02\xb1\x07\xfa/\x
9f\x9b\xc9.\xfc\x9b\xcf\xdf\x90\xff\"x1f\xe1\x0f\x9f\xd7\xed\xc4s
\xfb\xcb\xc7Q\x89\x7f\xf9\x1e\x82\xc0\xb9\xc2\xc1U"\xe7;y\x95
A\xa36FA\x11\x05\r\x8e\xa9\xcc\xbd\\\xe3\xf2\x7f
x\x0f:|U\xef\xd6\xb4\x84\x8e\x81\xffb\xd4\xdf\xc4&\xad\xf1\x1f\x
e6URV\n\xd0\x8feW\xe84\x1f\x87A\xd0\xe5\xef0\x98\x9aX\n\xf
a\xf8QM\xc9`by\x14\x13\x85\xdc\xd1\xe5h!\txd5;\x91k\xa5\xd7\
xda\xc9\xf2\xbb8\x89z\xb5O\xc6\xaf\xd5Nl2[\xb5\xfe\xbb\xcc\x1
6\xb6\xa6l\xb1\xe9=\xbd/\xb6pd\xa9[\x1a\x83\x86\xad\xb6\x8f\x
e7l\xf40\x87\x84\xdc\xec\x96"\xd2\x81\xb6\x86\xef\x7f\xf1a\xc7\
xbb\xa0\x8c\xbb7\x14x\xc7\x07\xec\x9d?
Length of String is : 2123
Longest Common Sub-sequence
LCS string:
b'x\x9c\xa5\x9G\x0f\xb\x0\x11\x86\x7f\x0\x0\x0b\x\xc
\xc\xd\x\x\xb\x\x2\x\xc\x\x\x\x3\xf\xc\xb\x0\x\x\xb\x0
\x1\x0\xd\x\x0\x\xe7\x00\x9\x8\x9\x\x\xe\x\xa\x9\x06\
