
Course Assignments
for
Graph Drawing
4DV802 – Autumn 2018
Assignment 2

Deadline for this assignment is Dec 11, 2018 at 23:55.

All students should develop a simple tool in Java that is able to read an input file with a graph specification and to draw this graph (including the nodes' id) within a scrollable 2D drawing area. Each student will implement a different drawing algorithm or variations of one algorithm. A simple GUI is needed to allow the user to load input files (based on GraphML) easily and to modify options, if necessary. The latter depends on the implemented algorithm, e.g., the width W of the Coffman-Graham Layering should be modifiable via the GUI. You should use the following graph specifications for testing (also available in Moodle):

<http://cs.lnu.se/isovis/courses/fall18/4dv802/assignments/dags-GraphML.zip> (DAGs)

<http://cs.lnu.se/isovis/courses/fall18/4dv802/assignments/digraphs-GraphML.zip> (digraphs)

Task 1 *GraphML (all students)*

Implement a parser for GraphML input files (a specification of GraphML can be found at the following URL: <http://graphml.graphdrawing.org/>). This graph format is based on XML. Your tool should be able to parse simple graph specifications (i.e., nodes and edges), such as given in the ZIP files with graph examples.

Task 2 *Hierarchical Layout of DAGs — Variant 1 (Student: Henric Rosengren Evenlind)*

Implement the hierarchical approach for creating polyline drawings of acyclic digraphs. Implement the algorithm and embed it into a tool as described above.

- Layer Assignment: Longest Path Layering
- Crossing Reduction: Hybrid Approach discussed in the course
- Coordinate Assignment: Simple dummy node removal

Task 3 *Hierarchical Layout of DAGs — Variant 2 (Student: Buttar Sarpreet Singh)*

Implement the hierarchical approach for creating polyline drawings of acyclic digraphs. Implement the algorithm and embed it into a tool as described above.

- Layer Assignment: Coffman/Graham Layering
- Crossing Reduction: Adjacent Exchange AND Split (user can choose)
- Coordinate Assignment: Simple dummy node removal

Task 4 *Hierarchical Layout of DAGs — Variant 3 (Student: Angelos Chatzimparmpas)*

Implement the hierarchical approach for creating polyline drawings of acyclic digraphs. Implement the algorithm and embed it into a tool as described above.

- Layer Assignment: Coffman/Graham Layering
- Crossing Reduction: Barycenter Method AND Median Method (user can choose)
- Coordinate Assignment: Simple dummy node removal

Task 5 *Hierarchical Layout of Digraphs — Variant 4 (Student: Harris Mohamed Alzuabi)*

Implement the hierarchical approach for creating polyline drawings of *digraphs*. Implement the algorithm and embed it into a tool as described above.

- Preprocessing: Cycle Removal

- Layer Assignment: Longest Path Layering
- Crossing Reduction: Barycenter Method
- Coordinate Assignment: Simple dummy node removal

Task 6 *Hierarchical Layout of Digraphs — Variant 5 (Student: Carl Johan Adolfsson)*

Implement the hierarchical approach for creating polyline drawings of *digraphs*. Implement the algorithm and embed it into a tool as described above.

- Preprocessing: Cycle Removal
- Layer Assignment: Longest Path Layering
- Crossing Reduction: Median Method
- Coordinate Assignment: Simple dummy node removal

Please prepare a demo of your tool as well as a short presentation (about 5–10 minutes) (PowerPoint, PDF, . . .) on the most important aspects of your implementation like data structures, etc. You will present both on Dec 12, 14:00–15:30, room B3032 or remotely via Zoom. Please, use your own computer for the demo and the presentation if possible. Submit all files in a ZIP archive via Moodle by the given deadline and also include a short readme file about your software with instructions on how to compile and run it.

Please note: any kind of plagiarism is not acceptable!