Team 2.2:

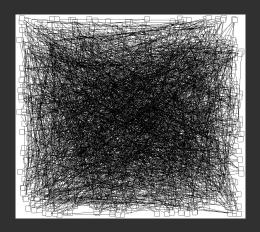
Stress Minimization und Multilevel Framework für VANTED

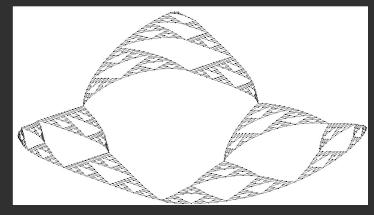
Layoutverfahren für große Graphen

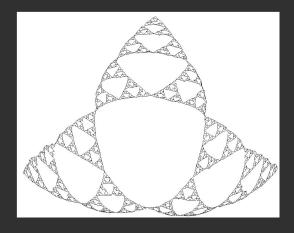
Jannik Löscher, René Groß, Theodor Gutschlag, Tobias Franz, Jonas Olenburger, Gordian Schönherr

Stress Minimization

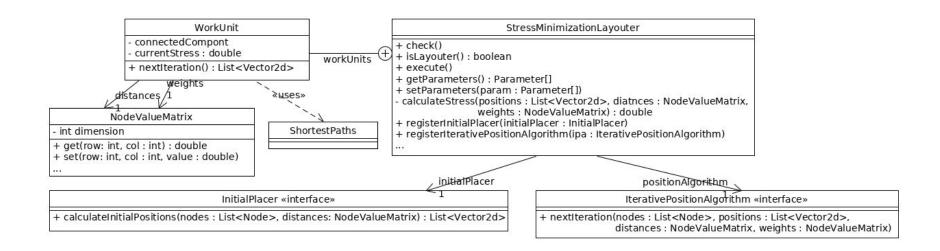
- Breitensuche zum Finden der kürzesten Distanzen
- PivotMDS als Vorlayout
- Iteratives Stressminimierungsverfahren



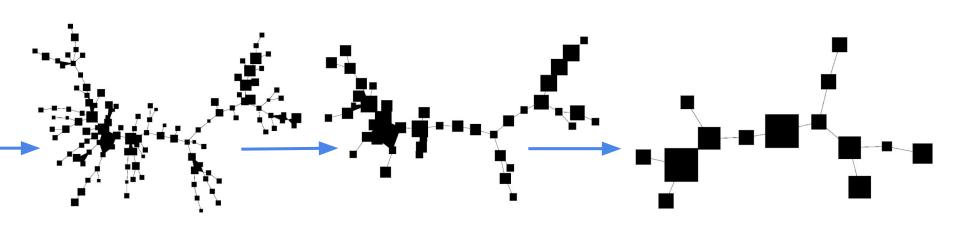




Design und Architektur (SM)



Multilevel-Ansatz



Multilevel Framework

- Erstellen von immer kleineren Graphen welche Anfangsgraph repräsentieren (coarsening).
- Layout des kleinsten Graphen
- Nächst-kleinerer Graph als initial placement für jeden Graph (placement)
- ...

Design und Architektur (MLF)

MultiLevelFramework + execute() + isLayoutAlgorithm(): boolean + setParameters(param: Parameter[]) + getParameters(): Parameter[] + check() + addMerger(m: Merger) + addPlacer(p: Placer) + addLayoutAlgorithm(I: Algorithm) buildComponentGraphs(): MultilevelGraph[] pergers placere Merger Placer «interface» «interface» + buildCoarseningLevels(mlg: MultilevelGraph) + reduceCoarseningLevel(mlg: MultilevelGraph) + getParameters(): Parameter[] + getParameters(): Parameter[] + setParameters(p: Parameter[]) + setParameters(p: Parameter[])

Triviale Merger & Placer

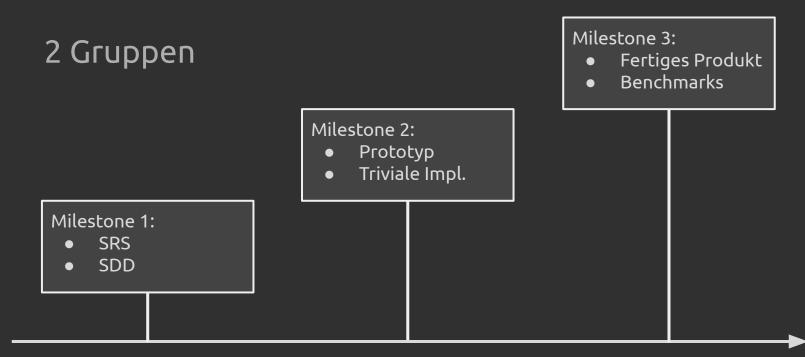
Random Merger

"Zufällig Knoten entlang einer Kante zusammenfassen"

Random Placer

"Enthaltene Knoten zufällig in Kreis um Ausgangsknoten platzieren"