x\x\xd\x\x\xe\x\xb\xe\x5\x1\x8\x\x\x\x9\x\x83\xc\xa\x\
xd\xe\x\x\xb\x\x\x\xf\x\xe4\xc\xf\x\x\xd0\x\xc\x\x\x\x\
x7\xc0\x\x0\xe\x\x1\x\x00\x\x2\x0\xe\x8\x7\x\xb\xf\x\x
\xc\x\x0\x\x\xb\x8\x\x\xe\xe6\xe\x\x95\x00\x1\xa\x8\x
0\x\x\xc\x\xb\x8\x\xa\xb\x\f\x8\xa\x88\xe\xd\x\x07\\\
x\x\x\xc\xa\xec\xd\xe\x\x9\xba\x1\x\x\x\xa5\x\x\x7\x8\
x5\xd\xb\x9\xa\x7\x\x\xb\x1\x6\x\x9\xa\xc\xf\x\x9\xf\x
3\x8\x\xd\xa4\x\xf\x6\x1\x\xf\xf\x\xf9\xdf\x\x\x11\x0\x\
x\xe\x\xfb\x\x\x8\x\xf1\x\xc\x\x\x7\x\x3\x1\xe\\xe\xf\xff
\xe\xd\x8\x\x\xf\x\x\xf\xf\xe\\x8\xe\x1f\x\xe5\x0\
x\x\\x\xb\\\x\xc\xe\x5\x\xa\xa\xc\xb\\\xc\xf\x\x\xbb\x\
Length of String is : 212
Percentage Image Match: 11.32%
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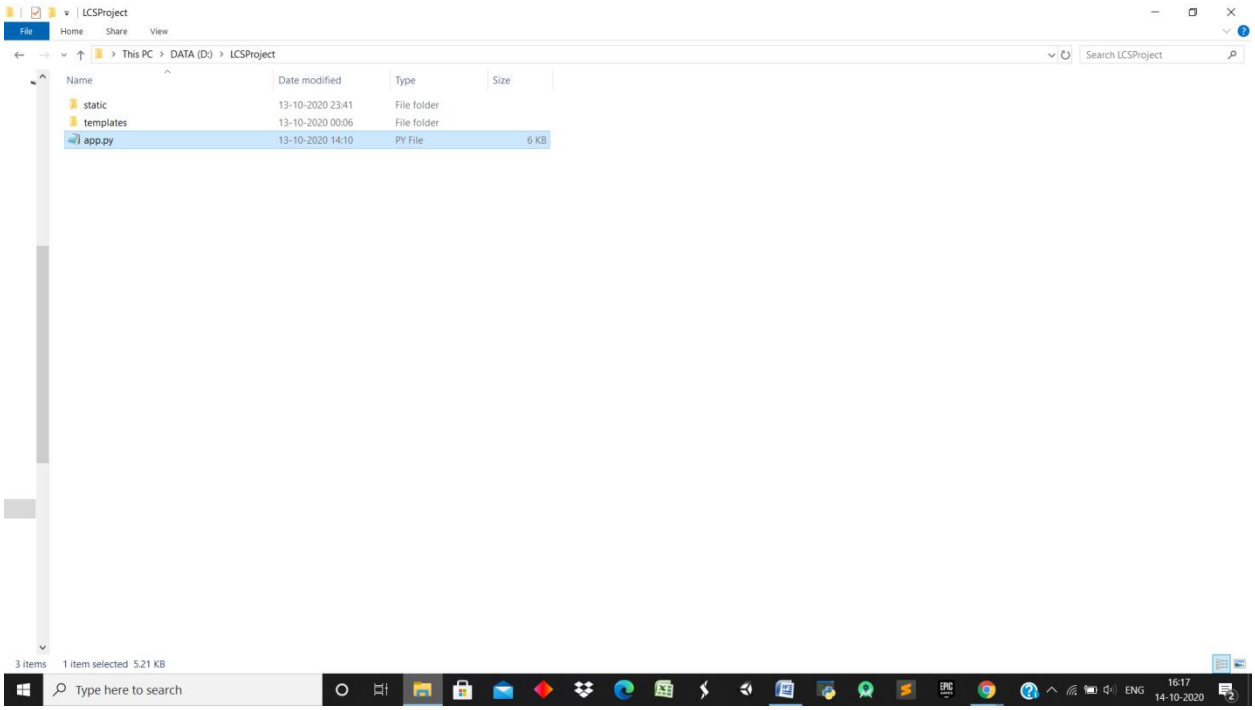
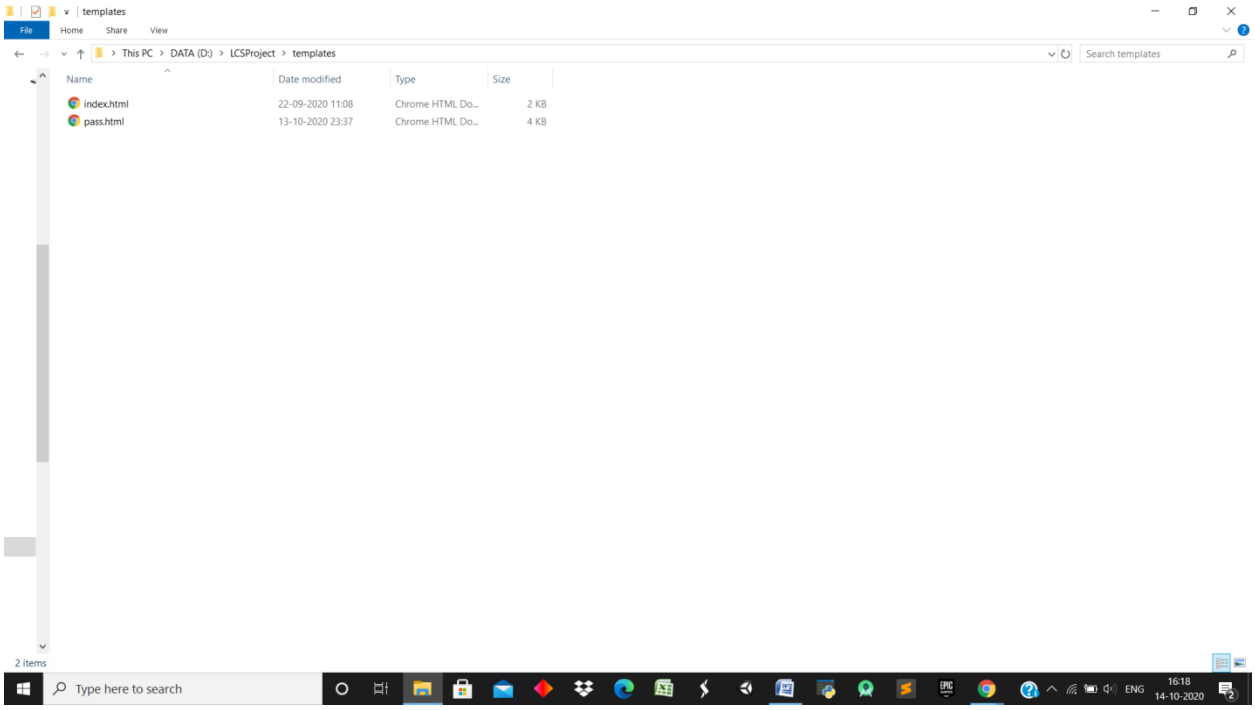
ENG
16:29
14-10-2020

