

The Title of the Article*

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Abstract

Here comes the abstract of the article, which is a summary of the main results discussed in the article. It should contain neither mathematical formulas, nor references.

Keywords: computer science, L^AT_EX, article format

1 Introduction

The paper should be written in standard L^AT_EX. Please do not use strange formats or non-standard packages. Avoid commands that would reconfigure the size of the page, the size and type of letters or the baselineskip.

The article in the first phase should be written with the `\draft` command that makes the overfull boxes visible. Before sending the final version of your article please be sure that there are no such overfull boxes.

2 Pictures and figures

Every figure should appear in the `figure` environment, i.e. must be defined between `\begin{figure}` and `\end{figure}`. You should provide where you prefer to put your figure [`htbp`] (h – here, t – top, b – bottom, p – page) right after `\begin{figure}`. Use L^AT_EX figures, or include PostScript(.ps) or, most preferred, Encapsulated PostScript(.eps) images with the `\includegraphics{image.eps}` command.

Before `\end{figure}` give a title to your figure within the `\caption{...}` command. To be able to refer to this figure later, label it with a unique identifier using the `\label{unique-label}` command. In the text you can refer to it with `\ref{unique-label}`. Let us consider the following example:

Figure `\ref{fig:example}` shows an example.
`\begin{figure}[ht]`

*This work was supported by...

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```

\centering\includegraphics[scale=0.5]{example.eps}
\caption{The example figure}
\label{fig:example}
\end{figure}

```

Figure 1 shows an example.

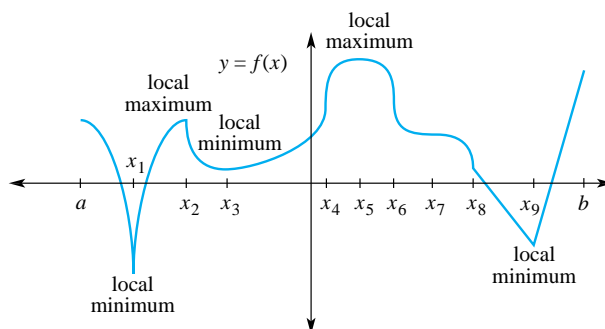


Figure 1: The example figure

3 Tables

Similarly to the procedure with figures, use the `table` environment to create tables. Normally, the title appears above the table, therefore put the `\caption{...}` command right after `\begin{table}[htbp]`. Use the `tabular` environment to prepare your table.

```

\begin{table}[ht]
\caption{This is an example table.}\label{tab:res}
\begin{center}
\begin{tabular}{l|rr}
Problem & Time(s) & Memory(MB) \\ \hline
easy    & 13      & 25 \\
hard    & 2359   & 6820 \\
\end{tabular}
\end{center}
\end{table}
Table \ref{tab:res} shows an example table.

```

Table 1 shows an example table.

Table 1: This is an example table.

Problem	Time(s)	Memory(MB)
easy	13	25
hard	2359	6820

4 Theorems and Lemmas

In the `actacyb` class the `amsthm` package is included. Thus, the most common environments, such as `definition`, `theorem`, `lemma`, `proposition`, `corollary`, `claim`, `remark`, `example` and `proof` are already defined. To define other environments, please use the `\newtheorem{otherenv}[theorem]{Otherenv}` command.

Please do not redefine the `theoremstyle` or `theorem numbering`. By default, each “theorem” type is consecutively numbered: **Theorem 1**, **Theorem 2**, **Lemma 1**, etc. throughout the paper. If you need numbering by sections, you should indicate it as an option to `\documentclass` at the beginning of the document:

```
\documentclass[theoremsectionnumbering]{actacyb.cls}
```

Not numbered theorem environments can also be used by specifying the option `notnumberedtheorems` for `documentclass`. Such environment names have an “nn” prefix, e.g., `nntheorem`, `nndefinition`, `nnremark`. If you would like to specify the default numbering behaviour explicitly, use the `theoremcontinuousnumbering` option.

The `proof` environment automatically generates the end of proof (qed) symbol at the end of the proof. If you don’t need this symbol, redefine it to an empty command inside the proof environment (for the given proof only) or in the preamble (globally) as `\renewcommand{\qedsymbol}{}`.

By using the `theoremcontinuousnumbering` and `notnumberedtheorems` options, the following commands produce the result below:

```
\begin{definition}
We define....
\end{definition}
```

```
\begin{theorem}
If  $N=1$ , then  $P=NP$ .
\end{theorem}
```

```
\begin{proof}
It is easy to see that if  $N=1$ , then  $NP=1 \cdot P = P$ .
\end{proof}
```

```
\begin{nnremark}
```

This is a not numbered remark.
`\end{nnremark}`

`\begin{definition}`
 We define....
`\end{definition}`

`\begin{remark}`
 Let us note that the above theorem is not...
`\end{remark}`

Definition 1. *We define....*

Theorem 1. *If $N = 1$, then $P = NP$.*

Proof. It is easy to see that if $N = 1$, then $NP = 1 \cdot P = P$. □

Remark. This is a not numbered remark.

Definition 2. *We define....*

Remark 1. Let us note that the above theorem is not...

By specifying the `theoremsectionnumbering` option at the `documentclass` declaration, we would see **Definition 4.1**, **Theorem 4.1**, **Remark**, and **Remark 4.1** captions here, respectively.

5 Equations

The usual way to write equations is to use the `equation` environment for a single line of equation, and the `eqnarray` environment for multiline equations. It is also possible to use the `array` environment within an `equation`, but we do not recommend its usage, because its spacing and labeling may not give the desired result. Besides the `equation` and `eqnarray` environments, other `amstex` environments, such as `multiline`, `align`, `split`, etc. are also recommended.

The function Φ is defined in formula `\ref{eq:phi}`.

`\begin{equation}`
 $\Phi(x) = \prod_{i=1}^n \sin(x_i) \cos(x_i - \frac{1}{3}\pi)$ `\label{eq:phi}`
`\end{equation}`

The function Φ is defined in formula (1).

$$\Phi(x) = \prod_{i=1}^n \sin(x_i) \cos(x_i - \frac{1}{3}\pi) \tag{1}$$

6 Indentations

Below is an example of text indentation:

In addition, seeds have the following property:

```
\begin{itemize}
\item[]
If a seed of clause  $c_T$ , and example  $\{\mathbf{x}\}$  satisfies
 $c_T$  but not  $c$ , then  $\{\mathbf{x}\}$  has at least one attribute
in  $c_T$  that is not in  $c$ .\hfill(\tt*)
\end{itemize}
The procedure below...
```

In addition, seeds have the following property:

If a seed of clause c_T , and example \mathbf{x} satisfies c_T but not c , then \mathbf{x} has at
least one attribute in c_T that is not in c . (*)

The procedure below...

6.1 Bulleted List

Below is an example of a bulleted list:

```
\begin{itemize}
\item for every  $x \in A$  and for...
\item for every  $x_1, x_2$  and for every...
\end{itemize}
```

- for every $x \in A$ and for...
- for every x_1, x_2 and for every...

6.2 Enumerated List

Below is an example of an enumerated list:

```
\begin{enumerate}
\item If one of the following conditions holds:
\begin{enumerate}
\item The first condition.\label{step:1a}
\item The second condition.
\end{enumerate}
\end{enumerate}
\item If  $\frac{n}{n_1} \geq 3$  then in the majority of cases the
assumption may be removed.
\end{enumerate}
```

Let us refer to the first condition by `\ref{step:1a}`.

1. If one of the following conditions holds:
 - a) The first condition.
 - b) The second condition.
2. If $\frac{n}{n_1} = 3$ then in the majority of cases the assumption may be removed.

Let us refer to the first condition by 1.a.

7 Algorithms

If you want to include algorithms in your manuscript, please use the `algorithm` package along with the `algorithmic` style. As in other floating environments, please use some of the `[htbp]` (h – here, t – top, b – bottom, p – page) letters right after `\begin{algorithm}` to determine the desired place of your algorithm. Please provide a title with the `\caption{...}` command, and use the `\label{alg:...}` and `\ref{alg:...}` commands if you want to refer to the algorithm in the text, as shown in the following example. If you have the latest `algorithmic` package, you can also refer to any step of the algorithm as shown in the following example.

A general Interval Branch and Bound algorithm is shown in Algorithm~\ref{alg:ibb}. One of the following selection rules is applied in Step \ref{step:selrule}:

```

\begin{algorithm}[ht!]
\caption{ A general interval B\&B algorithm.}
\label{alg:ibb}
\textbf{\underline{Funct}} IBB($S, f$)
\renewcommand{\algorithmiccomment}[1]{\hfill {\it #1}}
\begin{algorithmic}[1]
\STATE Set the working list  $\mathcal{L}_W := \mathcal{S}$  and the final
list  $\mathcal{L}_Q := \{\}$ 
\WHILE{(  $\mathcal{L}_W \neq \emptyset$  )} \label{alg:igoend}
  \STATE Select an interval  $XX$  from  $\mathcal{L}_W$ 
      \label{step:selrule} \COMMENT{Selection rule ~}
  \STATE Compute  $\mathbf{f}(X)$  \COMMENT{Bounding rule ~}
  \IF[Elimination rule]{ $XX$  cannot be eliminated}
    \STATE Divide  $XX$  into  $X^j, j=1, \dots, p$ , subintervals
      \COMMENT{Division rule ~}
  \FOR{$j=1, \dots, p$}
    \IF[Termination rule]{ $X^j$  satisfies the termination
      criterion}
      \STATE Store  $X^j$  in  $\mathcal{L}_W$ 
    \ELSE
      \STATE Store  $X^j$  in  $\mathcal{L}_Q$ 
    \ENDIF
  \ENDFOR
\ENDWHILE
\ENDALGORITHM

```

```

\ENDFOR
\ENDIF
\ENDWHILE
\STATE \textbf{return} $\{\text{cal L}\}_Q$
\end{algorithmic}
\end{algorithm}

```

A general Interval Branch and Bound algorithm is shown in Algorithm 1. One of the following selection rules is applied in Step 3.

Algorithm 1 A general interval B&B algorithm.

Func IBB(S, f)

```

1: Set the working list  $\mathcal{L}_W := \{S\}$  and the final list  $\mathcal{L}_Q := \{\}$ 
2: while ( $\mathcal{L}_W \neq \emptyset$ ) do
3:   Select an interval  $X$  from  $\mathcal{L}_W$  Selection rule
4:   Compute  $lb f(X)$  Bounding rule
5:   if  $X$  cannot be eliminated then Elimination rule
6:     Divide  $X$  into  $X^j$ ,  $j = 1, \dots, p$ , subintervals Division rule
7:     for  $j = 1, \dots, p$  do
8:       if  $X^j$  satisfies the termination criterion then Termination rule
9:         Store  $X^j$  in  $\mathcal{L}_Q$ 
10:      else
11:        Store  $X^j$  in  $\mathcal{L}_W$ 
12:      end if
13:    end for
14:  end if
15: end while
16: return  $\mathcal{L}_Q$ 

```

8 Bibliography

For the bibliography, either you can use bibtex to generate the items or these can be typed manually into the `\thebibliography` environment, but please follow the rules of the plain bibliography style.

If you would rather make a bibliography using BibTeX write

```

\bibliographystyle{actaplain}
\bibliography{optimization}

```

and replace `optimization` with the name of your .bib file.

For a “plain” bibliography, please follow the rules of the style shown below. Refer to an article [9], a book [5], a technical report [8], a manual [10], an article in a book [6], a chapter in a book [3], an unpublished paper [7], a thesis [2], a

proceedings [4], or an article in proceedings [1] as it is shown in the bibliography below. The source should look like the following:

```
\begin{thebibliography}{10}

\bibitem{alefeld-survey}
Alefeld, G.
\newblock Inclusion methods for systems of nonlinear equations -- the interval
  {Newton} method and modifications.
\newblock In Herzberger, J., editor, {\em Topics in Validated Computations},
  pages 7--26, Amsterdam, 1994. Elsevier Science Publishers.

\bibitem{braune-diss}
Braune, K.~D.
\newblock {\em {Hochgenaue Standardfunktionen {f{"ur} reele und komplexe Punkte
  und Intervalle in beliebigen Gleitpunktrastern}}}.
\newblock PhD thesis, {Universit{"at Karlsruhe}}, 1987.

