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Report of PAR assignment 3

Task 1

We defined the variables as follow:

- Author Visibility (between 0 to one million views on Wikipedia page):
  o Low [0 0 100 1000]
  o Medium [100 1000 100000 500000]
  o High [300000 500000 1000000 1000000]

Name	Author_Visibility	
Range	[0 1e+06]	
Number of MFs:	3	

Name	Type	Parameters
Low	Trapezoidal	[0 0 100 1000]
Medium	Trapezoidal	[100 1000 100000 500000]
High	Trapezoidal	[300000 500000 1e+06 1e+06]

- Previous Sales (between 0 to 20000 books):
  o Low [0 0 500 1800]
  o Low intermediate [500 1800 3000 4200]
  o High intermediate [3000 4200 10000 12700]
  o High [10000 12700 20000 20000]

Name	Previous_Sales	
Range	[0 20000]	
Number of MFs:	4	

Name	Type	Parameters
Low	Trapezoidal	[0 0 500 1800]
Low intermediate	Trapezoidal	[500 1800 3000 4200]
High intermedi...	Trapezoidal	[3000 4200 10000 12700]
High	Trapezoidal	[10000 12700 20000 20000]

- Publisher prestige (between 0 and 10):
  o Bad [0 0 4 5]
  o Medium [3 4 7 8]
  o Good [6 7 10 10]

Name		Publisher_Prestige	
Range		[0 10]	
Number of MFs:	3		

Name	Type	Parameters
Bad	Trapezoidal	[0 0 4 5]
Medium	Trapezoidal	[3 4 7 8]
Good	Trapezoidal	[6 7 10 10]

- Publishing period (between 0 and 10):
  - Bad [0 0 4 5]
  - Medium [3 4 7 8]
  - Good [6 7 10 10]

Name		Publishing_Period	
Range		[0 10]	
Number of MFs:	3		

Name	Type	Parameters
Bad	Trapezoidal	[0 0 4 5]
Medium	Trapezoidal	[3 4 7 8]
Good	Trapezoidal	[6 7 10 10]

Each variable uses trapezoidal functions.

Name		Number_Of_Books_To_Print	
Range		[0 20000]	
Number of MFs:	4		

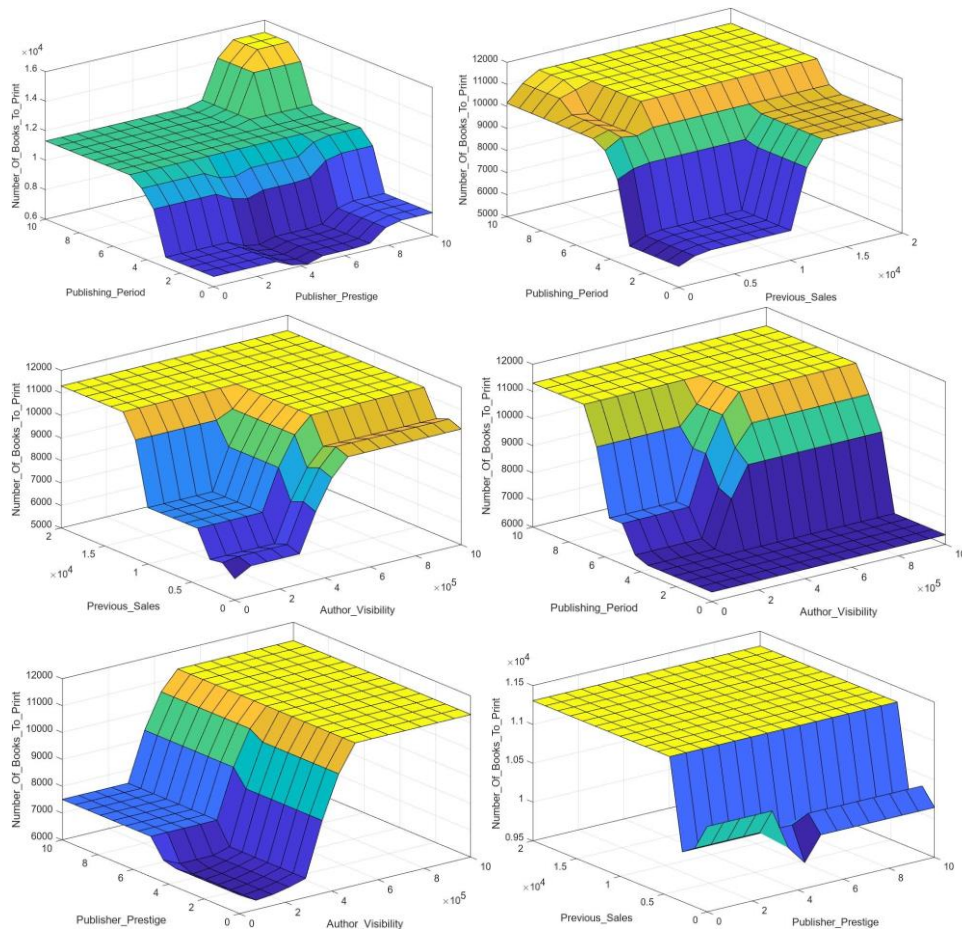| Name	Type	Parameters
Low	Trapezoidal	[0 100 500 1800]
Low intermediate	Trapezoidal	[500 1800 3000 4200]
High intermedi…	Trapezoidal	[3000 4200 10000 12700]
High	Trapezoidal	[10000 12700 18000 20000]