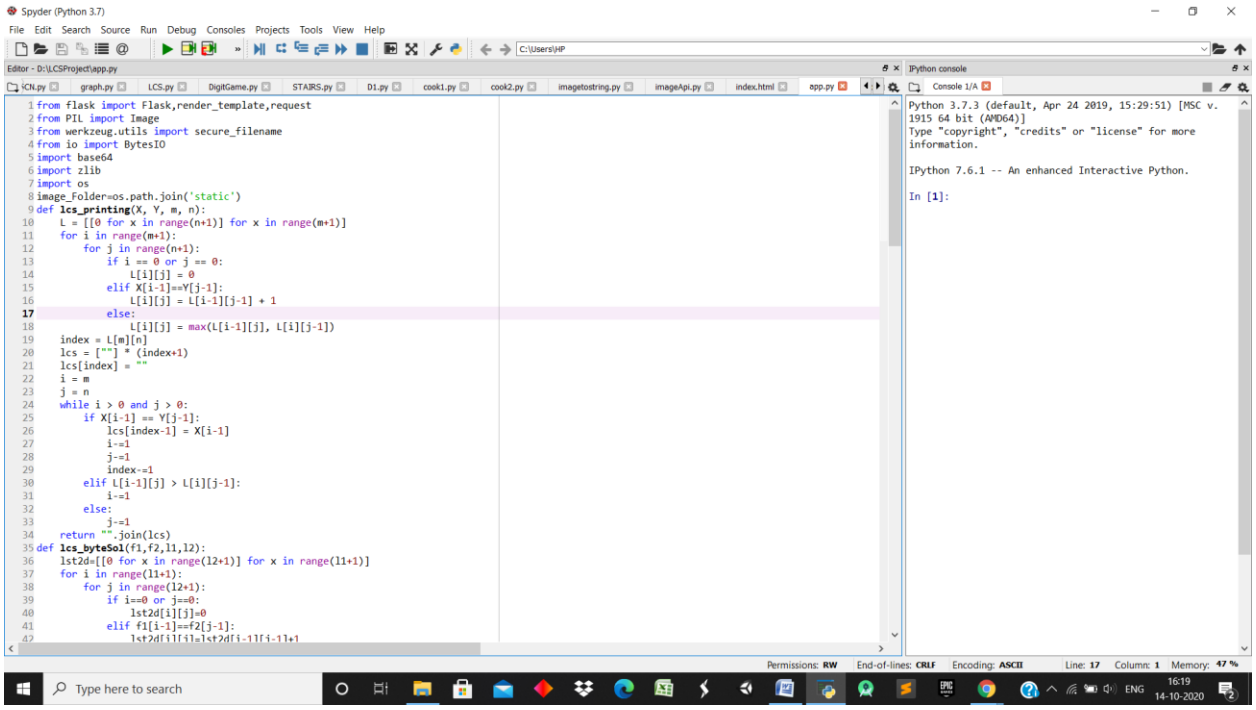
SCREENSHOTS FOR OUR APP AND DIRECTORY STRUCTURE AND CODE:



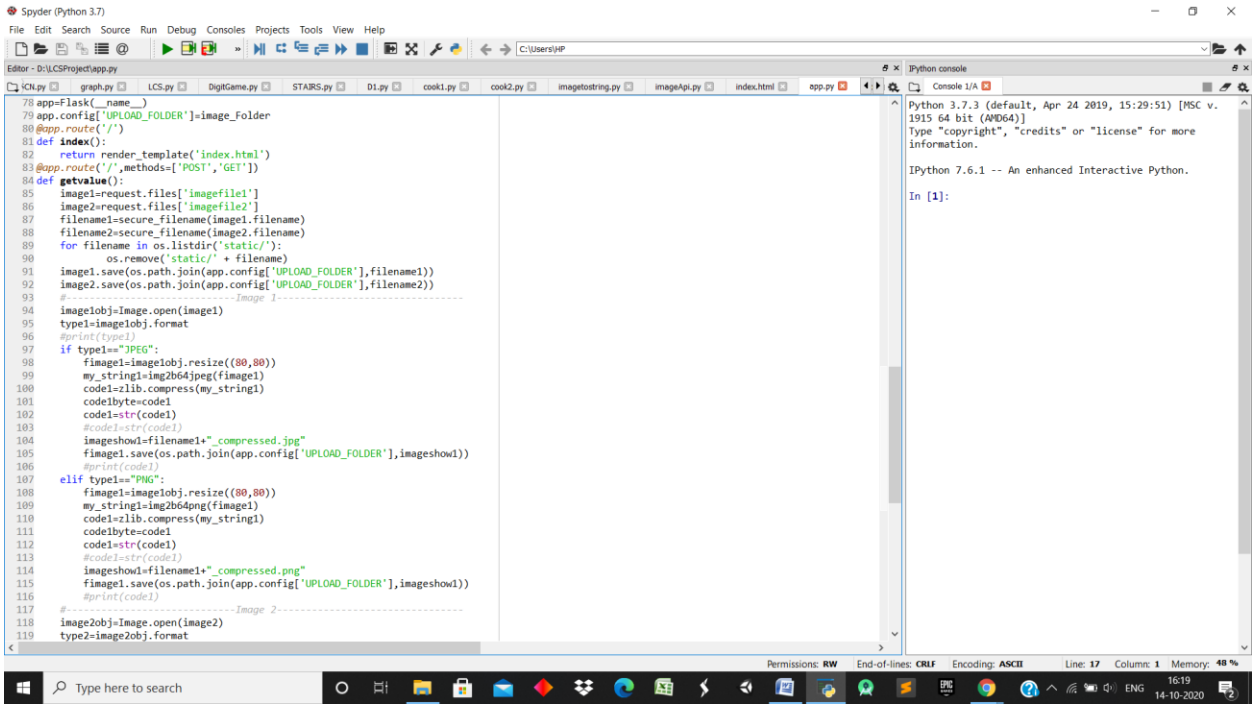


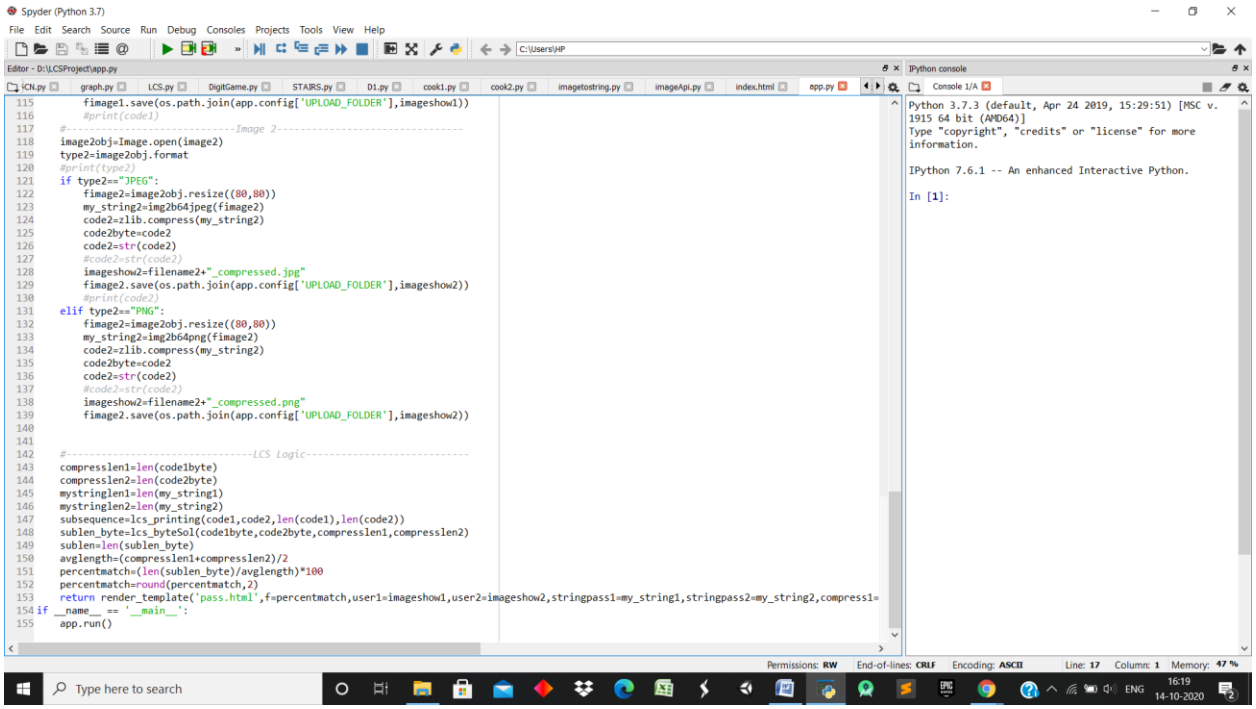
CODE SCREENSHOTS:

