

## **Rule generation methods based on logic synthesis**

Machine learning methods are successfully employed in the automatic construction of models for physical systems starting from a finite set of observations. For example, the analysis of reliability in communication networks or the determination of relevant genes for the onset of a given pathology can be efficiently faced by adopting connectionist systems, such as neural networks and support vector machines, or other machine learning approaches.

Nevertheless, most machine learning techniques do not allow to know the decisional mechanisms used to analyze and solve the target problem. It seems that these methods extract from data interesting information, without being able to communicate it in an intelligible form. An important alternative approach is offered by rule generation methods, which are able to provide a collection of intelligible rules underlying the problem at hand.

In the present seminar two new rule generation techniques, Hamming Clustering (HC) and Shadow Clustering (SC) will be presented. Both of them are based on Boolean function reconstruction from examples and are able to achieve accuracy values comparable to those of best machine learning methods, while providing intelligible information about the performed decisional process.



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