Challenge Sep-2020
Compressing Decision Tables

A solution with DT5GL by Jack Jansonius – 7 October 2020

The challenge involves this time, as mentioned on the website:
Compress the following multi-hit decision table.

Type	Adjustment	Adjustment	Loss	Loss	Classified As
					NONE
31	>200		<-150		TOP
31		<200		>=-189	BOTTOM
32	>500		<-1000		TOP
32		<500		>=-99	BOTTOM
33	>500		<-1000		TOP
33		<500		>=-100	BOTTOM
34	>500		<-1000		TOP
34		<500		>=-100	BOTTOM
35	>500		<-800		TOP
35		<500		>=-100	BOTTOM
36	>500		<-800		TOP
36		<500		>=-100	BOTTOM
37	>500		<-2000		TOP
37		<500		>=0	BOTTOM

First of all, a compliment to the submitter of this challenge; it took quite some effort to figure out the logic in this decision table!

After a lot of puzzling I actually came up with the same rules as the given decision table; the only compression I realized is in merging rules with the same conditions and condition values.

Solution 1 (11 rules):

```
Table 0: Classify
If:                                 | 0| 1| 2|
'Classification is Top'              | Y| N| N|
'Classification is Bottom'           | -| Y| N|
Then:
Classification is Top                | X|  |  |
Classification is Bottom             |  | X|  |
Classification is None               |  |  | X|
# .......

rTable 1: Classify as Top
If:                                 | 0| 1| 2| 3|
Adjustment > 500                    | Y| Y| Y| -|
Adjustment > 200                    | -| -| -| Y|
Loss < -2000                        | Y| -| -| -|
Loss < -1000                        | -| Y| -| -|
Loss < -800                         | -| -| Y| -|
Loss < -150                         | -| -| -| Y|
Type = 37                           | Y| -| -| -|
Type in [32,33,34]                  | -| Y| -| -|
Type in [35,36]                     | -| -| Y| -|
Type = 31                           | -| -| -| Y|
Then:
'Classification is Top'              | X| X| X| X|
# .......

rTable 2: Classify as Bottom
If:                                 | 0| 1| 2| 3|
Adjustment < 500                    | Y| Y| Y| -|
Adjustment < 200                    | -| -| -| Y|
Loss >= -189                        | -| -| -| Y|
Loss >= -100                        | Y| -| -| -|
Loss >= -99                         | -| Y| -| -|
Loss >= 0                           | -| -| Y| -|
Type = 31                           | -| -| -| Y|
Type in [33,34,35,36]               | Y| -| -| -|
Type = 32                           | -| Y| -| -|
Type = 37                           | -| -| Y| -|
Then:
'Classification is Bottom'           | X| X| X| X|
# .......

GoalAttribute: Classification
Case: None
Print: "Classification is None"
Case: Top
Print: "Classification is Top"
Case: Bottom
Print: "Classification is Bottom"

Attribute: Type
Askable_using: "Type........: "

Attribute: Adjustment
Askable_using: "Adjustment..: "

Attribute: Loss
Askable_using: "Loss......: "
```

Solution 2 (9 rules):

```
rTable 0: Classify as Top
If:                                 | 0| 1| 2| 3|
Adjustment > 500                    | Y| Y| Y| -|
Adjustment > 200                    | -| -| -| Y|
Loss < -2000                        | Y| -| -| -|
Loss < -1000                        | -| Y| -| -|
Loss < -800                         | -| -| Y| -|
Loss < -150                         | -| -| -| Y|
Type = 37                           | Y| -| -| -|
Type in [32,33,34]                  | -| Y| -| -|
Type in [35,36]                     | -| -| Y| -|
Type = 31                           | -| -| -| Y|
Then:
Classification is Top               | X| X| X| X|
# .......

rTable 1: Classify as Bottom
If:                                 | 0| 1| 2| 3|
Adjustment < 500                    | Y| Y| Y| -|
Adjustment < 200                    | -| -| -| Y|
Loss >= -189                        | -| -| -| Y|
Loss >= -100                        | Y| -| -| -|
Loss >= -99                         | -| Y| -| -|
Loss >= 0                           | -| -| Y| -|
Type = 31                           | -| -| -| Y|
Type in [33,34,35,36]               | Y| -| -| -|
Type = 32                           | -| Y| -| -|
Type = 37                           | -| -| Y| -|
Then:
Classification is Bottom            | X| X| X| X|
# .......

rTable 2: Classify as None
If:                                 | 0|
'Finally'                           | -|
Then:
Classification is None              | X|
# .......

GoalAttribute: Classification
Case: Top
Print: "Classification is Top"
Case: Bottom
Print: "Classification is Bottom"
Case: None
Print: "Classification is None"

Attribute: Type
Askable_using: "Type........: "

Attribute: Adjustment
Askable_using: "Adjustment..: "

Attribute: Loss
Askable_using: "Loss......: "
```

And the analysis that (at the first attempt) went wrong.....

```
Table 1: Classify as Top
If:                          | 0| 1| 2| 3| 4| 5| 6| 7| 8| 9|10|
Adjustment > 500             | Y| Y| Y| Y| Y| Y| Y| N| N| N| N|
Adjustment > 200             | -| -| -| -| -| -| -| Y| Y| Y| N|
Loss < -2000                 | Y| Y| N| N| N| N| N| -| -| -| -|
Loss < -1000                 | -| -| Y| Y| N| N| N| -| -| -| -|
Loss < -800                  | -| -| -| -| Y| Y| N| -| -| -| -|
Loss < -150                  | -| -| -| -| -| -| -| Y| Y| N| -|
Type = 37                    | Y| N| -| -| -| -| -| -| -| -| -|
Type in [32,33,34]           | -| -| Y| N| -| -| -| -| -| -| -|
Type in [35,36]              | -| -| -| -| Y| N| -| -| -| -| -|
Type = 31                    | -| -| -| -| -| -| -| Y| N| -| -|
Then:
'Classification is Top'      | X|  | X|  | X|  |  | X|  |  |  |
# .......
```

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```
rTable 1: Classify as Top
If:                                | 0| 1| 2| 3|
Adjustment > 500                   | Y| Y| Y| N|
Adjustment > 200                   | -| -| -| Y|
Loss < -2000                       | Y| N| N| -|
Loss < -1000                       | -| Y| N| -|
Loss < -800                        | -| -| Y| -|
Loss < -150                        | -| -| -| Y|
Type = 37                          | Y| -| -| -|
Type in [32,33,34]                 | -| Y| -| -|
Type in [35,36]                    | -| -| Y| -|
Type = 31                          | -| -| -| Y|
Then:
'Classification is Top'            | X| X| X| X|
# .......
```

➔

(replace each 'N' with '-'):

```
rTable 1: Classify as Top
If:                                | 0| 1| 2| 3|
Adjustment > 500                   | Y| Y| Y| -|
Adjustment > 200                   | -| -| -| Y|
Loss < -2000                       | Y| -| -| -|
Loss < -1000                       | -| Y| -| -|
Loss < -800                        | -| -| Y| -|
Loss < -150                        | -| -| -| Y|
Type = 37                          | Y| -| -| -|
Type in [32,33,34]                 | -| Y| -| -|
Type in [35,36]                    | -| -| Y| -|
Type = 31                          | -| -| -| Y|
Then:
'Classification is Top'            | X| X| X| X|
# .......
```