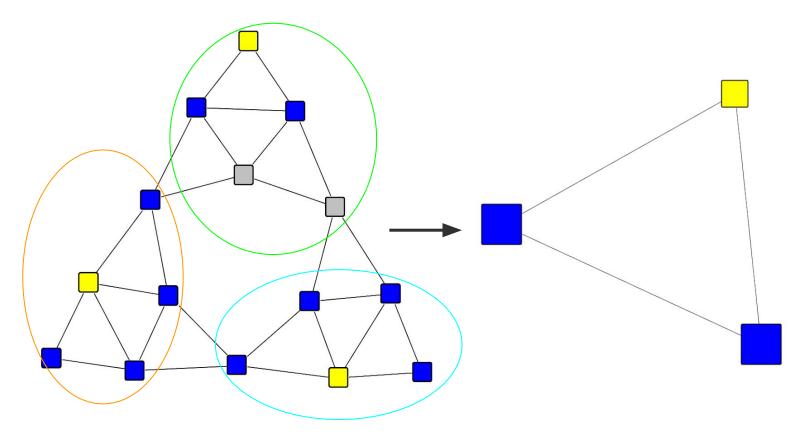
Planung



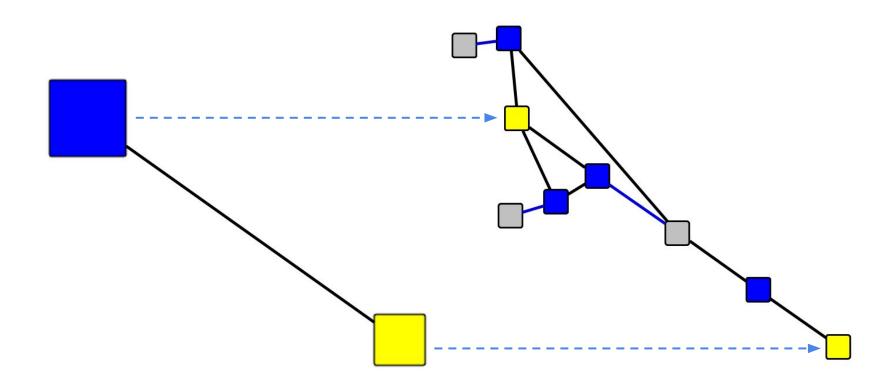
Herausforderungen

- VANTED
- SM:
 - PivotMDS
 - Laufzeit
- MLF:
 - Algorithmen integrieren
- Arbeitsaufteilung

Solar Merger

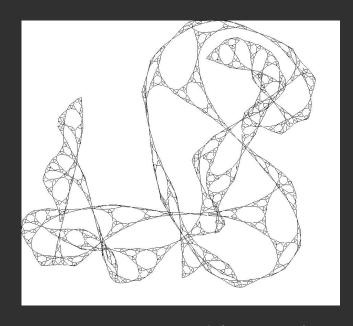


Solar Placer

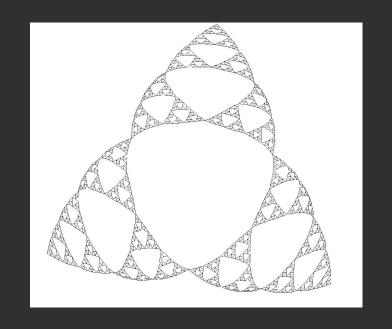


Benchmarks

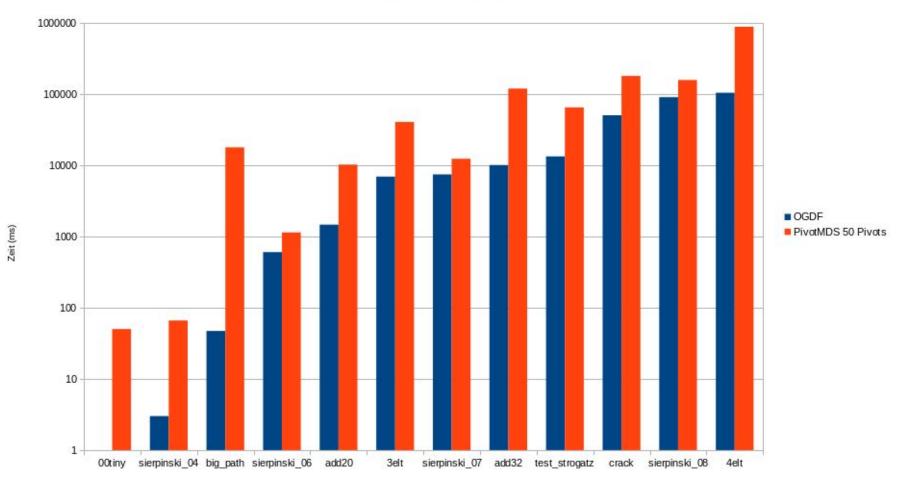
Stress Minimization vs. "Force Directed"