app.py

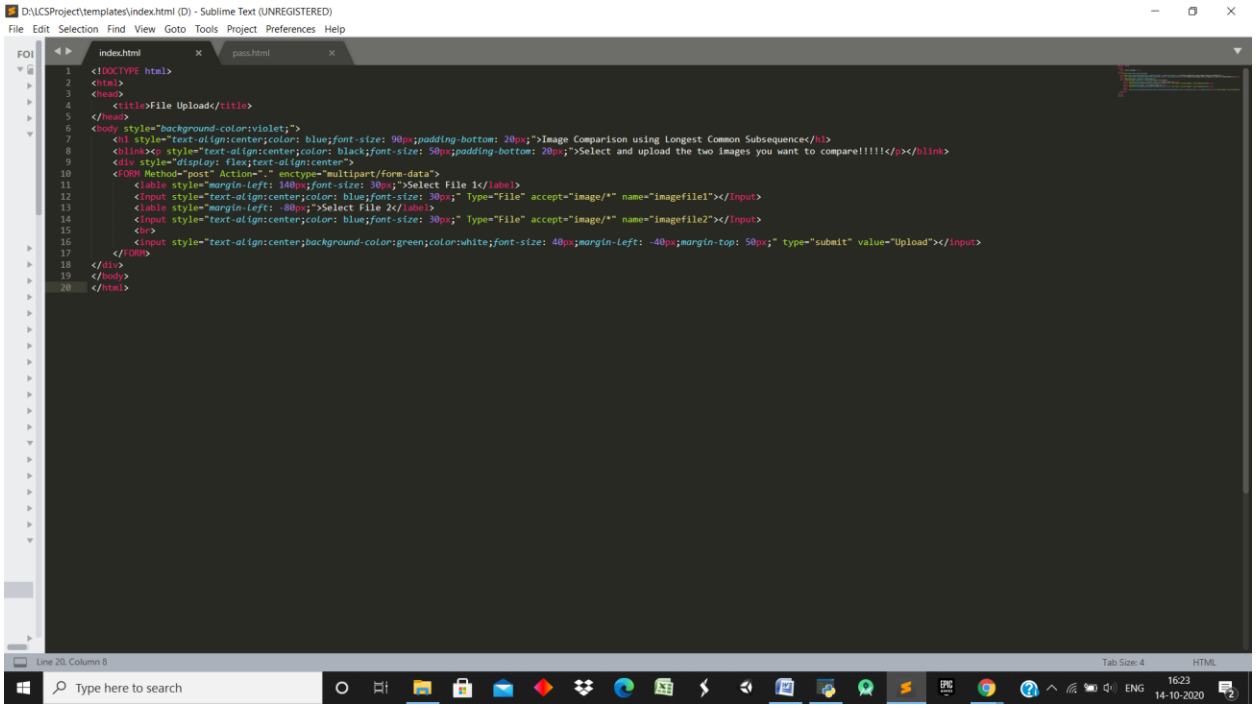



```python
from flask import Flask,render_template,request
from PIL import Image
from werkzeug.utils import secure_filename
from io import BytesIO
import base64
import zlib
import os
image_Folder=os.path.join('static')
def lcs_printing(X, Y, m, n):
    L = [[0 for x in range(n+1)] for x in range(m+1)]
    for i in range(m+1):
        for j in range(n+1):
            if i == 0 or j == 0:
                L[i][j] = 0
            elif X[i-1]==Y[j-1]:
                L[i][j] = L[i-1][j-1] + 1
            else:
                L[i][j] = max(L[i-1][j], L[i][j-1])
    index = L[m][n]
    lcs = [""] * (index+1)
    lcs[index] = ""
    i = m
    j = n
    while i > 0 and j > 0:
        if X[i-1] == Y[j-1]:
            lcs[index-1] = X[i-1]
            i-=1
            j-=1
            index-=1
        elif L[i-1][j] > L[i][j-1]:
            i-=1
        else:
            j-=1
    return "".join(lcs)
def lcs_byteSol(f1,f2,l1,l2):
    lst2d=[[0 for x in range(l2+1)] for x in range(l1+1)]
    for i in range(l1+1):
        for j in range(l2+1):
            if i==0 or j==0:
                lst2d[i][j]=0
            elif f1[i-1]==f2[j-1]:
                lst2d[i][j]=lst2d[i-1][j-1]+1
            else:
                lst2d[i][j]=max(lst2d[i-1][j],lst2d[i][j-1])
    index=lst2d[l1][l2]
    lcs=[""]*(index+1)
    lcs[index]=""
    i=l1
    j=l2
    while i > 0 and j > 0:
        if f1[i-1]==f2[j-1]:
            lcs[index-1]=f1[i-1]
            i-=1
            j-=1
            index-=1
        elif lst2d[i-1][j]>lst2d[i][j-1]:
            i-=1
        else:
            j-=1
    lcs.pop(-1)
    return lcs
def img2b64jpeg(image):
    buff=BytesIO()
    image.save(buff,format="JPEG")
    img_str=base64.b64encode(buff.getvalue())
    #print(type(sf))
    #print(type(img_str))
    #print(sf)
    return img_str
def img2b64png(image):
    buff=BytesIO()
    image.save(buff,format="PNG")
    img_str=base64.b64encode(buff.getvalue())
    #print(type(sf))
    #print(type(img_str))
    #print(sf)
    return img_str
app=Flask(__name__)
app.config['UPLOAD_FOLDER']=image_Folder
```


