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**Report of Machine Learning Course #3**

**TWO-CLASS PATTERN RECOGNITION PROBLEM**

Pattern recognition (PR) addresses the problem of synthesizing artificial systems that group input data (also called patterns) into categories (or classes). Many PR problems are ill defined (i.e. there is no mathematical theory that can properly cope with them) so they cannot be solved completely by handcrafted algorithms and then the designer must use a learning machine. Typically, this learning device automatically synthesizes some of the parts that compose a pattern recognizer from a set of labelled examples belonging to the recognition problem (learning from examples).

Many modules can be integrated to form a pattern recognizer depending on the complexity of the problem. The core of any pattern recognizer is typically composed of a feature extractor and a classifier. The feature extractor reduces the input data by measuring certain invariant “features” or “properties”. The classifier uses then these features to make the decision of assigning the input pattern to a class.

The feature extractor is often handcrafted since it is rather specific to the problem. However, the current tendency is relying more on learning devices that automatically extract features and less on manual feature extraction of discriminatory information. Recent research efforts integrate the feature extractor into the classifier for performing a global training of both systems since separate training does not usually give the best possible solution.

**Reference**

[1]. Sergio Bermejo, Joan Cabestany (2001). Learning with Nearest neighbor classifiers.