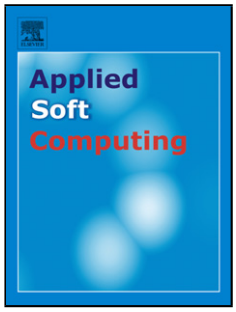


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# Linking soft computing to art: introduction of efficient k-continuous line drawing

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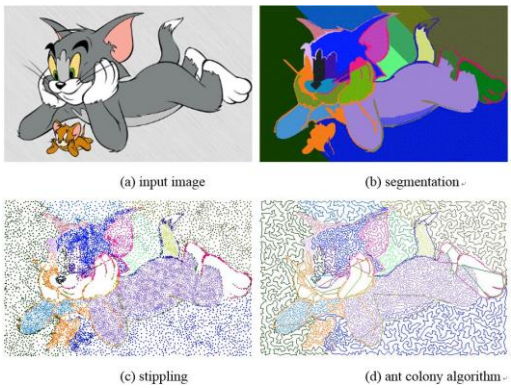
**Graphical abstract**




**Research Highlights**

- ✓ Linking the soft computing algorithm to the art
- ✓ Development and implementation of a complete algorithm to draw k continuous line drawing
- ✓ Modification of graph-based segmentation algorithm
- ✓ Understanding of computer graphics and conversion basics
- ✓ Introduction of a new art technique: k continuous line drawing

**Abstract**: Continuous line drawing (CLD) is a technique used in the field of art, in which the pen does not leave the paper until the sketch is completed. In this study, a novel technique, k-continuous line drawing (k-CLD), is proposed; this technique enables a visual image to comprise k closed non-intersecting lines. k-CLD involves the following challenges: 1) partitioning the target image into k regions, 2) stippling each region without distorting the target image, and 3) connecting the stippled dots in each region using a single closed, non-intersecting line. This study identifies and implements efficient algorithms to produce high-quality k-CLDs. Further, an improvement to the graph-based image segmentation algorithm has been proposed using the Minkowski distance to evaluate dissimilarity difference and demonstrated its effectiveness to partition the target image into k regions. Next, well-spaced stippled dots were generated in each region using a weighted Voronoi diagram. Finally, the stippled dots were connected by a single non-intersecting line, obtained by solving a traveling salesman problem (TSP) in each region. The metaheuristic to solve the TSP was an ant