

Force-Directed Graph Drawing Using Social Gravity and Scaling

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Force-directed layout algorithms produce graph visualization by resolving a system of emulated physical forces. We present techniques for using social gravity as an additional force in force-directed layouts, together with a scaling technique, to produce drawings of trees and forests, as well as more complex social networks. Social gravity assigns mass to vertices in proportion to their network centrality, which allows vertices that are more graph-theoretically central to be visualized in physically central locations. Scaling varies the gravitational force throughout the simulation, and reduces crossings relative to unscaled gravity. In addition to providing this algorithmic framework, we apply our algorithms to social networks produced by Mark Lombardi, and we show how social gravity can be incorporated into force-directed Lombardi-style drawings.

Joint work with Michael Bannister, David Eppstein, and Lowell Trott