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## Some Issues of the Paradigm of Multi-Learning Machine – Modular Neural Networks

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*This paper addresses some issues on the weighted linear integration of modular neural networks (MNN: a paradigm of hybrid multi-learning machines).*

*First, from the general meaning of variable weights and variable elements synthesis, three basic kinds of integrated models are discussed that are intrinsic-factors-determined, extrinsic-factors-determined, and hybrid-factors-determined. The authors point out: integrations dominated by both of the internal and external elements are highly correlative with not only the historical quality of the sub-networks, but also with the environment in which the information is processed.*

*In the sense of the mean of square error (MSE), several sufficient conditions to improve the whole system's performance are given while deleting one/some sub-networks in all the networks population. Meanwhile, when the whole performance of the current MNN system possesses is unsatisfactory, a corresponding improved strategy which need add one/some sub-networks is presented.*

*For the optimal weights vector under the framework of the weighted sum of the sub-networks' outputs, we point out some constraints forms of the sub-networks' integrated weights are unreasonable and present a general form while the corresponding computational algorithms are described briefly.*

*The authors present a new training algorithm of sub-networks named "Expert in one thing and good at many" (EOGM)." In this algorithm, every sub-network is trained on a primary dataset with some of its near neighbors as the accessorial datasets. Simulated results with a kind of dynamic integration methods show the effectiveness of these algorithms, where the performance of the algorithm with EOGM is better than that of the algorithm with a common training method.*

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