

Drawing a Figure in a Two-Dimensional Plane for a Qualitative Representation

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This paper describes an algorithm for generating a figure in a two-dimensional plane from a quantitative spatial representation of PLCA. In general, it is difficult to generate a figure from qualitative spatial representations, since they contain positional relationships but do not hold quantitative information such as position and size. Therefore, an algorithm is required to determine the coordinates of the objects while preserving the positional relationships. Moreover, it is more desirable that the resulting figure meets a user's requirement. PLCA is a simple symbolic representation consisting of points, lines, circuits and areas. We have already proposed one algorithm for drawing, but the resulting figures are far from a "good" one. In that algorithm, we generate the graph corresponding to a given PLCA expression, decompose it into connected subgraphs, determine the coordinates in a unit circle for each subgraph independently, and finally determine the position and size of each subgraph by locating the circles in appropriate positions. This paper aims at generating a "good" figure for a PLCA expression. We use a genetic algorithm to determine the locations and the sizes of circles in the last step of the algorithm. We have succeeded in producing a figure in which objects are drawn as large as possible, which complex parts larger than others. This problem is considered to be a type of "circle packing" and the method proposed here is applicable to the other problems in which locating objects in a non-convex polygon.