

Writing algorithms in latex

1 Using algorithm library

New commands for algorithm environment are defined in package `algorithmwh.sty`. It can be loaded from <http://www.cs.joensuu.fi/pages/whamalai/sciwri/algorithmwh.sty>. Save it to your working directory. In addition, you have to include two other packages (`float` and `xspace`) in the header. Thus, add the following lines to the header of your latex document:

```
\usepackage{float}
\usepackage{xspace}
\usepackage{algorithmwh}
```

2 Notes

- You can add your own commands to `algorithmwh.sty` by `\newcommand`. Suggestion: rename the style file according to you, if you make changes to it.
- Line numbers are useful, if you refer to certain lines in your code. Begin each code line by `\uln`. If you don't need line numbers, drop `\uln`.
- You have to specify the spaces explicitly by `\>`.
- Fix the style you use for assignments. There are several alternatives:
 $x = y$, $x \leftarrow y$, $x := y$.
- Logical bit-operations `\uor`, `\uxor`, `\uand`, `\unot` require math mode (\$'s), e.g. $x \mid y$ is achieved by

```
$x \uor y$
```

3 Example (a text extract)

The basic idea of the algorithm (Alg. 1) is following:

1. Search connected components from graph G by depth-first search. This can be completed in time $\Theta(|V| + |E|)$ (See section Analysis.) Let the resulting vertex set be $V' \subseteq V$, and the corresponding undirected subgraph $G' = (V', E')$.
2. For each connected component search self-referring groups from G' by depth-first search (Alg. 2).

Alg. 1 SelfReferringSets(G, min_f). An algorithm for searching all strongly self-referring sets in graph $G = (V, E)$.

Input: $G = (V, E), min_f$

Output: $Y \subseteq V$

```
1      begin
2          compute all connected components in  $G = (V, E)$ 
3          for each connected component  $V'$  in  $G = (V, E)$  do
4              for all  $v \in V'$  dfs( $\{v\}, degree(v), min_f, v$ )
5      end
```

Alg. 2 $\text{dfs}(X, d, \min_f, \text{last})$. A depth-first search of the self-referent sets in subgraph $G' = (V', E')$.

Input: $X \subseteq V, d, \min_f, \text{last}$

Output: $Y \subseteq V'$

```
1  begin
2      if  $f_{ref}(X) \geq \min_f$  then
3          output  $X$ 
4      else if  $(f_{ref}(X) < 1 - \frac{d(1-\min_f)}{(|X|-1)\min_f})$ 
5          then return // search failed
6      for all vertices  $u \in V'$  ( $u > \text{last}$  and  $\exists v \in X (v, u) \in E$ ) do
7           $\text{dfs}(X \cup \{u\}, d, \min_f, u)$ 
8  end
```
