Everything on Case-Based Reasoning
Another form of reasoning is case-based systems

CBR vs RBS
Unlike rule based systems and fuzzy logic, CBR doesn't use any rules or logical deductions. Instead it relies on the process of reasoning by analogy

Argued that CBS is easier for people to work with, and less time-consuming.

Architecture
Knowledge is stored as a record of cases not rules

A CBS involves:

1. A library of cases
2. A means of using key elements of present situation to find and retrieve most similar cases from the library
3. A means of drawing conclusions, known as adaptation

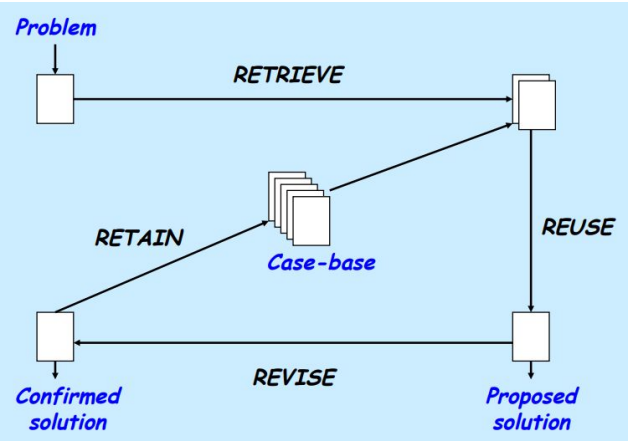
Structure

1) RETRIEVE most similar case(s) from library

2) REUSE case(s) to attempt to solve problem

3) REVISE proposed solution if necessary (adaptation)

4) RETAIN new solution as part of new case



Nearest Neighbour Algorithm
Another way to measure similarity of cases

Step-by-step Process:

1. Choose n nominal characteristics and represent them as numbers. These values are treated as coordinates of points in n-dimensional space

2. Calculate the distance between 2 points, using the euclidean distance
3. Calculate all distances and pick the smallest

The nearest neighbour is the case with the minimum distance from the specimen case under consideration

Issues:

1. Not all attribute values can be represented by numerical codes. A solution is taxonomy based comparison (for non-numerical attributes); Classification into group according to resemblance

Adaptation

About deducting information from a case, and adapting it to current problem

Issues:

1. Often the most difficult step
2. Systems using CBR for classification or identification may not require adaptation
3. Systems using CBR for design or planning activities, where the retrieved solution will be an approximate match, adaptation is likely needed
4. Updating the case-base with adapted cases can create problems. If wrongly concluded cases are added to the case-base, it becomes progressively degraded.

Typically put fresh cases into a special file which is reviewed by a domain expert

Indexing

Looking up in case library can be a substantial task. Some indexing mechanisms are necessary. Artificial Neural Networks (ANN) may be used to provide an indexing procedure

Disadvantages of CBS, have to:

1) Identify the significant attributes

2) Find the values of these attributes

3) When a new case appears, find these attribute values and compare with case library

4) Decide on an algorithm to measure similarity

5) Decide whether adaptation is necessary and how it is to be done

When to use a CBS

1) There are existing records of previously solved cases

2) Historical cases referred to when solving new cases

3) Human experts tend to use examples for domain problems

4) The problem is not well defined

5) Experience is seen as valuable as textbook knowledge