

CSC2400 / Chapter 7 Homework

Due: Thursday, November 7, 2019

NAME: _____

1. (3 points) What are the three methods for exploiting space for time tradeoffs?

- a. Input enhancement
- b. Pre-structuring
- c. Dynamic programming

2. (10 points) Assuming that the set of possible list values is {a, b, c, d}, sort the following list in alphabetical order by the distribution-counting algorithm.

b, c, d, c, b, a, a, b

Frequency Array:

A	B	C	D
2	3	2	1

Distribution Count Array:

A	B	C	D
2	$(2+3) = 5$	$(5+2) = 7$	$(7+1) = 8$

Sorted Array:

A	A	B	B	B	C	C	D
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3. (10 points) Demonstrate the Horspool's algorithm to search for the pattern **BAOBAB** in the text **BESS_KNEW_ABOUT_BAOBABS**.

0 1 2 3 4 5 < Index Value

B A O B A B < pattern length =6

Handwritten solution for Horspool's algorithm search:

	0	1	2	3	4	5
B A O B A B						
↑ ↑ ↑ ↑ ↑ ↑						

1. BESS_KNEW - ...
 B A O B A B No match shift 6

2. BESS_KNEW - ABOUT - B A O B A B S
 B A O B A B No match shift 2

3. ... KNEW - ABOUT - B A O B A B S
 B A O B A B No match shift 2

4. ... KNEW - ABOUT - B A O B A B S
 B A O B A B No match shift 6

5. ... ABOUT - B A O B A B S
 B A O B A B No match shift 2

6. ... B A O B A B S
 ✓ B A O B A B Match

3.	0	1	2	3	4	5	B	A	0	*
	B	A	0	B	A	B	2	1	3	C
	↑	↑		↑	↑					

1. BCSS - NEW - ...
BAOBAB No match shift 6
2. BCSS - NEW - ABOUT - BAOBABs
BAOBAB No match shift 1
3. ... - NEW - ABOUT - BAOBABs
BAOBAB No match shift 2
4. ... - NEW - ABOUT - B, ...
BAOBAB No match shift 6
5. ... - ABOUT - BAOBABs
BAOBAB No match shift 2
6. ... - BAOBABs
✓ BAOBAB Match

3.	0	1	2	3	4	5	B	A	0	*
	B	A	0	B	A	B	2	1	3	C
	↑	↑		↑	↑					

1. BCSS - NEW - ...
BAOBAB No match shift 6
2. BCSS - NEW - ABOUT - BAOBABs
BAOBAB No match shift 1
3. ... - NEW - ABOUT - BAOBABs
BAOBAB No match shift 2
4. ... - NEW - ABOUT - B, ...
BAOBAB No match shift 6
5. ... - ABOUT - BAOBABs
BAOBAB No match shift 2
6. ... - BAOBABs
✓ BAOBAB Match

3.	0	1	2	3	4	5	B	A	O	*
	B	A	O	B	A	B	2	1	3	0
	↑	↑		↑	↑					
1. BCSS - NEW - ...										
BAOBAB No match shift 6										
2. BCSS - NEW - BOU7 - BAOBABs										
BAOBAB No match shift 1										
3. ... - NEW - BOU7 - BAOBABs										
BAOBAB No match shift 2										
4. ... - NEW - BOU7 - B...										
BAOBAB No match shift 6										
5. ... - BOU7 - BAOBABs										
BAOBAB No match shift 2										
6. ... - BAOBABs										
✓ BAOBAB Match										

4. (10 points) Demonstrate the Knuth-Morris-Pratt Algorithm to search for the pattern **BAOBAB** in the text **BAOBXBAOBXBAOBAB**.

	Pattern						Bad Match Table					
4	0	1	2	3	4	5	0	1	2	3	4	5
	B	A	O	B	A	B	0	0	0	0	1	1
Text-5	B	A	O	B	A	B	Pattern -					
	B	A	O	B	A	B	Index 0					
Text-6	...	B	A	O	B	A	Pattern - move 1					
	...	B	A	O	B	A	Index 1					
Text-12	...	X	B	A	O	B	Pattern - Index 2					
	...	X	B	A	O	B	Index 2					
Text-13	...	A	X	B	A	O	Pattern - move 2					
	...	A	X	B	A	O	Index 3					
Text-14	...	X	B	A	O	B	Pattern - move 2					
	...	X	B	A	O	B	Index 3					
Text-20	...	X	B	A	O	B	Pattern - move 2					
	...	X	B	A	O	B	Index 3					

5. (10 points) For the input **30, 20, 56, 75, 31, 19** and hash function $h(K) = K \% 11$, construct the open hash table (**chaining** method for collision management).

Bucket 0

Bucket 1 [56]

Bucket 2

Bucket 3

Bucket 4

Bucket 5

Bucket 6

Bucket 7

Bucket 8 [30] --> [19]

Bucket 9 [20] --> [75] --> [31]

Commented [HB1]: Follow Up: 20]

6. (2 points) For problem #5, find the largest number of key comparisons in a successful search in this table.

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7. (10 points) For the input **30, 20, 56, 75, 31, 19** and hash function $h(K) = K \% 11$, construct the closed hash table (**linear probing** method for collision management).

Bucket 0	75
Bucket 1	56
Bucket 2	31
Bucket 3	19
Bucket 4	
Bucket 5	
Bucket 6	
Bucket 7	
Bucket 8	30
Bucket 9	20

Commented [HB2]: Follow Up: 20]

8. (2 points) For problem #7, find the largest number of key comparisons in a successful search in this table.

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SCORE: _____ / 57