Task 2

We saw in the papers that the visibility is the most important factor for selling books, the publisher prestige and the previous sales are quite equivalent, and the publishing period is the less important factor.

We made our rules based on this hierarchy.

Here are the rules that we defined :

	Rule	Weight	Name
1	If Author_Visibility is Low and Publisher_Prestige is Bad then Number_Of_Books_To_Print is Low	1	rule1
2	If Author_Visibility is Low and Previous_Sales is Low then Number_Of_Books_To_Print is Low	1	rule2
3	If Author_Visibility is Medium and Publisher_Prestige is Bad then Number_Of_Books_To_Print is Low intermediate	1	rule3
4	If Author_Visibility is Medium and Previous_Sales is Low then Number_Of_Books_To_Print is Low intermediate	1	rule4
5	If Author_Visibility is High and Publisher_Prestige is Bad then Number_Of_Books_To_Print is High intermediate	1	rule5
6	If Author_Visibility is High and Previous_Sales is Low then Number_Of_Books_To_Print is High intermediate	1	rule6
7	If Author_Visibility is High and Publishing_Period is Bad then Number_Of_Books_To_Print is High intermediate	1	rule7
8	If Author_Visibility is Low and Publisher_Prestige is Bad and Publishing_Period is Bad then Number_Of_Books_To_Print is Low	1	rule8
9	If Author_Visibility is Medium and Publishing_Period is Bad then Number_Of_Books_To_Print is Low intermediate	1	rule9
10	If Publisher_Prestige is Bad and Previous_Sales is Low then Number_Of_Books_To_Print is Low	1	rule10
11	If Publisher_Prestige is Bad and Publishing_Period is Bad then Number_Of_Books_To_Print is Low	1	rule11
12	If Publisher_Prestige is Medium and Previous_Sales is Low then Number_Of_Books_To_Print is Low intermediate	1	rule12
13	If Publisher_Prestige is Medium and Publishing_Period is Bad then Number_Of_Books_To_Print is Low intermediate	1	rule13
14	If Publisher_Prestige is Good and Previous_Sales is Low then Number_Of_Books_To_Print is Low intermediate	1	rule14
15	If Publisher_Prestige is Good and Publishing_Period is Bad then Number_Of_Books_To_Print is High intermediate	1	rule15
16	If Previous_Sales is Low and Publishing_Period is Bad then Number_Of_Books_To_Print is Low	1	rule16
17	If Previous_Sales is Low intermediate and Publishing_Period is Bad then Number_Of_Books_To_Print is Low intermediate	1	rule17
18	If Previous_Sales is High intermediate and Publishing_Period is Bad then Number_Of_Books_To_Print is High intermediate	1	rule18
19	If Previous_Sales is High and Publishing_Period is Bad then Number_Of_Books_To_Print is High	1	rule19
20	If Author_Visibility is Medium and Publishing_Period is Medium then Number_Of_Books_To_Print is High intermediate	1	rule20
21	If Publisher_Prestige is Medium and Publishing_Period is Medium then Number_Of_Books_To_Print is High intermediate	1	rule21
22	If Previous_Sales is Low intermediate and Publishing_Period is Medium then Number_Of_Books_To_Print is Low intermediate	1	rule22
23	If Author_Visibility is High and Publishing_Period is Medium then Number_Of_Books_To_Print is High	1	rule23
24	If Publisher_Prestige is Good and Publishing_Period is Medium then Number_Of_Books_To_Print is High intermediate	1	rule24
25	If Previous_Sales is High intermediate and Publishing_Period is Medium then Number_Of_Books_To_Print is High intermediate	1	rule25
26	If Previous_Sales is High and Publishing_Period is Medium then Number_Of_Books_To_Print is High	1	rule26
27	If Author_Visibility is Medium and Publishing_Period is Good then Number_Of_Books_To_Print is High intermediate	1	rule27
28	If Author_Visibility is High and Publishing_Period is Good then Number_Of_Books_To_Print is High	1	rule28
29	If Publisher_Prestige is Medium and Publishing_Period is Good then Number_Of_Books_To_Print is High intermediate	1	rule29
30	If Publisher_Prestige is Good and Publishing_Period is Good then Number_Of_Books_To_Print is High	1	rule30
31	If Previous_Sales is High intermediate and Publishing_Period is Good then Number_Of_Books_To_Print is High	1	rule31
32	If Previous_Sales is High and Publishing_Period is Good then Number_Of_Books_To_Print is High	1	rule32

