

***** COVER PAGE *****

Class: CV
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Project: Project 5
Project Name: Image Compression via Distance Transform
Language: C++
Due Date: 10/20/2024
Submit Date: 10/20/2024

===== ALGORITHM STEPS =====

Step 0: inFile, prettyPrintFile, skeletonFile, deCompressedFile, logFile open via **argv []**

numRows, numCols, minVal, maxVal read from inFile dynamically allocate ZFAry and skeletonAry with extra 2 rows and 2 cols distanceChoice get from **argv [2]**

Step 1: setZero (ZFAry)
setZero (skeletonAry)

Step 2: loadImage (inFile, ZFAry)
prettyPrint (ZFAry, prettyPrintFile) // with caption "*** Below is input image**"

Step 3: distanceTransform (ZFAry, distanceChoice, prettyPrintFile, logFile)

Step 4: compression (ZFAry, distanceChoice, skeletonAry, skeletonFile, prettyPrintFile, logFile)

Step 5: close skeletonFile

Step 6: reopen skeletonFile

Step 7: setZero (ZFAry)

Step 8: loadSkeleton (skeletonFile, ZFAry, logFile)
prettyPrint (ZFAry, prettyPrintFile) // with caption "*** Below is the loaded skeleton with choice = **"

Step 9: deCompression (ZFAry, distanceChoice, prettyPrintFile, logFile) // Perform decompression

Step 10: deCompressedFile output numRows, numCols, minVal, maxVal

Step 11: binThreshold (ZFAry, deCompressedFile)

Step 12: close all files

```
=====prettyPrint=====
```

[illegible][illegible]

.....

[illegible]

Header: 40 22 1 10

```
1st pass Expansion with choice = 44
```

Header: 40 22 1 10

Header: 40 22 1 10

11 12 10
22 3 1
22 21 1
23 4 2
23 20 2
24 5 3
24 19 3
25 6 4
25 18 4
26 7 5
26 17 5
27 8 6
27 16 6
28 9 7
28 15 7
29 10 8
29 14 8
30 12 10

[illegible]

[illegible]

```

*** Entering distanceTransform() method ... ***
*** Entering distancePass1() ***
1st Pass transform with choice = 4 : City-block Distance Transform
*** Entering distancePass2() ***
2nd Pass transform with choice = 4 : City-block Distance Transform
*** Leaving distanceTransform() Method ... ***
newMinVal: 1 newMaxVal: 10
*** Entering compression() method ***
Skeleton Extracted ...
*** Leaving compression() method ***
Skeleton File closed ...
Skeleton File read ...
ZF array Zeroed out ...
*** Entering LoadingSkeleton() ***
Loaded: 11 12 10
Loaded: 22 3 1
Loaded: 22 21 1
Loaded: 23 4 2
Loaded: 23 20 2
Loaded: 24 5 3
Loaded: 24 19 3
Loaded: 25 6 4
Loaded: 25 18 4
Loaded: 26 7 5
Loaded: 26 17 5
Loaded: 27 8 6
Loaded: 27 16 6
Loaded: 28 9 7
Loaded: 28 15 7
Loaded: 29 10 8
Loaded: 29 14 8
Loaded: 30 12 10
*** Skeleton loaded ... ***
*** Entering deCompression() ***
expansionPass1 ...
expansionPass2 ...
*** Leaving deCompression() ***
*** deCompressed Header Printed ***
ZFArray printed onto deCompressedFile

```

```
=====prettyPrint=====
```

```
Header: 40 22 0 1
```

*** Below is the input image ***

[illegible]

Header: 40 22 1 9

```
1st Pass transform with choice = 8 : 8 Connected Distance Transform
```

[illegible]

```
Header: 40 22 1 6
```

2nd Pass transform with choice = 8 : 8 Connected Distance Transform

[illegible]

Extracted Skeleton Array

Header: 40 22 1 6

[illegible]

*** Below is the loaded skeleton with choice = 8 ***
Header: 40 22 1 6

```
. . . . .
. . . . .
. . . . . 1 . . . . .
. . . . .
. . . . . 2 . . . . .
. . . . .
. . . . . 3 . . . . .
. . . . .
. . . . . 4 . . . . .
. . . . .
. . . . . 5 . . . . .
. . . 1 . 2 . 3 . 4 . 5 5 5 . 4 . 3 . 2 . 1 .
. . . . . 5 . . . . .
. . . . .
. . . . . 4 . . . . .
. . . . .
. . . . . 3 . . . . .
. . . . .
. . . . . 2 . . . . .
. . . . .
. . . . . 1 . . . . .
. . . . . 1 . . . . .
. . . . .
. . . . .
. . . . .
. . . . . 5 5 . . . . . 5 5 . . . . .
. . . . . 5 . 6 6 6 6 . 5 . . . . .
. . . . . 6 6 6 . . . . .
. . . . . 6 . . . . .
. . . . . 5 . . . . .
. . . . .
. . . . . 4 . . . . .
. . . . .
. . . . . 3 . . . . .
. . . . .
. . . . . 2 . . . . .
. . . . .
. . . . . 1 . . . . .
. . . . .
```

