fancy software name

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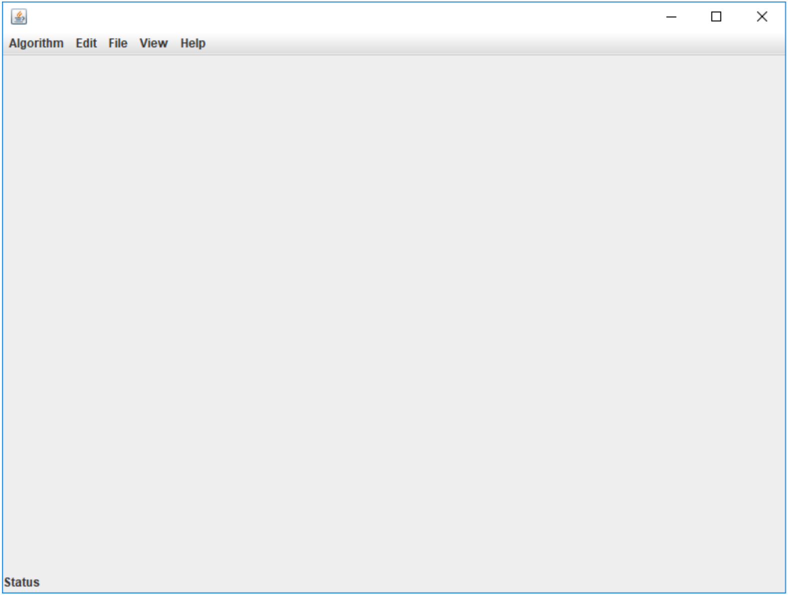
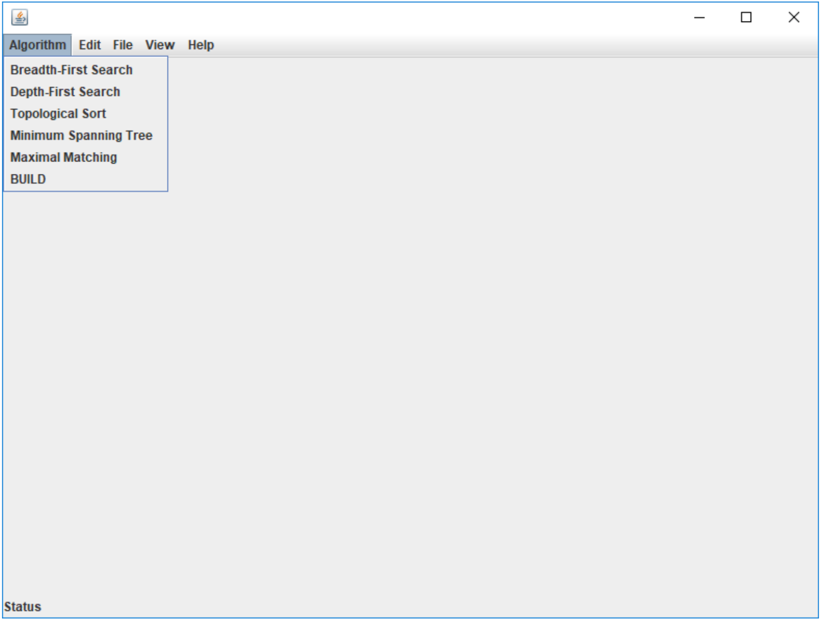
GUI



Algorithms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Breadth-First Search
Depth-First Search
Topological Sort
Minimum Spanning Tree
Maximal Matching
BUILD
Status

Breadth/Depth-First Search

Input: $G = (V, E),\ s \in V$

$Q, F \leftarrow \emptyset$

$R \leftarrow \{s\}$ $\triangleright$ visited vertices

for all $(s, v) \in E$ **do**

  $Q \leftarrow Q + (s, v)$

while $Q \neq \emptyset$ **do**

  $(v, w) \leftarrow \mathit{choose}(Q)$ $\triangleright$ Q is queue or stack (BFS/DFS)

  if $w \notin R$ or $v \notin R$ **then**

    $R \leftarrow R + w + v$

    $F \leftarrow F + (v, w)$

    for all $(w, x) \in E$ **do**

      $Q \leftarrow Q + (w, x)$

return (V, F)