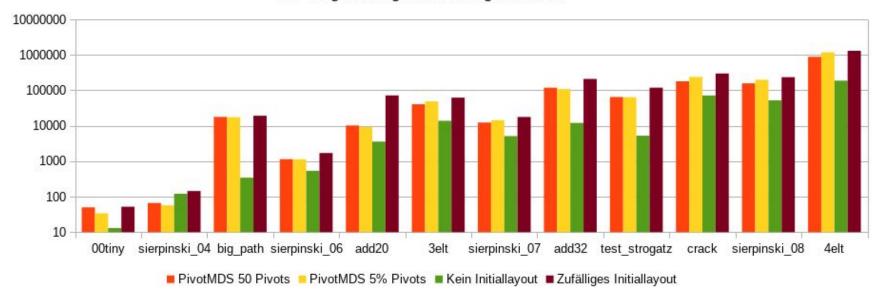
Force Directed (t ≈ 10s)



Stress Minimization ($t \approx 2s$)

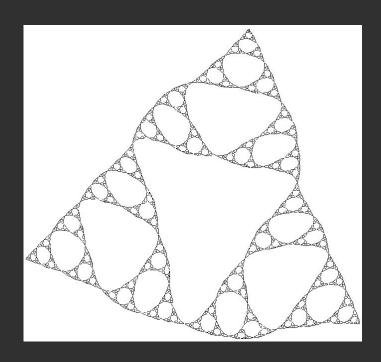


SM Vergleich Algorithmen Logarithmisch

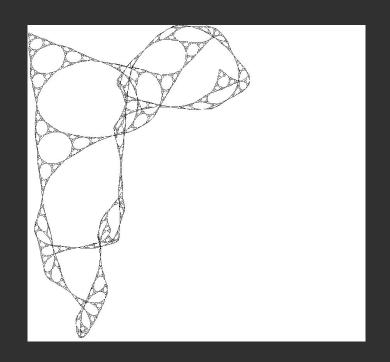


Zeit (ms)

Force Directed mit und ohne Multilevel Framework

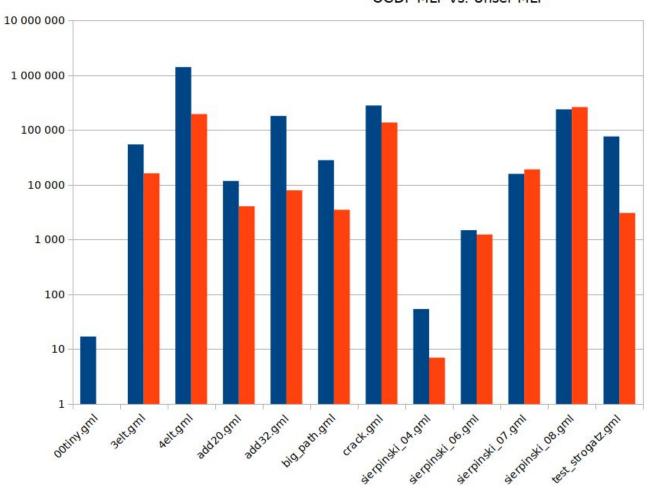


Force Directed + MLF (150s)

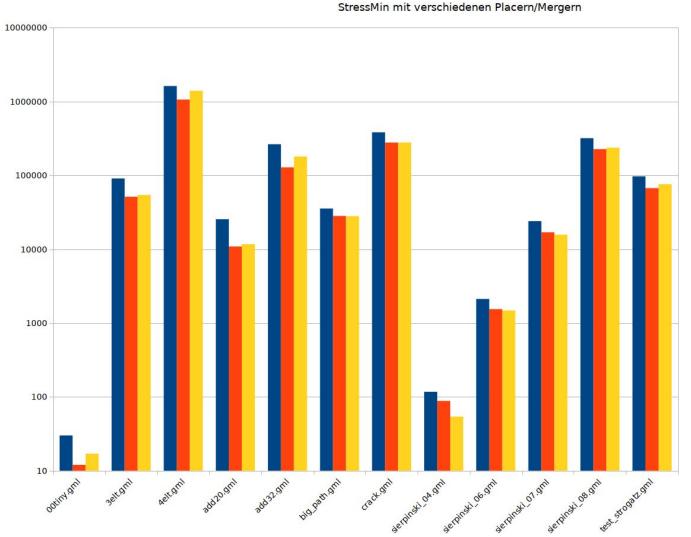


Force Directed alleine (150s)

OGDF MLF vs. Unser MLF



- Solar Merger/Solar Placer/Stress Minimization
- Solar Merger/Solar Placer/Stress Minimization (OGDF)



■ Random Merger/Random Placer/Stress Minimization

Solar Merger/Random Placer/Stress Minimization

Solar Merger/Solar Placer/Stress Minimization

Live Demo

