Exercise 5.6

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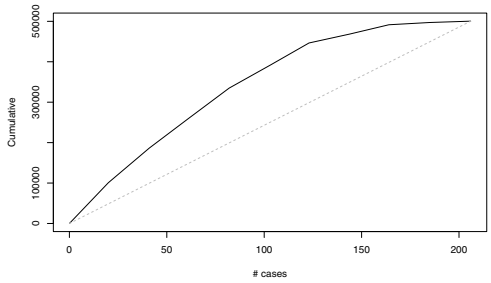

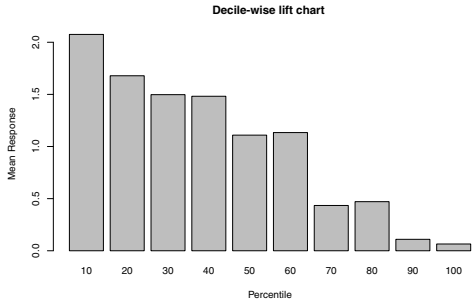

- data on 500 customers
- global mean of profit is 2500$ by customer
- cost of sales effort is 2500$ by customer

1 If the company begins working with a new set of 1000 leads to sell the same services, similar to the 500 in the pilot study, without any use of predictive modeling to target sales efforts, what is the estimated profit?

If the set of new customers is similar to our data, without using any predictive model, then the profit will be the number of customers multiplied by the mean profit by customer, i.e.

$$1000 \cdot 2500\$ = 2'500'000\$$$

The total costs will be the number of customers multiplied by the cost by customer:

$$1000 \cdot 2500\$ = 2'500'000\$$$

Thus, the estimated gain for the company will be

$$2'500'000\$ - 2'500'000\$ = 0\$$$

The company clearly needs a predictive model if it wants to make some gains.

2 If the firm wants the average profit on each sale to at least double the sales effort cost, and applies an appropriate cutoff with this predictive model to a new set of 1000 leads, how far down the new list of 1000 should it proceed (how many deciles)?

By looking at the decile chart, we can see that the first decile has a mean response ratio of approximately 2.1. This means that the average profit for the first decile is 2.1 times bigger than the global mean profit (2500$).

The second decile, on the other hand, has a mean response ratio of approximately 1.7.

Then, if we take the first two deciles together, their mean response ratio will be equal to

$$\frac{2.1 + 1.7}{2} = 1.9 < 2$$

This means that to have a profit that at least doubles the sales effort cost of 2500$, which is equal to the global mean profit, we can only take the first decile of customers. This will give us an approximate mean profit by customer of

$$2.1 \cdot 2500\$ = 5250\$$$

Taking out the sales effort cost by customer, the company's gain by customer will be

$$5250\$ - 2500\$ = 2750\$$$

Taking only the first decile means that only 100 customers from our new set will be targeted, so the total gains in this case will be

$$100 \cdot 2750\$ = 275'000\$$$

3 Still considering the new list of 1000 leads, if the company applies this predictive model with a lower cutoff of 2500$, how far should it proceed down the ranked leads, in terms of deciles?

1. If, like in question 2, we want an **average profit on each sale** of at least 2500$, then since this is equal to our global profit mean, we are again in the initial situation, meaning that we can take all deciles and get a global mean profit of 2500$.

   The company's gain will then be 0$ again, as computed at point 1.

2. Otherwise, if we want an **average profit on each decile** of 2500$, then looking at the decile chart, we must take only the first six deciles, which all have mean response ratios above 1.

   The first six deciles give together an average ratio of

   $$\frac{2.1 + 1.7 + 1.5 + 1.5 + 1.1 + 1.1}{6} = 1.5$$

   This means the average profit on each sale for the first six deciles will be

   $$1.5 \cdot 2500\$ = 3750\$$$

   and the company's gain by customer will be

   $$3750\$ - 2500\$ = 1250\$$$

   Taking the first six deciles means that 600 customers from our new set will be targeted, so the total gains in this case will be

   $$600 \cdot 1250\$ = 750'000\$$$

   This would bring more gains than the previous option with one decile only.

4 Why use this two-stage process for predicting sales — why not simply develop a model for predicting profit for the 1000 new leads?

The analysis of the 500 customers acts like a training set, it allowed us to identify the customers' behaviors and rank them. This gives an important insight and a baseline to decide which portion of customers to target in the future. If the new 1000 customers are of the same type as our 500 customers, then we can apply what we learnt from the analysis to the 1000 customers.

This approach is also flexible, as it gives the power to management to decide which cutoff would be preferable, i.e. which portion of customers should be targeted.