source: lecture graphtheory by Prof. Dr. Marc Hellmuth

Topological Sort

```
L ← empty list                              ▷ will contain the sorted elements
S ← set of all vertices with no incoming edge
while S ≠ ∅ do
    remove a vertex n from S
    add n to tail of L
    for all vertices m with an edge e from n to m do
        remove edge e from the graph
        if m has no other incoming edge then
            insert m into S
if graph has edges then
    return error                            ▷ graph has at least one cycle
else
    return L
```

source: https://en.wikipedia.org/wiki/Topological_sorting

Minimum Spanning Tree

$F \leftarrow \emptyset$
for $i = 1$ to $|E|$ **do**
    if $(V, F + e_i)$ is acyclic **then**
        $F \leftarrow F + e_i$
return (V, F)

source: lecture graphtheory by Prof. Dr. Marc Hellmuth

Maximal Matching

$M \leftarrow \emptyset$
$E' \leftarrow E$ ▷ not visited edges
while $E' \neq \emptyset$ **do**
  choose $e = (u, v) \in E'$
  $M \leftarrow M + (u, v)$
  delete all edges from E' that are incident to u or v
return M

source: lecture discret optimization by Prof. Dr. Marc Hellmuth, own

BUILD

BUILD

INPUT: Set of triples in $\mathscr{R}$, leaf set $\mathscr{L}$.
OUTPUT: A rooted, phylog. tree distinctly leaf-labeled by $\mathscr{L}$ consistent with all rooted triplets in $\mathscr{R}$, if one exists; otherwise *null*.
compute $G(\mathscr{R},\mathscr{L})$
compute connected components $C_1,\dots,C_s$ of $G(\mathscr{R},\mathscr{L})$
if $s=1$ and $|\mathscr{L}|=1$ **then**
    return tree $\simeq K_1$
else if $s=1$ and $|\mathscr{L}|>1$ **then**
    return *null*
else
    for $i=1,\dots s$ **do**
        $T_i = \mathtt{BUILD}(\mathscr{R}_{|V(C_i)}, V(C_i))$
    end for
    if $T_i \neq null$ for all $i=1,\dots s$ **then**
        attach all of these trees to a common parent node and let T be the resulting tree; else $T = null$.
    end if
end if

source: lecture bioinformatics by Prof. Dr. Marc Hellmuth

Requirements

properties of the graph

- no coloring of edges or vertices
- no weights of edges or vertices

  $\rightarrow$ not needed for algorithms
- mainly undirected graphs
- vertex label

  $\rightarrow$ for BUILD

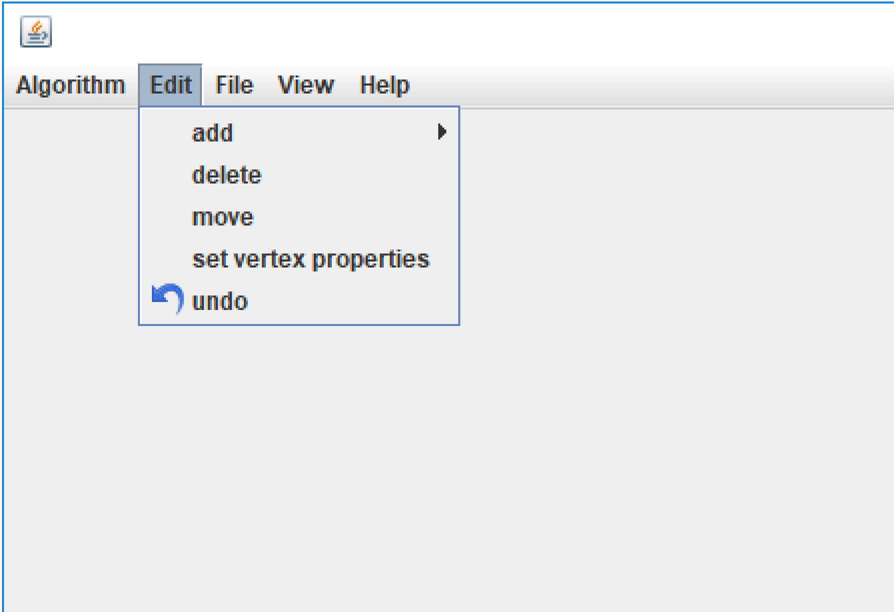
$\rightsquigarrow$ as easy as possible

Requirements

format of textfile

1	'u' or 'd' (undirected or directed)
2	Integer n (number of vertices)
3	Integer m (number of edges)
$4 - (n+4)$	vertex list (name, label) for each vertex
$(n+5) - (m+n+5)$	edge list (u,v) for each edge

