SCALING BACK-PROPAGATION BY PARALLEL SCAN ALGORITHM

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INSIGHT: SPARSITY IN THE JACOBIANS

A full Jacobian can be prohibitively large to handle. However, the Jacobians of major operators can be extremely sparse:

Could be parallelized if all inputs are available.

BP AS A SCAN OPERATION

Define a binary, associative, non-commutative operator:

We can reformulate BP as calculating:

Which is an exclusive scan on the input array:

BPPSA EXPLAINED BY AN EXAMPLE

Parallel BP as Bleichlo Scan

Operands swapped for non-commutativity!