The `newalg` Package

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Abstract

The package contains the definitions that are needed to typeset code algorithms in a pretty way. The Formatted algorithms follow the style set forth in the book “Introduction to Algorithms” by Cormen, Leiserson and Rivest.

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1 Introduction

The LATEX macros which are described here allow descriptions of algorithms to be typeset in a pretty way. This is very useful for functional specifications for a software project or to document an algorithm for a white paper.

The idea for this macro package comes from the book “Introduction to Algorithms” by Cormen, Leiserson, and Rivest. Any examples in this document come directly from that book and should not be reproduced without proper attribution.

2 User Interface

2.1 The algorithm environment

Use the algorithm environment to typeset algorithm code. This environment makes

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several new commands available that help in typesetting code algorithms. The algorithm environment uses math mode and the array environment to do the typesetting. Everything typed is interpreted in math mode. To leave math mode use the text command. Here is an example of the output produced by using the algorithm environment.

\begin{algorithm}
\begin{IF}{free = \NIL}
\ERROR{out of space}
\ELSE
x \= free \;
free \= next[x] \;
\RETURN x
\end{IF}
\end{algorithm}

2.2 Flow Control Environments

\textbf{IF} Use the environment \texttt{IF} to format an if statement. When inside the \texttt{IF} environment, the \texttt{ELSE} macro becomes available to show the else clause. The environment takes one argument that is the condition for the if statement. For an example of its usage, see the above example.

\textbf{FOR} Use the \texttt{FOR} environment to format a for loop and takes one argument. There are two kinds of for loops supported by this macro. The first type of for loop is generally known as the \texttt{for-each} loop. This type of loop is used to iterate over the values of some set. The syntax for the argument to the environment is \texttt{\EACH <var> \IN <set>". The other type of loop supported is used to assign a variable to a range of values. The syntax for the argument in this case is \texttt{<var> \= <beginning> \TO <end>". Here is an example usage.

\begin{algorithm}
\begin{FOR}{i \= 2 \TO n}
\begin{IF}{s_i \geq f_j}
A \= A \cup \{i\} \;
j \= i \;
\end{IF}
\end{FOR}
\RETURN A
\end{algorithm}

\textbf{WHILE} Use the \texttt{WHILE} environment to format a while loop. The environment takes one argument. The argument is the exit condition for the loop. The loop will
iterate until the condition is false. Here is an example usage.

\begin{algorithm}{Tree-Successor}{x}
\begin{IF}{right[x] \neq \NIL}
\RETURN \begin{CALL}{Tree-Min}(right[x])
\end{CALL}
\end{IF}
y \= p[x] \\
\begin{WHILE}
\{y \neq \NIL \text{and} x=right[y]\}
x \= y \\\ny \= p[y]
\end{WHILE}
\RETURN y
\end{algorithm}

\begin{algorithm}{Hash-Search}{T,k}
i \= 0 \\\n\begin{REPEAT}
\begin{IF}{T[j] = k}
\RETURN j
\end{IF}
i \= i+1
\end{REPEAT} T[j]=\NIL \text{or} i=m \\\n\RETURN \NIL
\end{algorithm}

\begin{algorithm}{SWITCH}{T,k}
\item{\text{default}}$
\end{algorithm}
The current implementation of the `algorithm` environment is sensitive to the proper placement of `\` in the text. See the examples for this. The environments should work without being so fussy on this point. (Something you need a `\` at the end of and environment, sometimes you don’t).

I would like the syntax of the repeat loop to be the same as the while loop. I was having some trouble getting the stack commands to work, so that I could save of the argument. This environment is not very consistent with the rest of the `algorithm` environments.
There is probably a better way to do the formatting then using the array environment. Currently \LaTeX is formatting the algorithms by using the \texttt{array} environment. This is pretty silly, because this is not really an array.

You cannot center the algorithm environment. This is probably because it is being implemented as an array. The current workaround for this problem is to include the algorithm in a \texttt{\begin{minipage}{1pt} ... \end{minipage}}. Seems to work in every case that I have come across.

There is probably a better way to make a mode that is like math mode that does not insert $\$ \texttt{characters everywhere.}

I am not very experienced in writing modes for \LaTeX, so if you have any suggestions for improvements or know how to solve any of the above listed problems, please send me email. The address is on the front page of this document.