Menues


Algorithm
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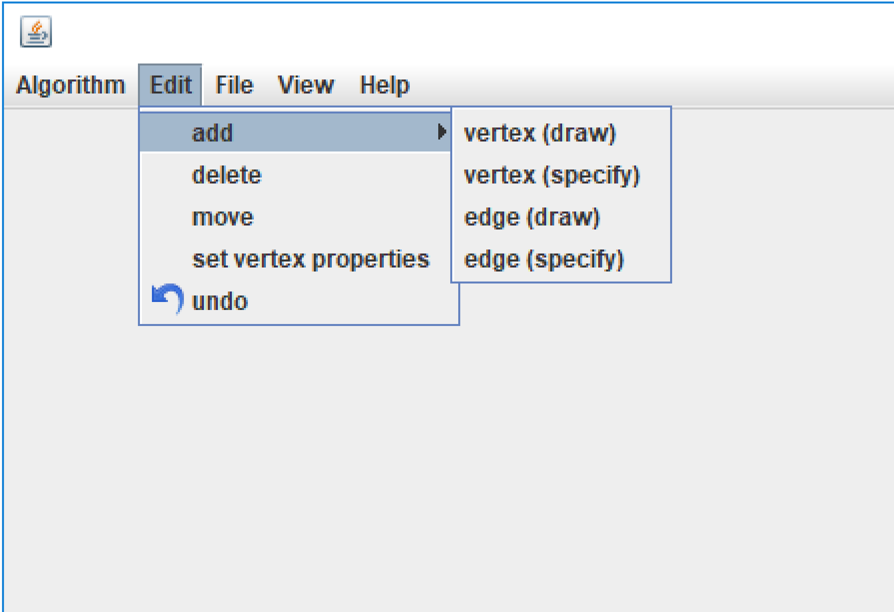
Menues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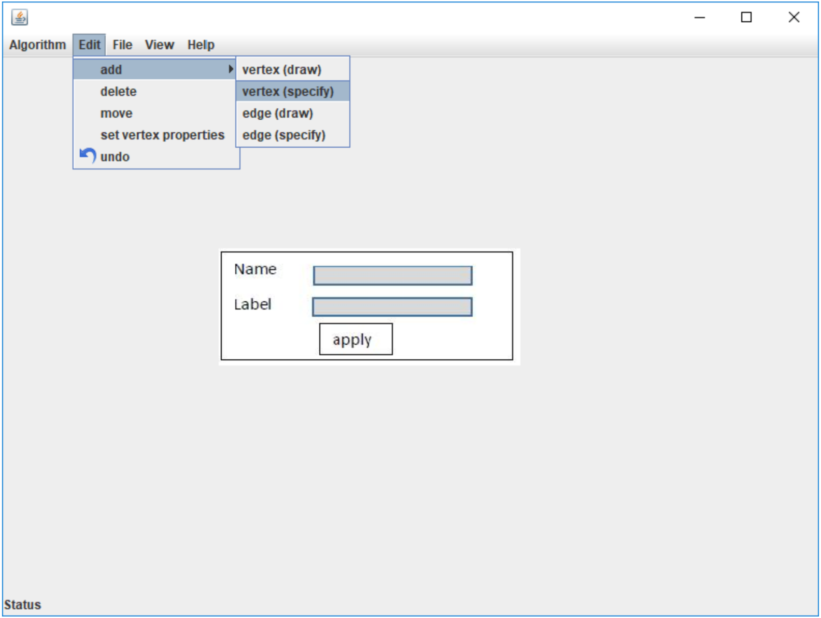
vertex (draw)
vertex (specify)
edge (draw)
edge (specify)

