LL Frame System of Learning Methods

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Machine learning methods are widely used in many AI applications (e.g. data mining, speech recognition, robot control). To solve a learning problem we have to preprocess the input data, apply an algorithm and then evaluate the output. Generally, it is not enough to use just one algorithm. It is necessary to do experiments by hand, employing various learning algorithms, testing their parameters systematically, this requires a lot of work. It would be nice to develop a general environment which supplies the appropriate methods, automatizes the whole process.

The main result of the LL (Learning and Logic Based Knowledge Management) system is the unified managing of a variety of methods, their inputs and outputs, the development of new learning methods and their integration into the system.

To facilitate the preprocessing of the input data, an editor is used in the handling of various types of examples (ARFF, the C4.5 file format, etc.), and a converter makes it possible to convert to one format to another.

In the LL system we can define a project for a learning problem. A project can include tasks which makes possible to get experience in one go with different algorithms for various parameters. This enables us to find a better solutions for given learning problem. Two main built-in tools help in the postprocessing: One of them stores the result automatically in a dynamic grid for different task-runs and allows the user to view the result. The other is a built-in optimization algorithm that helps one to choose the best solution for the learning problem. The user can define a measure for the accuracy of solution and the search space, including the various parameters of the applied algorithms. The optimization algorithm provides the most suitable parameter settings for the learning problem using a deterministic annealing technique.

The structure of the LL system is modular, so it is easy to insert new learning methods.

In this paper we introduce the LL system and some of its interesting applications.

The previously integrated algorithms and methods are:

- The C4.5 Decision Tree Learner.
- Learning methods for Logic and Constraint Logic Programs: SPECTRE (SAC, DAC, RAC), IMPUT [1], IMPUT-LP-SLICE, IMPUT-CLP-SLICE.
- Slicing methods for (Constraint) Logic programs: SLICER [3].
- Methods including C4.5 from natural language processing: the CHUNKING problem, the POST-TAG problem.

References

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