Karlsruher Institut für Technologie

KOLLOQUIUM

Informatik-Sonderkolloquium

Drawing Planar Graphs with Constraints: Algorithmic and Empirical Aspects

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Graph Drawing is a research area concerning automatic creation of pictorial representations of graphs. A node-link diagram is one of the most intuitive of these representations: the nodes are represented as 2 or 3-dimensional objects and edges as (poly-) lines or curves connecting the adjacent nodes. Node-link diagrams are used in a number of fields, including social science, bioinformatics, neuroscience, electronics, software engineering, business informatics and humanities.

The notions of readability, clarity, appropriateness (for an application) and aesthetic appeal of a node-link diagram are formalized using so-called drawing conventions, aesthetics functions and constraints that are fulfilled or optimized, by a graph drawing algorithm. Drawing conventions usually express requirements on the drawing from the perspective of an application: planarity, shape of the edges. Aesthetics functions are measures that assist how readable, clear and appealing a node-link diagram is, e.g., number of edge crossings, edge crossing angle, drawing resolution. Drawing constraints are local restrictions on a drawing provided by a user, e.g., set of nodes form a convex shape, important nodes lie on the top of the drawing or on pre-specified points.

I will start this talk with a short introduction into the field of Graph Drawing and a general description of research topics that I have studied. Afterwards, I will concentrate on the algorithms that produce node-link diagrams for planar graphs with constraints on the shape of the graphs' faces. Finally, I will provide an overview of an empirical study suggesting that the shape of the outer face of a node-link diagram is an influential factor of it's perceived aesthetics.

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