1st pass Expansion with choice = 88
Header: 40 22 1 6

```
. . . . .
. . . . .
. . . . . 1 . . . . .
. . . . . 1 1 1 . . . . .
. . . . . 1 2 1 . . . . .
. . . . . 2 2 2 1 . . . . .
. . . . . 1 2 3 2 1 . . . . .
. . . . . 1 3 3 3 2 1 . . . . .
. . . . . 2 3 4 3 2 1 . . . . .
. . . . . 1 2 4 4 4 3 2 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 5 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 2 1 1 . . . . .
. . . . . 1 1 2 1 1 . . . . .
. . . . . 1 1 1 . . . . .
. . . . . 1 . . . . .
. . . . . 1 . . . . .
. . . . .
. . . . .
. . . . .
. . . . . 4 4 4 4 3 2 1 . . . . 4 4 4 4 3 2 1 . . . . .
. . . . . 3 4 5 5 5 5 5 5 5 5 5 5 5 4 3 2 1 . . . . .
. . . . . 2 3 4 4 4 5 5 6 6 6 6 6 5 5 4 4 3 2 1 . . . . .
. . . . . 1 2 3 3 4 4 5 5 6 6 6 5 5 4 4 3 3 2 1 . . . . .
. . . . . 1 2 2 3 3 4 4 5 5 6 5 5 4 4 3 3 2 2 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 5 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 2 1 1 . . . . .
. . . . . 1 1 1 . . . . .
. . . . . 1 . . . . .
. . . . . 1 . . . . .
. . . . .
```

2nd pass Expansion with choice = 88
Header: 40 22 1 6

```
. . . . .
. . . . .
. . . . . 1 . . . . .
. . . . . 1 1 1 . . . . .
. . . . . 1 1 2 1 1 . . . . .
. . . . . 1 1 2 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 5 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 2 1 1 . . . . .
. . . . . 1 1 2 2 1 1 . . . . .
. . . . . 1 1 1 . . . . .
. . . . . 1 . . . . .
. . . . . 1 . . . . .
. . . . . 1 . . . . .
. . . . . 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 . . . . .
. . . . . 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 1 . . . . .
. . . . . 1 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 1 . . . . .
. . . . . 1 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 2 1 . . . . .
. . . . . 1 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 4 3 2 1 . . . . .
. . . . . 1 2 3 4 4 5 5 6 6 6 6 6 6 6 5 5 4 4 3 2 1 . . . . .
. . . . . 1 2 3 3 4 4 5 5 6 6 6 5 5 4 4 3 3 2 1 . . . . .
. . . . . 1 2 3 3 4 4 5 5 6 6 5 5 4 4 3 3 2 2 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 5 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 5 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 4 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 4 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 3 3 2 2 1 1 . . . . .
. . . . . 1 1 2 2 2 1 1 . . . . .
. . . . . 1 1 2 2 2 1 1 . . . . .
. . . . . 1 1 2 2 1 1 . . . . .
. . . . . 1 1 1 . . . . .
. . . . . 1 . . . . .
```

2	12	1
4	12	2
6	12	3
8	12	4
10	12	5
11	3	1
11	5	2
11	7	3
11	9	4
11	11	5
11	12	5
11	13	5
11	15	4
11	17	3
11	19	2
11	21	1
12	12	5
14	12	4
16	12	3
18	12	2
20	12	1
21	12	1
26	7	5
26	8	5
26	16	5
26	17	5
27	8	5
27	10	6
27	11	6
27	12	6
27	13	6
27	14	6
27	16	5
28	11	6
28	12	6
28	13	6
29	12	6
31	12	5
33	12	4
35	12	3
37	12	2
39	12	1

[illegible]

