Solution

Exercise 6.2 (Solution)

❖ Next, iteratively add such an object into a node which will maximize the difference in the node area enlargements if the object was inserted into the first or second node

Object	CIEH	DF	Difference
A	7x9-35=28	9x3-15=12	|28-12|=16
B	10x6-35=25	5x10-15=35	|25-35|=10
G	8x5-35=5	5x6-15=15	|5-15|=10

❖ The biggest difference shows the object A, hence it will be inserted into the node which is closer, i.e., DF

❖ Thus, we have nodes CIEH and DFA

Exercise 6.2 (Solution Continued)

❖ Next, iteratively add such an object into a node which will maximize the difference in the node area enlargements if the object was inserted into the first or second node

Object	CIEH	DFA	Difference
B	10x6-35=25	9x10-27=63	|25-63|=38
G	8x5-35=5	9x6-27=27	|5-27|=22

❖ The biggest difference shows the object B, hence it will be inserted into the node which is closer, i.e., CIEH

❖ Thus, we have nodes CIEHB and DFA

Exercise 6.2 (Solution Continued)

❖ Next, iteratively add such an object into a node which will maximize the difference in the node area enlargements if the object was inserted into the first or second node

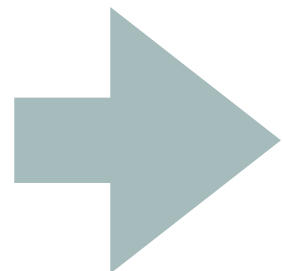| Object	CIEHB	DFA	Difference
G	10x6-60=0	9x6-27=27	|0-27|=27

❖ The biggest difference shows the object G, hence it will be inserted into the node which is closer, i.e., CIEHB

❖ Finally, we have nodes CIEHBG and DFA

Exercise 6.2 (Solution Continued)

❖ As a result, we have nodes CIEHBG and DFA

ABCDEFGHI → DFA CIEHBG

D						A		
D					A	A	A	
D		F	F	F		A		
				E		I		
		G	G	E		I		
				E				
B			H				C	
B	B		H			C	C	C
B								

❖ Objects A and B are inserted exactly the same as in the Exercise 6.2

❖ Finally, object G must be placed in the node DFA because the minimum number of items per node is $m = 4$ and $|DFA| = 3 < m$

    ❖ As a result, we have nodes CIEHB and DFAG

❖ There is larger death space in node DFAG and, at the same time, a huge overlapping area

    ❖ It is better to use smaller value of m

Exercise 6.5 (Solution)

❖ PickSeeds

   ❖ The largest dead space has DJ thus those will be the seeds of the splitting method

Pair	Overall area	Area of the objects	Dead space
AB	9x8=72	5+4=9	72-9=63
AC	8x5=40	5+4=9	40-9=31
...			
BG	11x8=88	4+2=6	88-6=82
...			
DJ	12x8=96	3+1=4	96-4=92
...			
IJ	6x1=6	2+1=3	6-3=3

Exercise 6.5 (Solution Continued)

❖ ChooseAxis

   ❖ x: 8/12 = 0.667

   ❖ y: 6/8 = 0.750

   ❖ In this particular case, the axis y is better separating D and J

G			A			I	I				J
G		A	A	A							
			A					C			
	F							C	C		
	F				H	H		C			
	F										
			E	E	E		B	B	B		
D	D	D						B			