Task 3

It makes sense because we can see that when the parameters are bad, the number of books to print is low and when the parameters are good, the number of books to print is high.

The result shown by the 3D graph are logical according to the rules we defined in Task 2.
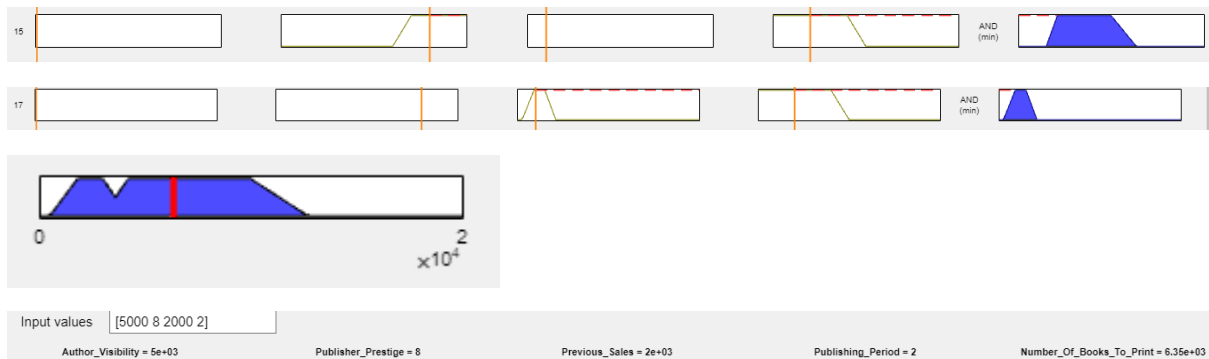
Task 4

- Case 1:
  - Author Visibility = 500
  - Previous Sales = 2000
  - Publisher prestige = 8
  - Publishing period = 2

For this situation we can imagine that the author is famous and wrote by the past famous books, so he has great prestige, but he is not active on the social medias, so he doesn't have a lot of visibility and his last book was not that great to he only sold 2000. And he decided to publish this book for the birthday of his daughter which happens to be in a not so good part of the year for selling books.

Rules activated :

Input values | [5000 8 2000 2]

Author_Visibility = 5e+03   Publisher_Prestige = 8   Previous_Sales = 2e+03   Publishing_Period = 2   Number_Of_Books_To_Print = 6.35e+03
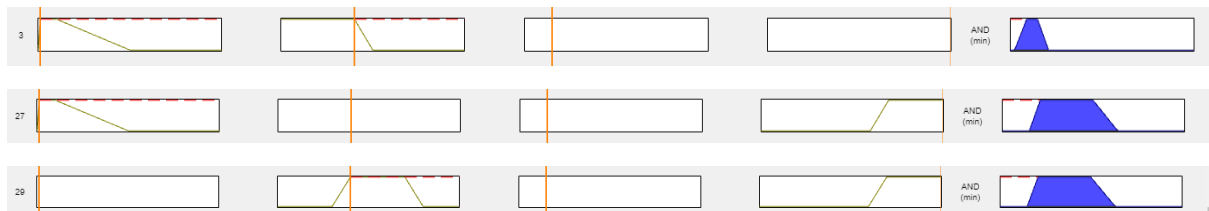
Number of books to print = 6350 books

This makes sense because the visibility is low but the author is famous so there should be a lot of people that would want to buy it.
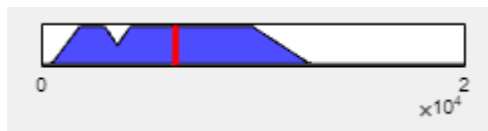
- Case 2:
    o Author Visibility = 10000
    o Previous Sales = 3000
    o Publisher prestige = 4
    o Publishing period = 10

Input values | [10000 4 3000 10]

Author_Visibility = 1e+04   Publisher_Prestige = 4   Previous_Sales = 3e+03   Publishing_Period = 10   Number_Of_Books_To_Print = 6.35e+03

Rules activated :

For this situation we can image that the author is not that famous but also not a person that no one knows so he is medium level visibility guy, so he has a decent amount of prestige not too much but not too little, so he only sold 3000 copies of his last book, but he published in a good period for the book. Number of books to print = 6350 books which makes sense considering the previous sales which were low but since his visibility he has as an author is great it compensates.


