convolution, and can certainly be used in place of the FFT algorithm.

Further increase of speed, generally impossible in one dimension, may be achieved by using the same one-dimensional partial FFT (or other transform) computation in overlapping parts (e.g., $B_{ij} \cap B_{i,j-1}$ in Fig. 2) of neighboring blocks. Generally, for an $n$-dimensional convolution, an $(n - 1)$-dimensional FFT can be used on the overlapping part of two blocks. Such practice will, however, require extra memory capabilities for the storage of intermediate results. It appears that a detailed study of multidimensional convolution optimal speed and storage tradeoffs is now desirable.

Another aspect of application of the proposed method is in the parallel processing of a multidimensional signal. Several modular processors can be combined so as to achieve high-speed or real-time signal processing. For example, three-dimensional (time-dependent) picture processing can be implemented by six processors such as shown in Fig. 4. With this implementation, the total computation time may be reduced to one sixth of the time needed with a single processor.

Fig. 3. Comparison of the dependence on dimension. $N = 32, M = 128$.

Fig. 4. Parallel picture processing (overlap-and-save method with six-modular processors).

REFERENCES


Corrections to “Pattern Recognition as Conceptual Morphogenesis”

SATOSI WATANABE

The following corrections should be noted in the above paper.

1) The last of the Index Terms should be “principal axes method.”

2) The last sentence in Section III should read as follows: “If we therefore extend the same philosophy to a more general area of problems, we can say that pattern recognition is a task of finding appropriate variables, and of giving an appropriate definition of entropy whose values become small, i.e., smaller than the maximum value.”

3) In the fifth line of the second paragraph after (4.4), the word “relation” should be “relaxation.”

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4) In the first line after the last equation of Section IV, \( p_i(\lambda) \) should be \( p_i(\lambda_j) \).
5) In the twelfth line of the second paragraph after (6.3), the word “perception” should be “perceptron.”
6) Equation (6.4) should read as follows:

\[
Q = S^{(1)} + S^{(2)} + \varepsilon \sum_{i=1}^{n} p_i(1)^2 - p_i(2)^2 .
\]  
\[ \text{(6.4)} \]

7) Equation (7.6) should read as follows:

\[
Q = T(p(1)) + T(p(2)) - \varepsilon R(p(1), p(2))
\]
\[
= \varepsilon \sum_{i=1}^{n} p_i(1)^2 - \sum_{j=1}^{n} (p_i(1))^2 - \sum_{i=1}^{n} (p_i(2))^2 + 2 - \varepsilon. \quad \text{(7.6)}
\]

8) In the third line before (7.7), the word “shaper” should be “shaper.”

9) Equation (A1.1) should read as follows:

\[
- \sum_{j=1}^{n} \sum_{i=1}^{n} \log p(x_{ij}^{(j)})
\]

\[
+ \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{j=1}^{n} p(x_{i1}^{(1)}, x_{i2}^{(2)}, \ldots, x_{iN}^{(N)})
\]

\[
\log p(x_{i1}^{(1)}, x_{i2}^{(2)}, \ldots, x_{iN}^{(N)}). \quad \text{(A1.1)}
\]

10) The last line of Appendix I should read “Theory in 1937 [12].”

11) Equation (A2.1) should read

\[
T(p) = 1 - \sum_{i=1}^{n} p_i^2 = \sum_{i=1}^{n} \sum_{j \neq i} p_i p_j \geq 0. \quad \text{(A2.1)}
\]

12) The first paragraph of Appendix III should read as follows: “If \( p(x|H) \) is the probability density of the data point at \( x \) according to hypothesis \( H \) which is meant to explain (or describe) this data, and if \( v(x) \) is the density of the data points at \( x \), the \textit{a posteriori} (Bayesian) probability for \( H \) is given by . . . .”

13) The date for the second reference in [3] should be 1926.


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