Spyder (Python 3.7)
File Edit Search Source Run Debug Consoles Projects Tools View Help
Editor - D:\LCSProject\app.py
app.py
IPython console
Console 1/A
Python 3.7.3 (default, Apr 24 2019, 15:29:51) [MSC v. 1915 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.
IPython 7.6.1 -- An enhanced Interactive Python.
In [1]:
Permissions: RW End-of-lines: CRLF Encoding: ASCII Line: 17 Column: 1 Memory: 48 %
Type here to search
ENG 16:19 14-10-2020


Spyder (Python 3.7)
File Edit Search Source Run Debug Consoles Projects Tools View Help
Editor - D:\LCSProject\app.py
app.py
IPython console
Console 1/A
Python 3.7.3 (default, Apr 24 2019, 15:29:51) [MSC v. 1915 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.
IPython 7.6.1 -- An enhanced Interactive Python.
In [1]:
Permissions: RW End-of-lines: CRLF Encoding: ASCII Line: 17 Column: 1 Memory: 47 %
Type here to search
ENG 16:19 14-10-2020

index.html

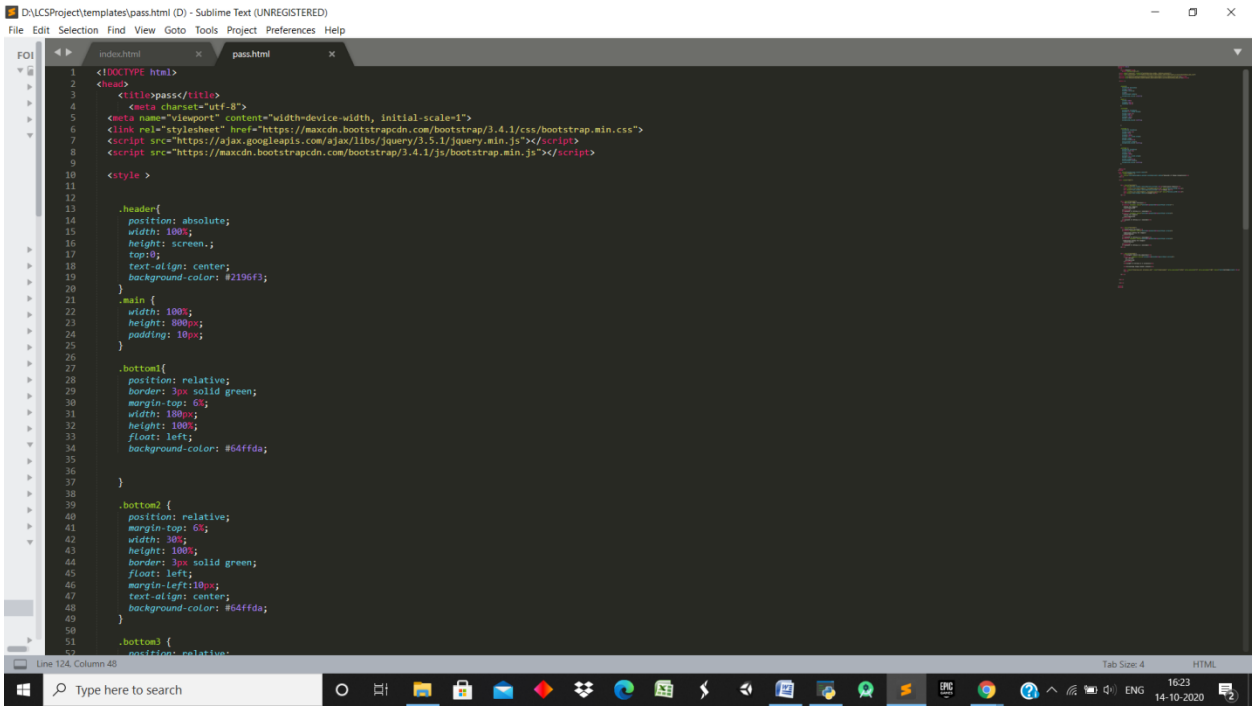

D:\LCSProject\templates\index.html (D) - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
index.html
pass.html
<!DOCTYPE html>
<html>
<head>
<title>File Upload</title>
</head>
<body style="background-color:violet;">
<h1 style="text-align:center;color: blue;font-size: 90px;padding-bottom: 20px;">Image Comparison using Longest Common Subsequence</h1>
<blink> Select and upload the two images you want to compare!!!!! </blink>