y: 6/8

x: 8/12
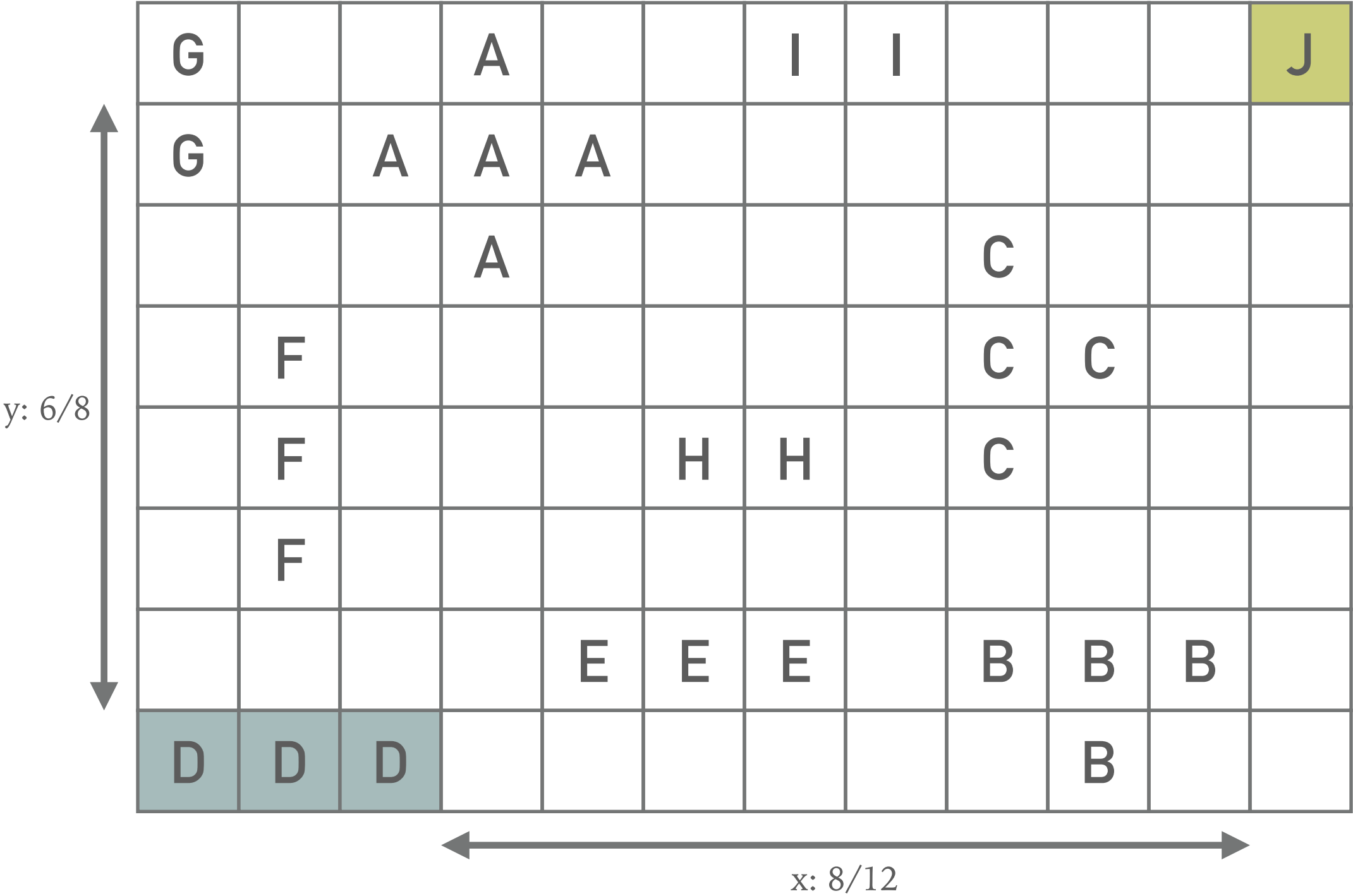
Exercise 6.5 (Solution Continued)

❖ Distribute according to axis y

Object	D	B	E	F	H	C	A	G	I	J
Start	0	0	1	2	3	3	5	6	7	7
end	0	1	1	4	3	5	7	7	7	7

❖ The solution:

