

## Application to a Knowledge base for the corals of the Mascarene Archipelago



The protection of the environment has become a major concern for the end of this century. In the process of monitoring, management and conservation of biodiversity, some individuals have acquired a unique know-how to inventory and classify species: they are the experts. An expert is not simply a live encyclopedia who knows a large quantity of informations by heart, he is also a person who knows how to reason in a particular domain so as to take the right decisions (for example to name, to classify, and to identify a specimen).

Unfortunately, expertise in Systematics (the branch of Science one of the objectives of which is to study the species richness and the natural diversity) becomes rare. It is therefore urgent to develop tools that would allow expert knowledge to be collected and safeguarded so as to be transmitted to future generations. If this is not done, we will only be left with monographic descriptions and collections in museums.

The knowledge base for the corals of the Mascarene Archipelago (SW of Indian Ocean) is an example of gathering of expertise which is based on the experimental expert approach in life sciences. Their experience relies on observation of facts, construction of hypotheses, and experimental tests to verify them. The knowledge base has been designed with the help of a software workshop called IKBS (Iterative Knowledge Base System). This tool is written in Java language so as to be available on the Web and to run on all platforms.

Knowledge in biology evolves with time and can be reappraised from one day to the next. This is why IKBS applies an iterative methodology to build knowledge bases:

### Methodology :

- Acquisition of a descriptive model (domain knowledge or observable facts),
- Acquisition of examples (or cases) constituting the body of observed facts, with the assistance of a questionnaire,
- Processing of such a Knowledge by discrimination (induction of a decision tree) and/or comparison (case-based reasoning),
- Validation of produced knowledge,
- Iteration on the definition of the descriptive model and the update of the old cases.

One cannot therefore consider the work of reproduction of the know-how of the experts in a computer as a linear process going from the acquisition of knowledge to its processing then to its validation.

The nature offers such a varied and contradictory playground that it is very difficult to state rules that are always valid.

The originality of the demonstration resides in the cooperative approach for designing interactively a knowledge base derived from the experience of several distant experts: they share their experiences of modeling and describing and apply them to the same Family of corals (*Pocilloporidae*), exchange their interpretations of the observation on specimens, choose the best characters and illustrations for the questionnaire so as to improve the overall robustness of the multi-expert knowledge base.



*Pocillopora verrucosa*

The system, for which demonstrations are given, allows, thanks to satellite link up and the ATM technology, a greater quality of interactivity between the different experts remotely interconnected, so as to create a collective memory that records and transmits a part of their knowledge without requiring a simultaneous presence at a single time and place.



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