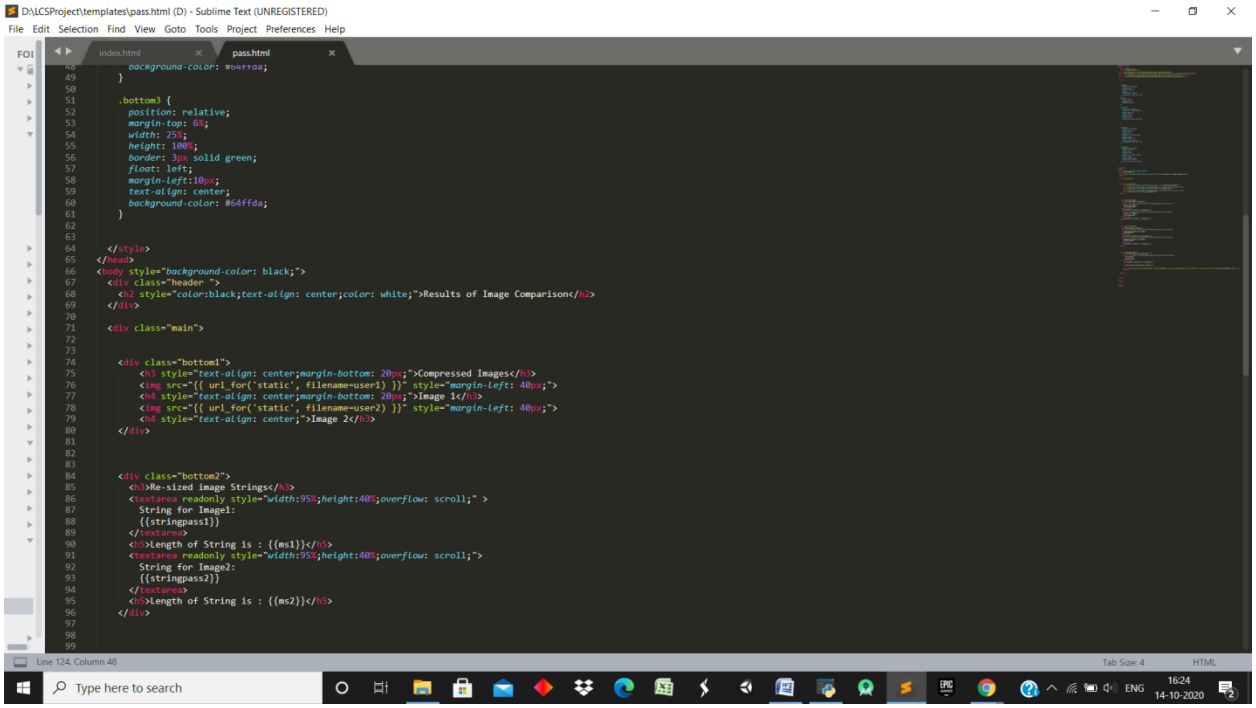
<FORM Method="post" Action="." enctype="multipart/form-data">
<lable style="margin-left: 140px;font-size: 30px;">Select File 1</label>
<Input style="text-align:center;color: blue;font-size: 30px;" Type="File" accept="image/*" name="imagefile1"></Input>
<lable style="margin-left: -80px;">Select File 2</label>
<Input style="text-align:center;color: blue;font-size: 30px;" Type="File" accept="image/*" name="imagefile2"></Input>

<input style="text-align:center;background-color:green;color:white;font-size: 40px;margin-left: -40px;margin-top: 50px;" type="submit" value="Upload"></input>
</FORM>

</body>
</html>
Line 20, Column 8
Tab Size: 4
HTML
Type here to search
ENG
16:23
14-10-2020

pass.html


D:\LCSProject\templates\pass.html (D) - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
index.html
pass.html
<!DOCTYPE html>
<head>
<title>pass</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
<style >
.header{
position: absolute;
width: 100%;
height: screen.;
top:0;
text-align: center;
background-color: #2196f3;
}
.main {
width: 100%;
height: 800px;
padding: 10px;
}
.bottom1{
position: relative;
border: 3px solid green;
margin-top: 6%;
width: 180px;
height: 100%;
float: left;
background-color: #64ffda;
}
.bottom2 {
position: relative;
margin-top: 6%;
width: 30%;
height: 100%;
border: 3px solid green;
float: left;
margin-left:10px;
text-align: center;
background-color: #64ffda;
}
.bottom3 {
Line 124, Column 48
Tab Size: 4
HTML
Type here to search
ENG
16:23
14-10-2020

