

Constraint Solvers For Graphical User Interface Layout

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Many computer programs have graphical user interfaces (GUIs). To use the screen real estate efficiently, developers need to layout the widgets of the GUI. Constraints have been influential in the construction of GUIs for a long time. In GUIs the main usage of constraints is to define the layout of the widgets. Various algorithms are widely used for solving linear constraints problems in a number of different scientific areas. The most important class of algorithms for sparse problems, as they appear for GUI layout, is that of indirect methods. These algorithms have some limitations, for example they work only with square matrices. We extend iterative methods to solve also non-square matrices and handle soft constraints. Pivot selection is a major issue in this regard. We present two pivot selection strategies, one random and one deterministic strategy. Furthermore, we propose two strategies for handling soft constraints efficiently. These strategies are implemented differently but the solution for both strategies is the same. We also show that iterative techniques have a smaller memory footprint and are faster than a previous approach for solving GUI layout problems. Some computational results which demonstrate the effectiveness of the solvers are presented. It is demonstrated that iterative methods can be designed to converge even in the case of non-square problems.