Menues


Algorithm
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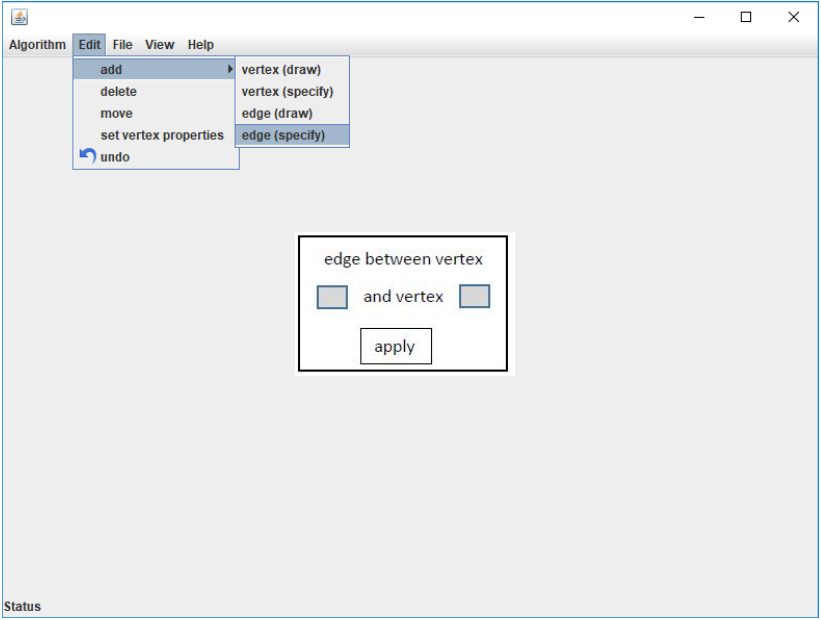
set vertex properties
undo
vertex (draw)
vertex (specify)
edge (draw)
edge (specify)
Name
Label
apply
Status

Menues


Algorithm
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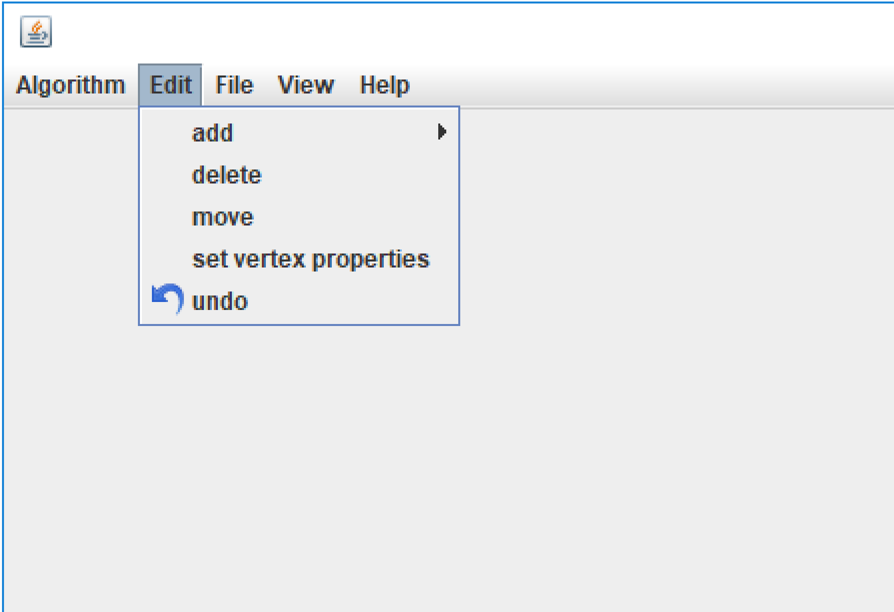
set vertex properties
undo
vertex (draw)
vertex (specify)
edge (draw)
edge (specify)
edge between vertex
and vertex
apply
Status