- Case 3:
    o Author Visibility = 350000
    o Previous Sales = 17500
    o Publisher prestige = 8
    o Publishing period = 9

Input values | [350000 8 17500 9]

Author_Visibility = 3.5e+05   Publisher_Prestige = 8   Previous_Sales = 1.75e+04   Publishing_Period = 9   Number_Of_Books_To_Print = 1.3e+04

For this situation we can imagine that the author is famous and wrote by the past famous books, so he has great prestige, he is also active on social media, so he has a lot of visibility. His last book was

the one which made him famous so there was a lot of sales, and he is publishing his book for Christmas which is a good period to sell books.

Rules activated :
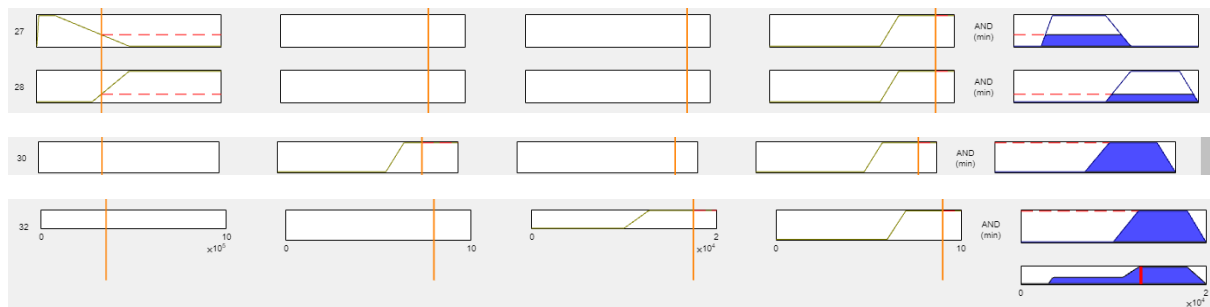
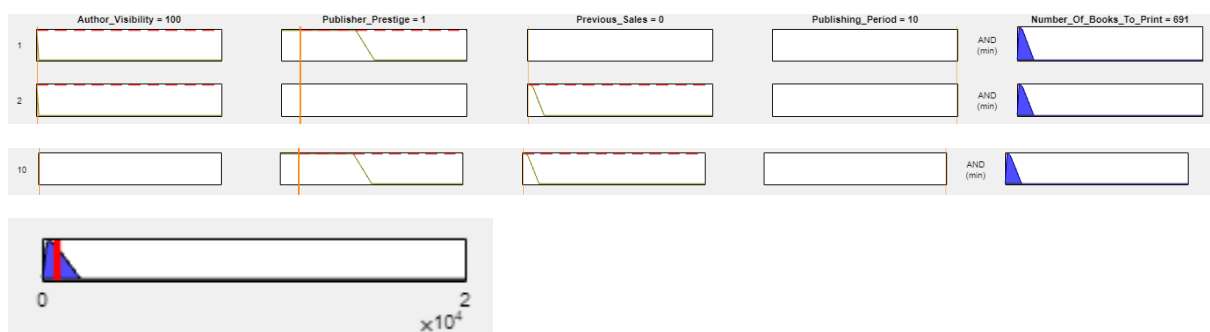Number of books to print = 13000 books

This makes sense because all the parameters are good so the number of books to print is high.

- Case 4:
    o Author Visibility = 100
    o Previous Sales = 0
    o Publisher prestige = 1
    o Publishing period = 10

This author could be someone who just started to be an author, so he has not great visibility yet, no previous sales and no prestige yet. But he is publishing is book in a great period for selling his book because he is lucky.

Rules activated :

Number of books to print = 691

As we could expect, there is not a lot of books to print for this author because he is no known yet.

Task 5

1) As we defined it during Task 2, we wanted the visibility to have a greater impact on the number of books to print and the period of publishing is the lowest impact.
2) We will have to define the readers_age parameter with all the ages for the categories (kids, teens,adults,…) then we would have to create some rules like the visibility doesn't matter if

it s for young kids and the teens care a bit about the visibility and the adults care a lot and other rules with the same idea.

3) We might be able to model it with a fuzzy expert system just like we did for this exercise.

For example, here the variables could be the number of follower on twitter, the number of views on his Wikipedia page and the number of times he went on TV. And the output will be a grade out of 100.