



# What is Case-based Reasoning?

A presentation of Kolodner chapter 1 by Jan Eriksson



# Overview

- **Introduction**
- What is a case
- Processes and issues
- Applications of CBR
- Pros and cons
- Summary



# Introduction

- A simple example – planning a meal
- Consists of 4 steps:
  - Remembering previous similar experience
  - Proposing a solution
  - Adapting to the new environment
  - Warn of possible problems, and interpreting them



# Quality of a CBR module

- Depends on 5 things:
  - Previous experiences
  - Ability to understand new experiences
  - Ability to adapt a solution
  - Ability to evaluate and repair
  - Ability to integrate new experiences



# Tasks

- Recalling
  - Also called the indexing problem
- Interpretation
- Adaption
- Evaluation
- Repair



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# What is a case? Part 1

- Situations that occur with regularity
- Emphasis on specific knowledge, in contrast to general knowledge
- Generalized (norm) cases
- Memorable cases
- When should it be recorded?



# What is a case? Part 2

- Represents specific knowledge tied to a context
- Variable time size and properties
- Records differences that teaches a lesson
- Have the ability to help the reasoner in the future



# What is a case? Conclusion

- *“A case is a contextualized piece of knowledge representing an experience that teaches a lesson fundamental to achieving the goal of the reasoner.”*
- Content can be divided into the lesson it teaches and the context in which it teaches the lesson



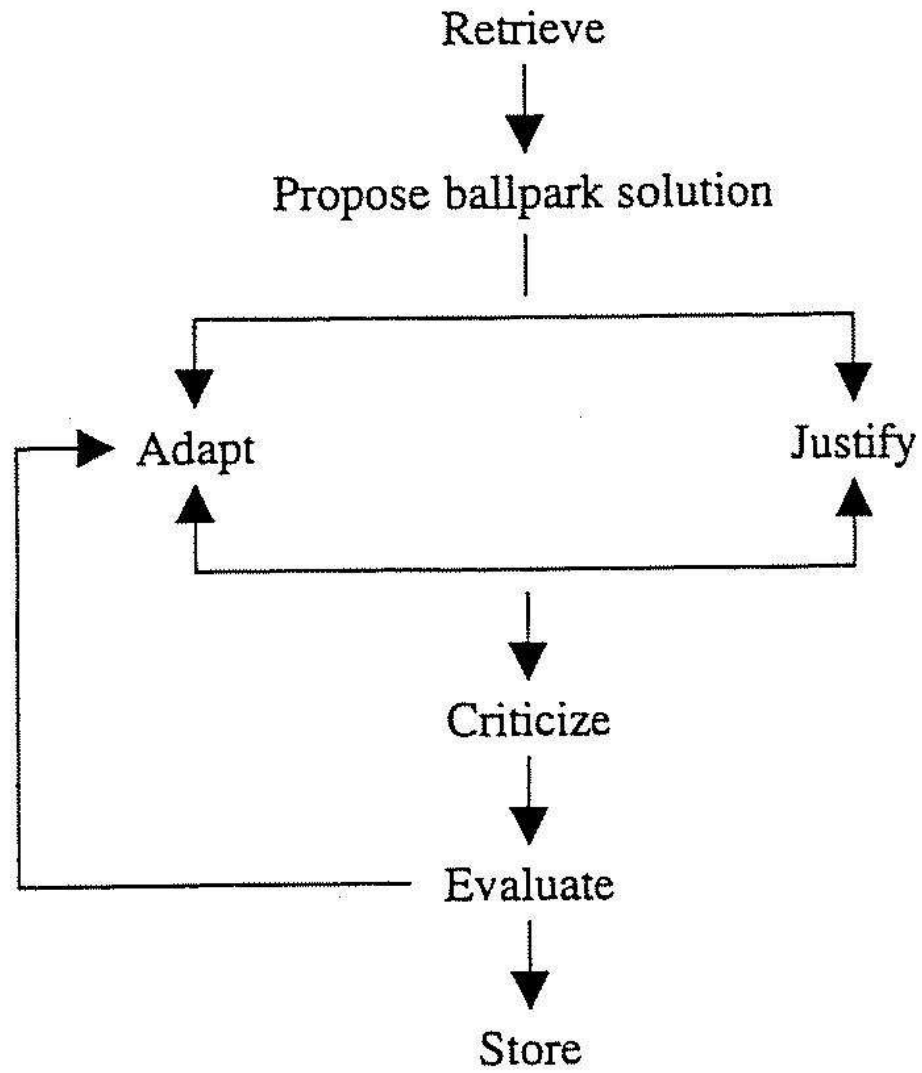
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# Processes

- The process can be divided into:
  - Case retrieval
  - Proposing a ballpark solution
  - Adapting the solution
  - Evaluating the solution
  - Storing relevant cases





# Case retrieval

- Recalling “good” cases
- Selecting a subset (could be one)
- Similarity assessment problem
- Indexing vocabulary problem
- Situation assessment problem
- Retrieval algorithms
- Together these make the indexing problem



# Proposing a ballpark solution

- What part of the solution is relevant?
- Amount of work done before passing solution on?
- Where to begin interpretation?



# Adaption

- What should be adapted to the new solution?
- How should we adapt it?



# Evaluation

- Checking database for similar solutions
- Propose hypothetical solutions
- Test in real world



# Storing cases

- Indexing, anticipating importance of new case



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# Applications of CBR

- Medical science
- In fields with incomplete knowledge
- Other complex areas



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# Pros of CBR

- Time efficiency
- Solutions for unpredictable environments
- Solutions when no algorithms exist
- Solutions for ill-defined and open-ended environments
- Warns about previous errors of a solution
- Gives reasoner focus on important parts of a problem



# Cons of CBR

- Following old cases blindly
- Creating bias from old solutions
- Might not find most appropriate sets of cases



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# Summary

- CBR allows a reasoner to efficiently find solutions that can help it solve a new problem
- A case is more just a chunk of knowledge, it helps the reasoner understand new situations with the potential pitfalls and problems that come with those.
- Integrates learning with reasoning, if designed correctly