How to Use the ICTR LaTeX Class

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Abstract: This paper describes how to use the ICTR class with LaTeX to produce high quality papers suitable for submission to the journal of *Research and Development on Information and Communication Technology*.

Keywords: *Class, ICTR, LaTeX, style, template, typesetting.*

I. Class Option

All papers submitted to the journal of Research and Development on Information and Communication Technology must use the following class option:

```
\documentclass[10pt, a4paper, journal,
   two side]{ICTR}
```

The above class option indicates the use of `10pt` text size, `a4paper` size, `journal` mode, and `two side` layout. The option `{ICTR}` indicates the use of the ICTR class.

II. The Title Page

The title area is created by using the command `\maketitle`, which is called after declaring all the text objects to be appeared in the title area.

1. Page Title

The page title can be created by the command `\title{}`, for example,

```
\title{An Important Paper}
```

2. Author Names and Author Addresses

Author names can be declared by using the command `\AuthorName{}` like

```
\AuthorName{First Author$^1$, Second
   Author$^2$}
```

Here, the superscripts `$^1$` and `$^2$` are used as the references to the addresses of the authors. The addresses can be declared by using the command `\AuthorAddress{}` like

```
\AuthorAddress{$^1$ A University, City,
    Country\\
$^2$ Another University, City, Country}
```

Note that the double backslash `\\` must be used to separate different addresses on different lines.

3. Running Heading

The running heading can be created by using the command `\ICTRleftmark{}` with the heading being provided inside the braces `{}`, for example,

```
\ICTRleftmark{Journal of \LaTeX}
```

III. Abstract and Keywords

The abstract of the paper can be created by the `abstract` environment, for example,

```
\begin{abstract}
This paper describes how to use the
   ICTR class with \LaTeX\ ...
\end{abstract}
```

The keywords can be declared by the `keywords` environment, for example,

```
\begin{keywords}
Class, ICTR, \LaTeX, ...
\end{keywords}
```

IV. Sections

The ICTR class supports three-level sections including `\section{}`, `\subsection{}`, and `\subsubsection{}`. The `\paragraph{}` is not treated as a section and not being numbered, but can still be used to produce paragraphs inside sections.

V. Citations and References

Citations are made by calling the `cite` package as `\usepackage{cite}` and using the `\cite{}` command.

References are made by using the style of IEEEtran as `\bibliographystyle{IEEEtran}`.

VI. Equations

This section presents different ways to create different types of equations.

1. Single-line Equations

Equations are created by using the traditional `equation` environment, for example,

```
\begin{equation} \label{eq_1}
e^{\pi i} + 1 = 0
\end{equation}
```

which produces the following equation

$$e^{\pi i} + 1 = 0 \tag{1}$$

If equation number is not needed, use the `displaymath` environment instead. Note that the equation (1) can be referred by `(\ref{eq_1})`.

2. Multi-line Equations

a) Using `split`

Multi-line equations can be created by using the `split` environment inside the `equation` environment like

```
\begin{equation} \label{eq_2}
\begin{split}
A & = \frac{\pi r^2}{2} \\
  & = \frac{1}{2} \pi r^2
\end{split}
\end{equation}
```

which produces the following

$$\begin{aligned} A &= \frac{\pi r^2}{2} \\ &= \frac{1}{2}\pi r^2 \end{aligned} \tag{2}$$

b) Using `align`

Another way to create multi-line equations is to use the `align` environment like

```
\begin{align}
x - y &=  0 \\
x + 2y &=  3
\end{align}
```

TABLE I
Caption of Table.

Column 1	Column 2	Column 3	Column 4	Column 5
Cell 1.1	Cell 1.2	Cell 1.3	Cell 1.4	Cell 1.5
Cell 2.1	Cell 2.2	Cell 2.3	Cell 2.4	Cell 2.5
Cell 3.1	Cell 3.2	Cell 3.3	Cell 3.4	Cell 3.5
Cell 4.1	Cell 4.2	Cell 4.3	Cell 4.4	Cell 4.5

which produces

$$x - y = 0 \tag{3}$$
$$x + 2y = 3 \tag{4}$$

Note that the `align` environment produces numbering for every line. If numbering is not needed, use `align*` instead of `align`. If a certain line doesn't need numbering, insert `\nonumber` at the end of each line, just before the double backlash `\\`.

