

Business Analytics & Machine Learning

Homework sheet 7: Model Evaluation and Selection

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Exercise H7.1 *Metrics*

You want to bet on soccer matches and try to predict match results. In order to improve your forecasts, you decide to use your knowledge on data mining and construct a decision tree. The table below compares the real outcome and your predicted outcome of 15 matches.

Calculate the accuracy, the true positive rate, the false positive rate and the true negative rate for your decision tree based on your predictions.

True Class	Predicted Class
1	1
0	1
1	1
1	1
1	0
0	0
0	1
1	0
0	0
0	0
0	0
1	1
1	1
1	0
0	0

Exercise H7.2 Gain curve, lift curve, ROC curve

Use the given results of a classifier that outputs the probabilities of instances being positive to construct:

- a gain curve (10 % steps),
- a lift curve,
- an ROC curve.

Furthermore, mark a cutoff value of 0.87 in the plots.

Index	Probability	Class
1	0.991	+
2	0.977	+
3	0.973	+
4	0.945	+
5	0.918	+
6	0.915	-
7	0.906	+
8	0.889	-
9	0.873	+
10	0.871	+
11	0.869	-
12	0.866	-
13	0.862	+
14	0.852	-
15	0.837	+
16	0.831	-
17	0.829	-
18	0.811	-
19	0.787	-
20	0.779	-

Remember: A cutoff value of 0.87 means that we will classify an instance as positive if its probability is above 87 % and negative, otherwise.

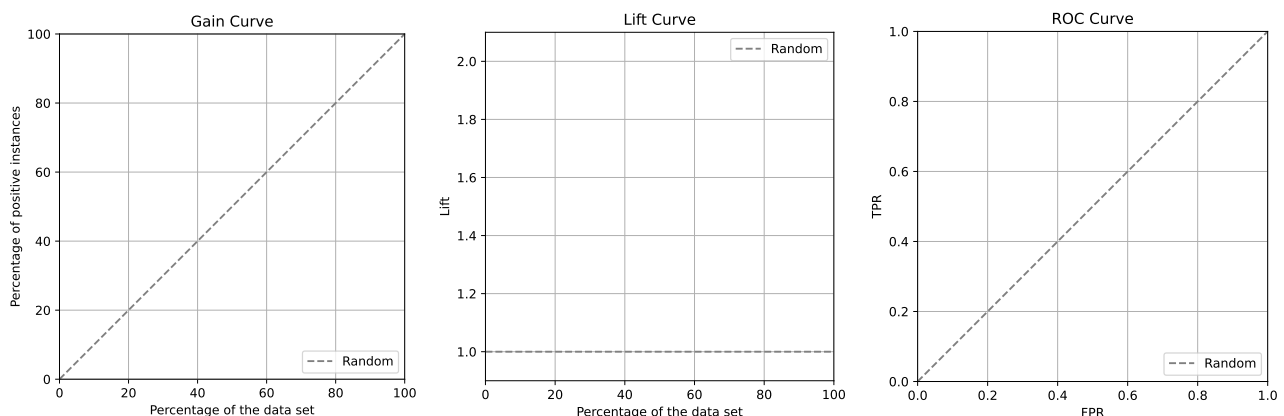


Figure 1 Exercise 8.2 template from left to right: Gain curve, lift curve, and ROC curve.

Exercise H7.3 *Cross validation*

Design a stratified 5-fold cross-validation for the below-mentioned table. Each data point consists of four attributes (A1 - A4) and a class label (Class).

Nr.	A1	A2	A3	A4	Class
1	4.9	3.1	1.5	0.1	1
2	5.0	3.2	1.2	0.2	0
3	5.5	3.5	1.3	0.2	0
4	4.9	3.1	1.5	0.1	1
5	4.4	3.0	1.3	0.2	1
6	5.1	3.4	1.5	0.2	0
7	5.0	3.5	1.3	0.3	1
8	4.5	2.3	1.3	0.3	1
9	4.4	3.2	1.3	0.2	0
10	5.0	3.5	1.6	0.6	0
11	5.1	3.8	1.9	0.4	0
12	4.8	3.0	1.4	0.3	1
13	5.1	3.8	1.6	0.2	0
14	4.6	3.2	1.4	0.2	1
15	5.3	3.7	1.5	0.2	0
16	5.0	3.3	1.4	0.2	0
17	7.0	3.2	4.7	1.4	1
18	6.4	3.2	4.5	1.5	0
19	6.9	3.1	4.9	1.5	1
20	5.5	2.3	4.0	1.3	1