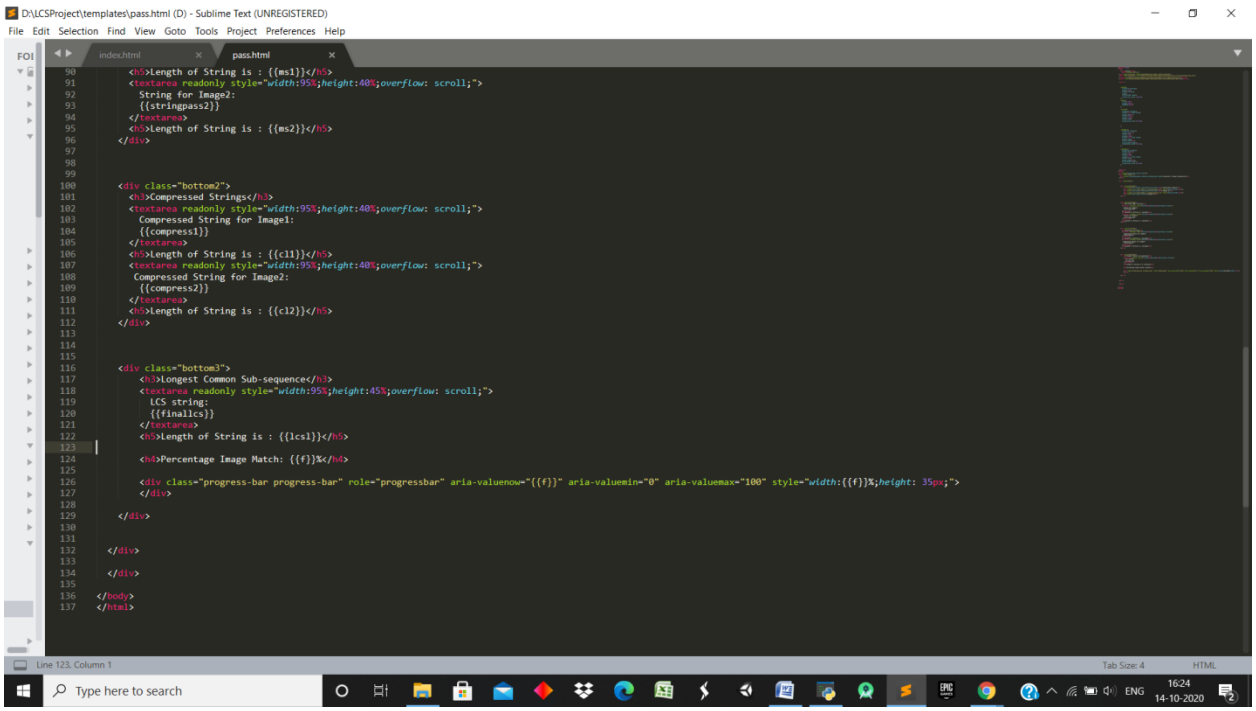

D:\LCSProject\templates\pass.html (D) - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
index.html
pass.html
background-color: #64ffda;
}
.bottom3 {
position: relative;
margin-top: 6%;
width: 25%;
height: 100%;
border: 3px solid green;
float: left;
margin-left:10px;
text-align: center;
background-color: #64ffda;
}
</style>
</head>
<body style="background-color: black;">

<h2 style="color:black;text-align: center;color: white;">Results of Image Comparison</h2>

<h3 style="text-align: center;margin-bottom: 20px;">Compressed Images</h3>
<img src="{{ url_for('static', filename=user1) }}" style="margin-left: 40px;">
<h4 style="text-align: center;margin-bottom: 20px;">Image 1</h3>
<img src="{{ url_for('static', filename=user2) }}" style="margin-left: 40px;">
<h4 style="text-align: center;">Image 2</h3>

<h3>Re-sized image Strings</h3>
<textarea readonly style="width:95%;height:40%;overflow: scroll;" >
String for Image1:
{{stringpass1}}
</textarea>
<h5>Length of String is : {{ms1}}</h5>
<textarea readonly style="width:95%;height:40%;overflow: scroll;">
String for Image2:
{{stringpass2}}
</textarea>
<h5>Length of String is : {{ms2}}</h5>

Line 124, Column 48
Tab Size: 4
HTML
Type here to search
ENG
16:24
14-10-2020


D:\LCSProject\templates\pass.html (D) - Sublime Text (UNREGISTERED)
File Edit Selection Find View Goto Tools Project Preferences Help
index.html
pass.html
<h5>Length of String is : {{ms1}}</h5>
<textarea readonly style="width:95%;height:40%;overflow: scroll;">
String for Image2:
{{stringpass2}}
</textarea>
<h5>Length of String is : {{ms2}}</h5>

<h3>Compressed Strings</h3>
<textarea readonly style="width:95%;height:40%;overflow: scroll;">
Compressed String for Image1:
{{compress1}}
</textarea>
<h5>Length of String is : {{cl1}}</h5>
<textarea readonly style="width:95%;height:40%;overflow: scroll;">
Compressed String for Image2:
{{compress2}}
</textarea>
<h5>Length of String is : {{cl2}}</h5>

<h3>Longest Common Sub-sequence</h3>
<textarea readonly style="width:95%;height:45%;overflow: scroll;">
LCS string:
{{finallcs}}
</textarea>
<h5>Length of String is : {{lcs1}}</h5>
<h4>Percentage Image Match: {{f}}%</h4>

</body>
</html>
Line 123, Column 1
Tab Size: 4
HTML
Type here to search
ENG
16:24
14-10-2020

----------THANK YOU----------