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Introduction

Policies for Cooperative CBR
   Comitee
   Peer Counsel
   Bounded Counsel

CBR Agents Design

Experiments

Conclusion

References
Motivation

There are a few reasons to choose to distribute CBR:

- Large databases
- Privacy concerns

This paper presents three approaches to distribute CBR, while taking in maintaining:

- Agent ability to make independent decisions
- Privacy of the agent case database
The set-up

- We assume to have $n$ Agents
- Thus the Multiagent System is $M = \{A_i, C_i\}_{i=1}^n$
The Voting Algorithm

- Each Agent can process a specific problem $P$ and returns a Solution Endorsment Record (SER).
- A SER is of the form $\{\{S_k, E^j_k\}, P, A_j\}$
- In order to decide which is the "best" solution Each $A_i$ is given one vote, that can be split amongst several SER’s
- Each Solution $S_k$ generated by $A_j$ gets a vote

$$\text{Vote}(S_k, A_j) = \frac{E^j_k}{c + \sum_{r=1}^{k} E^j_r}$$

- Summing the Votes for $S_k$ produces the overall Ballot. The solution with the best Ballot is then chosen.
The Comitee Policy directly passes the Problem towards the other Comitee members.

The solution with the best Ballot is then chosen.

This framework only requires one iteration.
The Peer Counsel Policy tries to solve the problem locally. If no "good" solution is found, it passes it to the other peers.

The solution is deemed "good" if it passes a Self-competence test.

This framework requires up to two iterations.
The Bounded Counsel Policy also tries to solve the problem locally. If no "good" solution is found, it passes it to the other peers, one at a time.

A termination condition is enforced and the solution is returned if it’s vote is $\eta$ times better than the rest.

This framework requires up to $n$ iterations.
The LID Method in a Nutshel

- The terms in the Problem are processed as *Feature terms*
- Case relevance is assessed using a heuristic that minimizes RLM [1] distance
- The LID method is essentially $A^*$ search on the case space, using the RLM distance as a heuristic
A database with 280 cases about 3 different orders of marine sponges was distributed among 3 to 7 Agents.

The agents were ran on one machine, with disjoined case bases.

28 Problems were selected as test cases and randomly distributed to the agents.

10 Test runs were performed.
Results

- In all cases the Comitee Policy outperforms the rest
- The average number of Agents used however is the reverse
- The same is true for the average computation time spent
Conclusion

- The framework provided satisfies the design decisions.
- Agents can cooperate to solve problems, without entirely losing their autonomy.
- Future work includes:
  - Competence Models
  - Design of case-base sharing approaches
- Some critique:
  - The approaches require fine-tuned parameters
  - Isolated Agents
  - Networking aspect is disregarded in the experiments
Enric Plaza, Josep Lluis Arcos, and Francisco J. Martin.
Cooperative case-based reasoning.

Enric Plaza and Santiago Ontañoń.
Ensemble case-based reasoning: Collaboration policies for multiagent cooperative cbr.