Menues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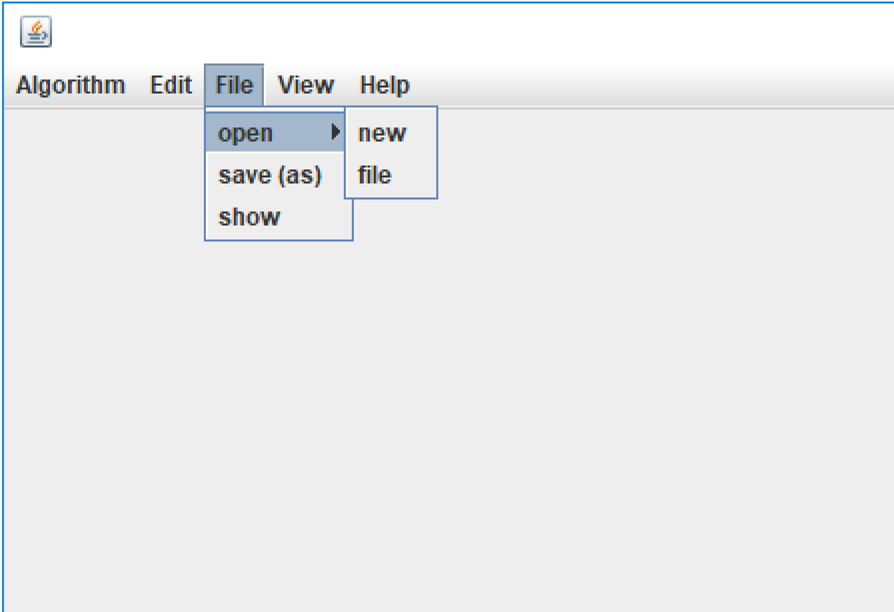
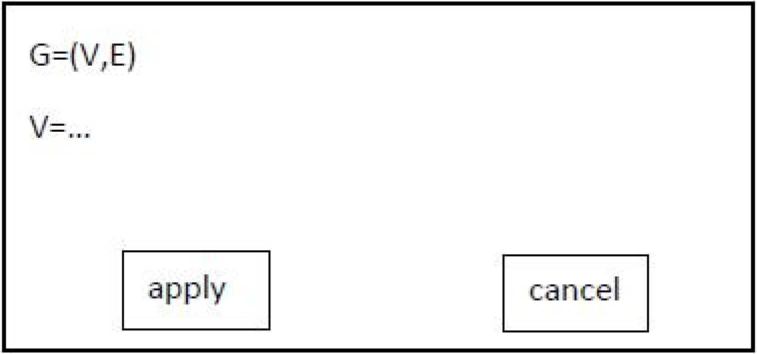
set vertex properties
undo

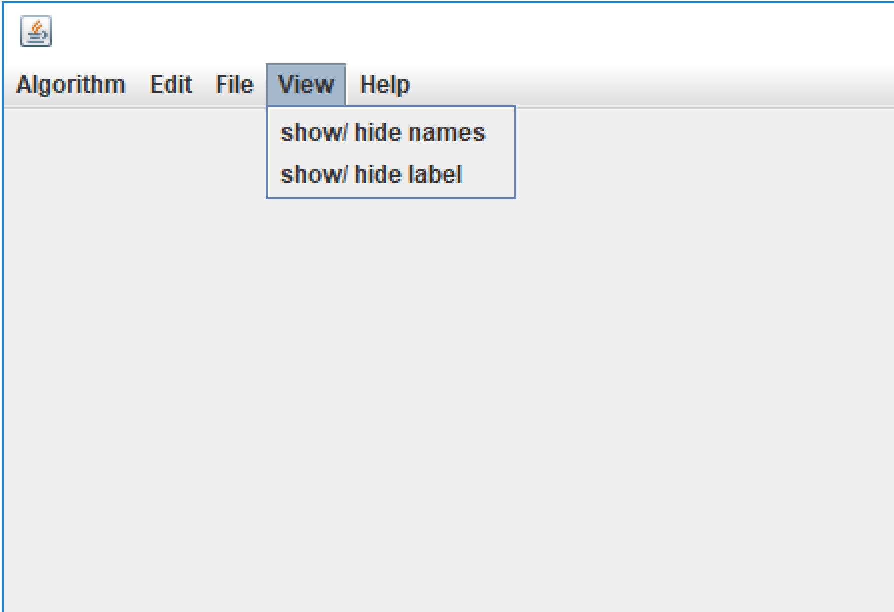
Menues



Menues



Menues


Algorithm
Edit
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View
Help
show/ hide names
show/ hide label

Thank you for your attention!