

Questions 14: Case-Based Reasoning

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Question 1

Briefly describe the main principles of a case-based reasoning (CBR) expert system, its operation process and possible differences in implementation.

Question 2

Suppose that the database of a CBR system contains the following four cases:

Case	Monthly Income (£K)	Account Balance (£K)	Home Owner	Credit Score
1	3	2	0	2
2	2	1	1	2
3	3	2	2	4
4	0	-1	0	0

The system is using the nearest neighbour retrieval algorithm with the following similarity function:

$$d(T, S) = \sum_{i=1}^m |T_i - S_i|w_i$$

where T is the target case, S is the source case, i is the number of a feature, and w_i are the weights. Cases with smaller values of $d(T, S)$ are considered to be more similar. Consider the following new (target) case:

Case	Monthly Income (£K)	Account Balance (£K)	Home Owner	Credit Score
5	3	1	2	?

Answer the following questions:

- a) Which case will the CBR system retrieve as the ‘best match’, if all the weights $w_i = 1$?

- b) The solution that the CBR system should propose is the credit score rating. Suggest how should the solution of the retrieved case be adapted for the target case?
- c) What can be changed in the similarity function to make feature 'Account Balance' three times more important than any other feature? Will this change influence the solution?

Question 3

Describe characteristics of problems in which it is better to use rule-based expert systems or problems where the case-based systems are more appropriate.