  ❖ BDEFH || ACGIJ

[0,0]
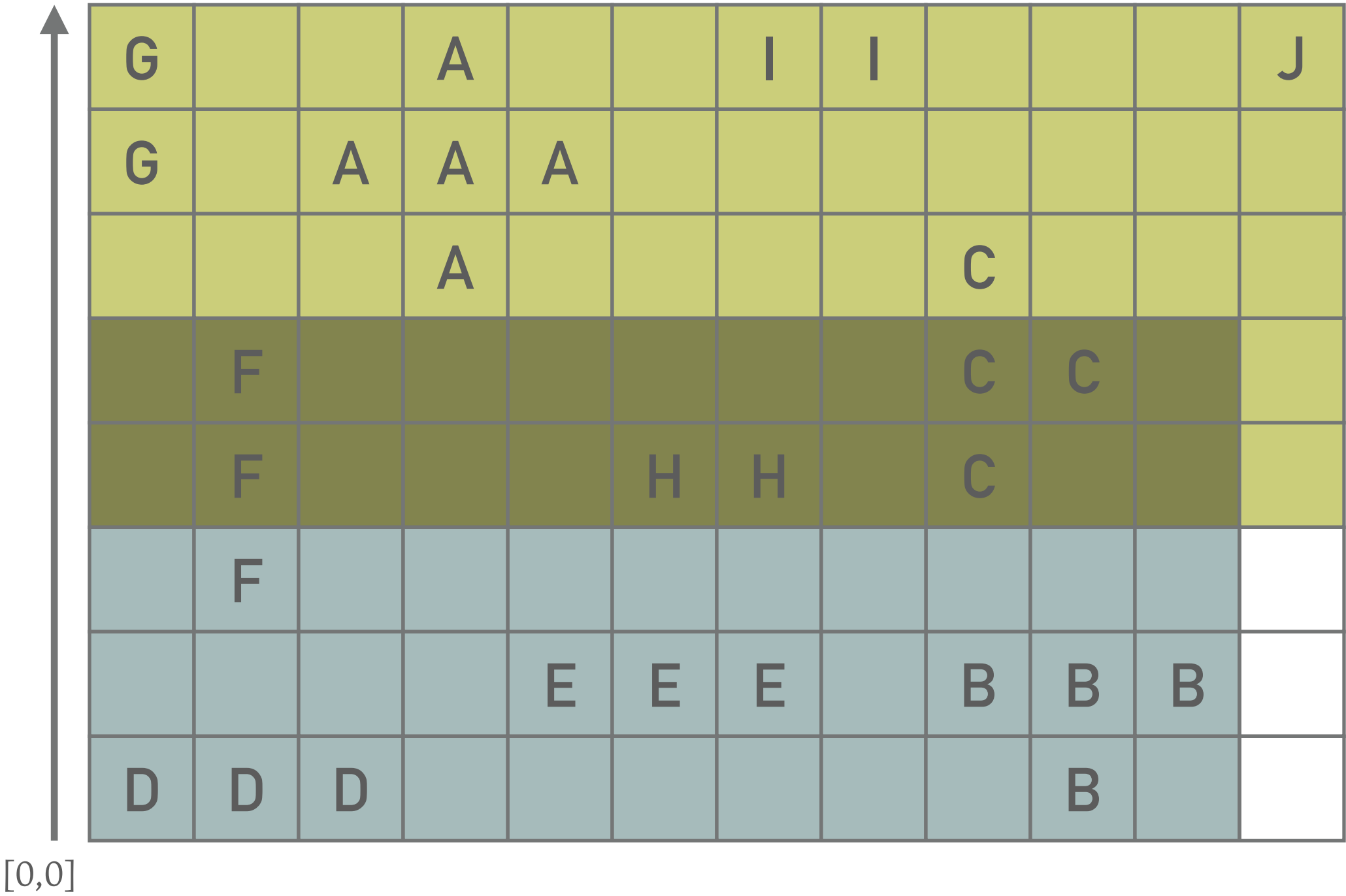
Exercise 6.7 (Solution)

