

# A new Hierarchical Pattern Recognition method using Mirroring Neural Networks

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## ABSTRACT

In this paper, we develop a hierarchical classifier (an inverted tree-like structure) consisting of an organized set of “blocks” each of which is actually a module that performs a feature extraction and an associated classification. We build each of such blocks by coupling a Mirroring Neural Network (MNN) with a clustering (algorithm) wherein the functions of the MNN are automatic data reduction and feature extraction which precedes an unsupervised classification. We then devise an algorithm which we name as a “Tandem Algorithm” for the self-supervised learning of the MNN and an ensuing process of unsupervised pattern classification so that an ensemble of samples presented to the hierarchical classifier is classified and then sub-classified automatically. This tandem process is a two step process (feature extraction/data reduction and classification), implemented at each block (module) and can be extended level by level in the hierarchical architecture. The proposed procedure is practically demonstrated using 2 example cases where in a collage of images consisting of faces, flowers and furniture are classified and sub classified automatically.

We expect that this kind of architecture will be very useful in the development of efficient and powerful self-learning machines in the future.

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