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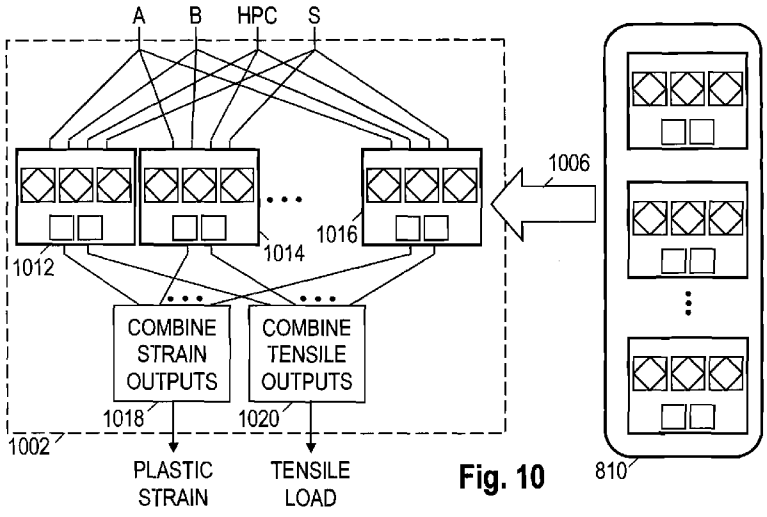


Fig. 10

(57) Abstract: Various neural-network based surrogate model construction methods are disclosed herein, along with various applications of such models. Designed for use when only a sparse amount of data is available (a "sparse data condition"), some embodiments of the disclosed systems and methods: create a pool of neural networks trained on a first portion of a sparse data set; generate for each of various multi-objective functions a set of neural network ensembles that minimize the multi-objective function; select a local ensemble from each set of ensembles based on data not included in said first portion of said sparse data set; and combine a subset of the local ensembles to form a global ensemble. This approach enables usage of larger candidate pools, multi-stage validation, and a comprehensive performance measure that provides more robust predictions in the voids of parameter space.

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