[illegible]

```
Skeleton File read ...
ZF array Zeroed out ...
*** Entering LoadingSkeleton() ***
Loaded: 2 12 1
Loaded: 4 12 2
Loaded: 6 12 3
Loaded: 8 12 4
Loaded: 10 12 5
Loaded: 11 3 1
Loaded: 11 5 2
Loaded: 11 7 3
Loaded: 11 9 4
Loaded: 11 11 5
Loaded: 11 12 5
Loaded: 11 13 5
Loaded: 11 15 4
Loaded: 11 17 3
Loaded: 11 19 2
Loaded: 11 21 1
Loaded: 12 12 5
Loaded: 14 12 4
Loaded: 16 12 3
Loaded: 18 12 2
Loaded: 20 12 1
Loaded: 21 12 1
Loaded: 26 7 5
Loaded: 26 8 5
Loaded: 26 16 5
Loaded: 26 17 5
Loaded: 27 8 5
Loaded: 27 10 6
Loaded: 27 11 6
Loaded: 27 12 6
Loaded: 27 13 6
Loaded: 27 14 6
Loaded: 27 16 5
Loaded: 28 11 6
Loaded: 28 12 6
Loaded: 28 13 6
Loaded: 29 12 6
Loaded: 31 12 5
Loaded: 33 12 4
Loaded: 35 12 3
Loaded: 37 12 2
Loaded: 39 12 1
*** Skeleton loaded ... ***
*** Entering deCompression() ***
expansionPass1 ...
expansionPass2 ...
*** Leaving deCompression() ***
*** deCompressed Header Printed ***
ZFArray printed onto deCompressedFile
```

```
=====prettyPrintFile=====
```

[illegible][illegible]

=====SkeletonFile=====

63 31 1
63 31 2
8 31 3
12 31 5
13 22 1
13 24 2
13 26 3
13 28 4
13 30 5
13 31 5
13 32 5
13 34
13 36 3
13 38 2
14 30 1
14 31 5
14 46 1
14 62 1
15 46 1
15 61 1
15 62 1
16 31 4
17 47 2
17 61 2
18 31 3
18 47 2
18 48 2
18 60 2
18 61 2
20 48 3
20 60 3
21 9 6
21 10 6
21 11 6
21 12 6
21 13 6
21 15 6
21 48 3
21 49 3
21 59 3
21 60 3
22 31 1
23 31 1
23 49 4
23 51 1
23 53 2
23 54 2
23 55 2
23 57 3
23 59 4
25 48 3
25 49 3
25 59 3
25 60 3
26 48 3
26 60 3
27 31 3
28 47 2
28 48 2
28 60 2
28 61 2
29 47 2
29 61 2
31 31 5
31 46 1
31 47

31	61	1
31	62	1
32	22	1
32	24	2
32	26	3
32	28	4
32	30	5
32	31	5
32	32	5
32	34	4
32	36	3
32	38	2
32	40	1
32	46	1
32	62	1
33	31	5
35	31	4
37	31	3
39	31	2
41	31	1

```
=====deCompressedFile=====
```

[illegible]

```
*** Below is the input image ***
```

```
Loaded: 21 12 6
Loaded: 21 13 6
Loaded: 21 14 6
Loaded: 21 15 6
Loaded: 21 48 3
Loaded: 21 49 3
Loaded: 21 59 3
Loaded: 21 60 3
Loaded: 22 31 1
Loaded: 23 31 1
Loaded: 23 49 4
Loaded: 23 51 3
Loaded: 23 53 2
Loaded: 23 54 2
Loaded: 23 55 2
Loaded: 23 57 3
Loaded: 23 59 4
Loaded: 25 31 2
Loaded: 25 48 3
Loaded: 25 49 3
Loaded: 25 59 3
Loaded: 25 60 3
Loaded: 26 48 3
Loaded: 26 60 3
Loaded: 27 31 3
Loaded: 28 47 2
Loaded: 28 48 2
Loaded: 28 60 2
Loaded: 28 61 2
Loaded: 29 31 4
Loaded: 29 47 2
Loaded: 29 61 2
Loaded: 31 31 5
Loaded: 31 46 1
Loaded: 31 47 1
Loaded: 31 61 1
Loaded: 31 62 1
Loaded: 32 22 1
Loaded: 32 24 2
Loaded: 32 26 3
Loaded: 32 28 4
Loaded: 32 30 5
Loaded: 32 31 5
Loaded: 32 32 5
Loaded: 32 34 4
Loaded: 32 36 3
Loaded: 32 38 2
Loaded: 32 40 1
Loaded: 32 46 1
Loaded: 32 62 1
Loaded: 33 31 5
Loaded: 35 31 4
Loaded: 37 31 3
Loaded: 39 31 2
Loaded: 41 31 1
*** Skeleton loaded ... ***
*** Entering deCompression() ***
expansionPass1 ...
expansionPass2 ...
*** Leaving deCompression() ***
*** deCompressed Header Printed ***
ZFArray printed onto deCompressedFile
```