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Business Analytics & Machine Learning
Homework sheet 5: Decision trees

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Exercise H5.1 *Soccer results*

Host	Better Form	Referee's Preference	Tradition	Result
A	B	B	4	X
A	A	None	4	A
B	A	B	1	B
B	A	None	3	X
A	B	None	1	B
A	B	None	2	X
B	A	B	2	B
B	Same	None	1	B
A	Same	None	5	A
A	B	None	5	A
B	Same	None	4	A
B	Same	A	3	A
A	Same	A	3	A
A	B	None	3	A

Construct the first two levels of the decision tree using gain ratio.

Note: Tradition is a numerical attribute. You need to split it using a binary split. In order to construct the root, use 2.5 as the value for the split point. If necessary, find the optimal split point for the second level. The attribute Tradition indicates how many games team A won, out of the last six games.

Note: A and B are teams. The value "Same" indicates that both teams are in equally good form. X means that the game resulted in a draw.

Exercise H5.2 *Winter sports*

ID	Temperature	Visibility	Snow Depth	Sport
A	< -5	Clear	≥ 50	Skiing
B	< -5	Fog	≥ 50	Swimming
C	< -5	Fog	< 50	Swimming
D	< -5	Rain	≥ 50	Skiing
E	< -5	Rain	< 50	Swimming
F	≥ -5	Clear	≥ 50	Skiing
G	≥ -5	Clear	< 50	Skiing
H	≥ -5	Fog	< 50	Swimming
I	≥ -5	Rain	≥ 50	Skiing

a) Construct a decision tree for the variable Sport using gain ratio

b) Classify following data points:

- (Temperature = -3, Visibility = Fog, Snow Depth = 12)
- (Temperature = 10, Visibility = Clear, Snow Depth = 0)
- (Temperature = 5, Visibility = Rain, Snow Depth = 27)