Self-organisation is a universal phenomenon observable in many natural systems: both animate and inanimate. It is often easier to recognise self-organisation than to define it. The origins of Kohonen’s self-organising map (SOM) was as a simplified model of the relatively homogeneous structures found in mammalian brains, associated with the processing of sensory data, that exhibit self-organisation—that is the dimensionality reduction of unsupervised learning. In the terminology of neural computing, both animate and inanimate, self-organisation is the data-driven modification of synaptic strengths which, in turn, underlies the dynamics and behavioural modification of pattern recognition and the formation of higher-level representations. The SOM embodies a beautifully simple, yet powerful, abstraction of these mechanisms. Since it’s beginning in 1982, many thousands of research papers have reported on its various aspects and applications. Twenty years later, it is still a very active research topic within the neural network community. As the editors of this Special Issue, we would like to acknowledge the debt of our community to Teuvo Kohonen’s seminal contributions.

This Special Issue is a collection of recent contributions from the SOM and related communities. It consists of both extended versions of recommended papers from the Workshop on SOMs, held during June 2001 at the University of Lincoln, UK, and contributed articles received in response to a subsequent open call. Hopefully, they represent an accessible perspective on recent developments. The individual papers either describe novel extensions to SOM concepts or reveal connections to data analysis, data mining and visualisation, sequential and non-vectorial processing, convergence conditions, non-linear component analysis, information and reinforcement learning, or statistical learning ideas.

Although there are still important unanswered questions, the underlying principles and properties of the SOM and related methods are becoming much clearer. Their popularity has been enhanced greatly by new extensions, developments, and an ever-widening range of applications.

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