- Ordering* based on the x-axis: GDFAEHICBJ
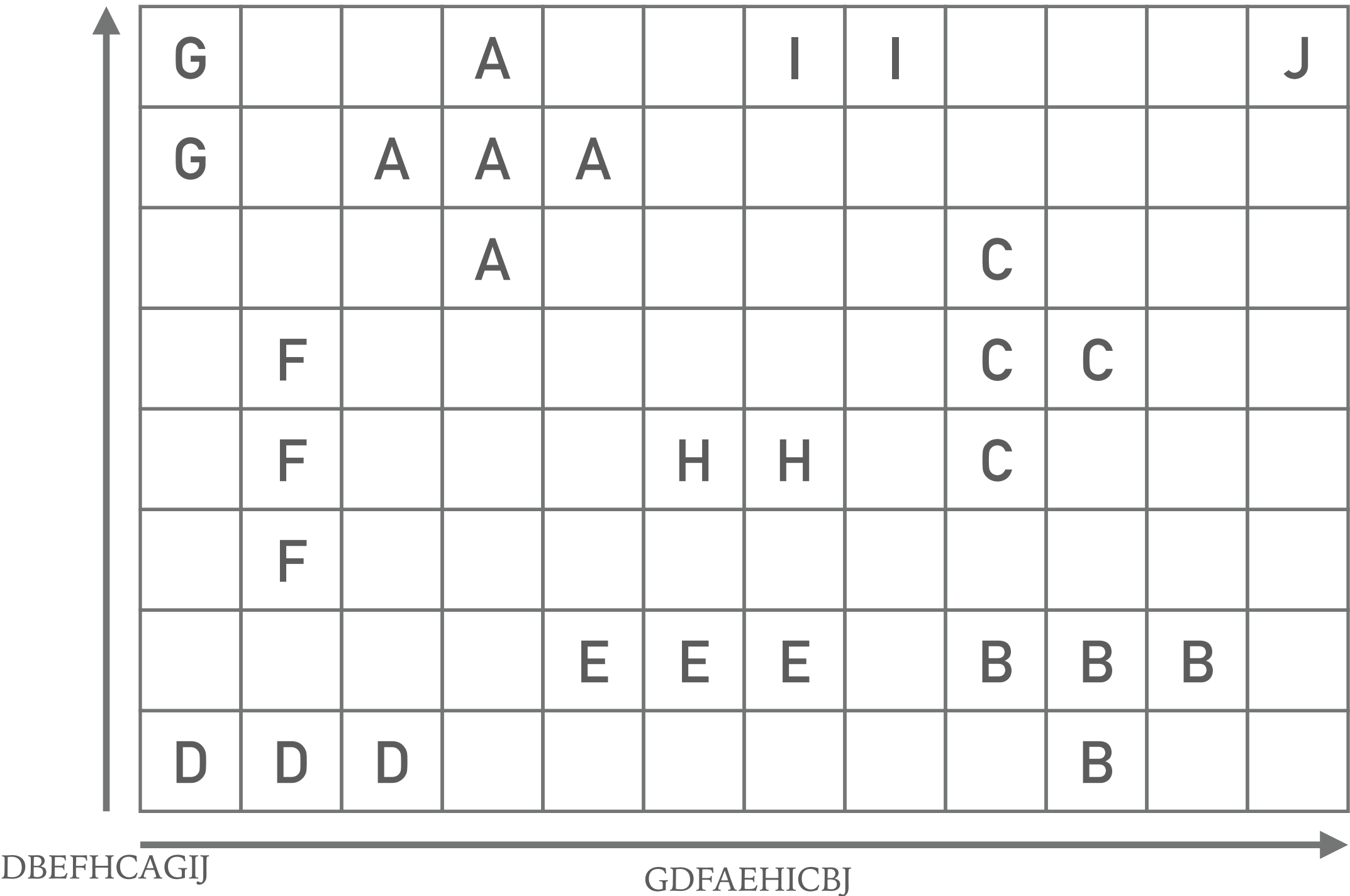
  - margin-value (GDF || AEHICBJ) = $(3+8)*2+(10+8)*2=22+36=58$

  - margin-value (GDFA || EHICBJ) = $(5+8)*2+(8+8)*2=26+32=58$

  - margin-value (GDFAE || HICBJ) = $(7+8)*2+(7+8)*2=30+30=60$

  - margin-value (GDFAEH || ICBJ) = $(7+8)*2+(6+8)*2=30+28=58$

  - margin-value (GDFAEHI || CBJ) = $(8+8)*2+(4+8)*2=32+24=56$

  - Sum = 58+58+60+58+56 = 290

- Ordering* based on the y-axis: DBEFHCAGIJ

  - margin-value (DBE || FHCAGIJ) = $(11+2)*2+(12+6)*2=26+36=62$

  - margin-value (DBEF || HCAGIJ) = $(11+5)*2+(12+5)*2=32+34=66$

  - margin-value (DBEFH || CAGIJ) = $(11+5)*2+(12+5)*2=32+34=66$

  - margin-value (DBEFHC || AGIJ) = $(11+6)*2+(12+3)*2=34+30=64$

  - margin-value (DBEFHCA || GIJ) = $(11+8)*2+(12+2)*2=38+24=62$

  - Sum = 62+66+66+64+62 = 320

G			A			I	I				J
G		A	A	A							
			A					C			
	F							C	C		
	F				H	H		C			
	F										
				E	E	E		B	B	B	
D	D	D							B		

DBEFHCAGIJ   GDFAEHICBJ

* If two objects start at the same level, we select first the one that ends at lower level. Or if two or mode objects starts and ends at the same level, the order is arbitrary.

Exercise 6.7 (Solution Continued)

❖ We chose splitting along the x-axis (smaller sum)

   ❖ overlap-value (GDF || AEHICBJ) = 8 (column AD)

   ❖ overlap-value (GDFA || EHICBJ) = 8 (column AE)

   ❖ overlap-value (GDFAE || HICBJ) = 16 (columns HE; IHE)

   ❖ overlap-value (GDFAEH || ICBJ) = 8 (column IHE)

   ❖ overlap-value (GDFAEHI || CBJ) = 0

❖ There is only one distribution having the smallest overlap, therefore the area-value does not have to be computed

❖ The result is: GDFAEHI || CBJ

G			A			I	I				J
G		A	A	A							
			A					C			
	F							C	C		
	F				H	H		C			
	F										
				E	E	E		B	B	B	
D	D	D							B		