Statistical Prediction with Kanerva's Sparse Distributed Memory

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Abstract: A new viewpoint of the processing performed by Kanerva's sparse distributed memory (SDM) is presented. In conditions of near- or over- capacity, where the associative-memory behavior of the mod(cid:173) el breaks down, the processing performed by the model can be inter(cid:173) preted as that of a statistical predictor. Mathematical results are presented which serve as the framework for a new statistical view(cid:173) point of sparse distributed memory and for which the standard for(cid:173) mulation of SDM is a special case. This viewpoint suggests possi(cid:173) ble enhancements to the SDM model, including a procedure for improving the predictiveness of the system based on Holland's work with 'Genetic Algorithms', and a method for improving the capacity of SDM even when used as an associative memory.