FORUM ON CONNECTIONISM

Connectionist Models for Natural Language Processing

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PANELIST STATEMENT

After an almost twenty year lull, there has been a dramatic upsurge of interest in massively parallel models for computation, descendants of perceptron and pandemonium models, now dubbed 'connectionist models.' Much of the connectionist research has focused on models for natural language processing. There have been three main reasons for this increase in interest:

1. Scientific adequacy of the models
2. The availability of fine-grained parallel hardware to run the models
3. The demonstration of powerful connectionist learning models.

The scientific adequacy of models based on a small number of coarse-grained primitives (e.g. conceptual dependency), popular in AI during the 70's, has been called into question and substantially replaced by a current emphasis in much of computational linguistics on lexicalist models (i.e., ones which use words for representing concepts or meanings). However, few people can doubt that words are too coarse, that they have structure and properties and features. Connectionist models offer very fine granularity; they can capture such detail in a manner that still allows for tractable computation. Such models also promise to make the integration of syntactic, semantic, pragmatic, and memory models simpler and more transparent.

Fine-grained hardware, such as the Connection Machine, can allow models with millions of active elements, full vocabularies, and rapid throughput, as well as powerful near-term connectionist applications based on the use of associative memory and hardware support for interprocessor communication. Meanwhile, connectionist learning models, such as the Boltzmann Machine and its descendant, the backward error propagation model, have demonstrated surprising power in learning concepts from example; as for instance in Sejnowski's NETtalk, which learned the pronunciation rules for English from examples. The future promises yet more surprising results as the concepts in even more radical models, such as Minsky's Society of Minds model, are digested and as new, even more powerful hardware becomes available.