Whether the generalisation of the meaning of 'processor' is legitimate or not is not a question I would care to comment upon, but the argument that generalisation should be encouraged to avoid waste is surely untenable. Far too many terms have suffered generalisation in the past to such an extent that they are now incapable of conveying precise meaning; 'flip flop' is one example, 'routine' is another. Even if 'processor' is restricted to hardware it is still difficult to define precisely (and 'central processor' is worse).

I would not impose upon you, Sir, the burden of being a terminological watchdog, but please do not allow your authors to take the Larmouth–Whitby-Strevens dictum too seriously.

<div align="right">Yours sincerely,
I. H. GOULD</div>

Sebright School
Cheverelles Green
Markyate
St. Albans
Hertfordshire
22 May 1969

To the Editor
The Computer Journal

Sir,
I support MM. Larmouth and Whitby-Strevens in their contention (this *Journal*, Vol. 12, p. 200) that the term 'processor' is valid for software. As further examples:

1. Firmware—which is an item of hardware that is obviously software.
2. My paper 'Checklist of Intelligence for Programming Systems', *CACM*, March 1959. This indicates that this usage was common enough a decade before the question has been raised anew.

<div align="right">Yours faithfully,
R. W. BEMER</div>

General Electric Company
North Black Canyon Highway
Phoenix
Arizona
U.S.A.
10 June 1969

To the Editor
The Computer Journal

Comments on a line thinning scheme

Sir,
Among other items included in his review-paper on pattern recognition, D. Rutovitz (1966) also deals with methods of processing digital images by computer. He goes on to suggest a set of rules (rules I–V on page 512) the realisation of which yields an image-thinning algorithm. The purpose of this communication is to present briefly some comments on, and suggested corrections to these rules.

Attention is drawn to the fact that the algorithm in its present form does not completely reduce diagonal lines to a skeleton form. Such strokes remain two-elements thick. See **Fig. 1(a)**. It is suggested that the amendments given below be incorporated in order to deal with this deficiency.

If the crossing number at the point in question is 4, ($X = 4$; the definition of X remaining unaltered) and conditions I, IV, and V are satisfied then the said point is still deleted provided that the conditions given in either A or B below are satisfied.

A.
$$\{\gamma(1) = 1, \gamma(7) = 1\}$$
$$AND$$
$$\{\gamma(2) = 1 \quad OR \quad \gamma(6) = 1\}$$
$$AND$$
$$\{\gamma(3), \gamma(4), \gamma(5), \gamma(8) = 0\},$$

B.
$$\{\gamma(3) = 1, \gamma(1) = 1\}$$
$$AND$$
$$\{\gamma(4) = 1 \quad OR \quad \gamma(6) = 1\}$$
$$AND$$
$$\{\gamma(5), \gamma(6), \gamma(7), \gamma(2) = 0\}.$$

Conditions A and B pertain respectively to diagonal strokes in the N.E.–S.W. and in the N.W.–S.E. directions. (Each argument in A is reduced by 2—on a period-of-8 basis—in B.)

Rule III becomes superfluous now that $X = 4$ forms one of the conditions for deletion. Hence its omission from the amendment. Furthermore, on using the above amendment one does not have to test for the conditions set out in the second part of rules IV and V.

It will not be inappropriate to mention that in his correspondence (privately) and elsewhere Dr. Rutovitz (1969) suggested yet a further modification to the original set of rules, whereby a point may not be deleted unless one of its axial neighbours is zero. This test is really superfluous. For having thus dispensed with the second part of rules IV and V, their first part—the conditions of which must be met before deletion can take place—express this very condition. The proposed axial-condition test is therefore unnecessary. **Fig. 1(b)** shows the image processed using all the above modifications.

INPUT   (a)   (b)
FIGURE 1
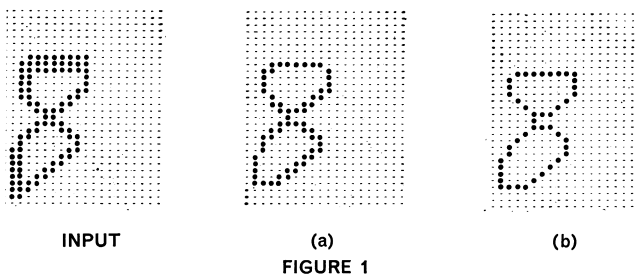
<div align="right">Yours faithfully,
E. S. DEUTSCH</div>

G.P.O. Research Station
Dollis Hill
London
29 July 1969

References

RUTOVITZ, D. (1966). Pattern Recognition, *Journal of the Royal Statistical Society*, Series A, Vol. 129, pp. 504–530.
RUTOVITZ, D. (1969). Local Operations on Digital Images, Lecture given at the 6th meeting of the Pattern Recognition Group, April 15th, University College, London.