\bibitem{CORR96}
Correa, R. and Ferreira, A.
\newblock {\em Parallel Best-First Branch and Bound in Discrete Optimization: a
  Framework}, pages 145--170.
\newblock Springer, 1996.

\bibitem{griewank-proceedings}
Griewank, A. and Corliss, G.~F., editors.
\newblock {\em Automatic Differentiation of Algorithms: Theory, Implementation,
  and Application}, Philadelphia, 1991. SIAM.

\bibitem{Klatte1993a}
Klatte, R., Kulisch, U., Wiethoff, A., Lawo, C., and Rauch, M.
\newblock {\em {C--XSC}, {A} {C}++ Class Library for Extended Scientific
  Computing}.
\newblock Springer-Verlag, Berlin, 1993.

\bibitem{Fuchi1996a}
Makino, K. and Berz, M.
\newblock Remainder differential algebras and their applications.
\newblock In Berz, Martin, Bischof, Christian, Corliss, George, and Griewank,
  Andreas, editors, {\em Computational Differentiation: Techniques,
  Applications, and Tools}, pages 63--74. SIAM, Philadelphia, 1996.

\bibitem{jamartin}
Mart{"i"}nez, J.A., Casado, L.G., Garc{"i"}a, I., Sergeyev, Ya.D., and
T{"o"}th, B.
\newblock On an efficient use of gradient information for accelerating interval
  global optimization algorithms.
\newblock Submitted to Numerical Algorithms, 2002.

\bibitem{ratz96optimized}
Ratz, D.
\newblock An optimized interval slope arithmetic and its application.
\newblock Bericht 4/1996, Institut f{"ur Angewandte Mathematik,
  Universit{"a}t Karlsruhe, Karlsruhe, Germany, 1996.

\bibitem{ratz99nonsmooth}
```



```

Ratz, D.
\newblock A nonsmooth global optimization technique using slopes, the one
dimensional case.
\newblock {\em Journal of Global Optimization}, 14(4):365--393, 1999.

\bibitem{T3D}
Smith, T.
\newblock {\em Cray T3D System Architecture Overview}.
\newblock Cray Research, 1993.

\end{thebibliography}

```

References

- [1] Alefeld, G. Inclusion methods for systems of nonlinear equations – the interval Newton method and modifications. In Herzberger, J., editor, *Topics in Validated Computations*, pages 7–26, Amsterdam, 1994. Elsevier Science Publishers.
- [2] Braune, K. D. *Hochgenaue Standardfunktionen für reele und komplexe Punkte und Intervalle in beliebigen Gleitpunktrastern*. PhD thesis, Universität Karlsruhe, 1987.
- [3] Correa, R. and Ferreira, A. *Parallel Best-First Branch and Bound in Discrete Optimization: a Framework*, pages 145–170. Springer, 1996.
- [4] Griewank, A. and Corliss, G. F., editors. *Automatic Differentiation of Algorithms: Theory, Implementation, and Application*, Philadelphia, 1991. SIAM.
- [5] Klatte, R., Kulisch, U., Wiethoff, A., Lawo, C., and Rauch, M. *C-XSC, A C++ Class Library for Extended Scientific Computing*. Springer-Verlag, Berlin, 1993.
- [6] Makino, K. and Berz, M. Remainder differential algebras and their applications. In Berz, Martin, Bischof, Christian, Corliss, George, and Griewank, Andreas, editors, *Computational Differentiation: Techniques, Applications, and Tools*, pages 63–74. SIAM, Philadelphia, 1996.
- [7] Martínez, J.A., Casado, L.G., García, I., Sergeyev, Ya.D., and Tóth, B. On an efficient use of gradient information for accelerating interval global optimization algorithms. Submitted to Numerical Algorithms, 2002.
- [8] Ratz, D. An optimized interval slope arithmetic and its applications. Bericht 4/1996, Institut für Angewandte Mathematik, Universität Karlsruhe, Karlsruhe, Germany, 1996.
- [9] Ratz, D. A nonsmooth global optimization technique using slopes, the one dimensional case. *Journal of Global Optimization*, 14(4):365–393, 1999.
- [10] Smith, T. *Cray T3D System Architecture Overview*. Cray Research, 1993.

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