VII. Tables

Some table templates can be found in TABLES I, II, and III. The following LaTeX code will produce TABLE I. Note that `\label{table1}` must be inside the `\caption{}` command so that the reference can be done properly.

```
\begin{table}[t!]
\caption{Caption of Table.\label{table1}}
\centering
\renewcommand{\arraystretch}{1.5}
\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{Column 1} & \textbf{Column 2} & \
    textbf{Column 3} & \textbf{Column 4} & \
    textbf{Column 5} \\ \hline
Cell 1.1  & Cell 1.2  & Cell 1.3  & Cell 1.4
      & Cell 1.5  \\ \hline
Cell 2.1  & Cell 2.2  & Cell 2.3  & Cell 2.4
      & Cell 2.5  \\ \hline
Cell 3.1  & Cell 3.2  & Cell 3.3  & Cell 3.4
      & Cell 3.5  \\ \hline
Cell 4.1  & Cell 4.2  & Cell 4.3  & Cell 4.4
      & Cell 4.5  \\ \hline
\end{tabular}
\end{table}
```

The following LaTeX code will produce TABLE II.

```
\begin{table}[t!]
\caption{Caption of Table.\label{table2}}
\centering
\renewcommand{\arraystretch}{1.5}
\begin{tabular}{|c|c|c|}
\hline
\textbf{Models} & \textbf{Parameters} & \
    textbf{Value} \\ \hline
Model 1 & $\alpha$ & 100 \\ \hline
\multirow{4}{*}{Model 2} & $\beta$ & 100 \\
    \cline{2-3}
& $\gamma$ & 100 \\ \cline{2-3}
```

TABLE II
CAPTION OF TABLE.

Models	Parameters	Value
Model 1	α	100
Model 2	β	100
	γ	100
	η	100
	θ	100
Model 3	σ	100
	λ	100

```
& $\eta$ & 100 \\ \cline{2-3}
& $\theta$ & 100 \\ \hline
\multirow{2}{*}{Model 3} & $\sigma$ & 100 \\
     \cline{2-3}
& $\lambda$ & 100 \\ \hline
\end{tabular}
\end{table}
```

And the following LaTeX code will produce TABLE III.

```
\begin{table*}[t!]
\caption{Caption of Table.\label{table3}}
\centering
\renewcommand{\arraystretch}{1.6}
\begin{tabularx}{\textwidth}[t]
{>{\hsize=0.12\hsize}X
>{\hsize=0.45\hsize}X
>{\hsize=0.25\hsize}X
>{\hsize=0.18\hsize}X}

\hline
\textbf{Column 1} & \textbf{Column 2} & \
    textbf{Column 3} & \textbf{Column 4} \\

\hline
Row 1 & \LaTeX\ is a very useful and
    professional system to produce documents
    , especially for the publication of
    scientific documents. Researchers should
     learn to use \LaTeX. &
Researchers should learn to use \LaTeX. &
Researchers should learn to use \LaTeX.\\
\hline
Row 2 & \LaTeX\ is a very useful and
    professional system to produce documents
    , especially for the publication of
    scientific documents. Researchers should
     learn to use \LaTeX. &
Researchers should learn to use \LaTeX. &
Researchers should learn to use \LaTeX.\\
\hline
Row 4 & Researchers should learn to use \
    LaTeX. & &  \\
\hline
\end{tabularx}
\end{table*}
```

Note that the environment `\begin{table*} \end{table*}` is used to span the table over the two columns. TABLES I and II are restricted in one column only.

VIII. ALGORITHMS

An algorithm template is given in **Algorithm 1**, which is produced by the following LaTeX code:

```
\begin{algorithm}[t!] \label{algo_1}
\small
\caption{Caption of algorithm.}
\textbf{Inputs}: inputs of algorithm.\\
\textbf{Outputs}: outputs of algorithm.\\
\Begin{
  $y = x + z$\label{line4}\;
  \For{$i=1$ \textup{to} $n$}{
    another command\;
    \ForEach{$x\in\mathcal{X}$}{
      \If{condition}{
        do something\;
      }
    }
  }
  \While{condition is satisfied}{
    another command\;
    \eIf{condition}{
      do something\;
    }{
      do something else\;
    }
  }
  \Return solution\;
}
\end{algorithm}
```

Note that any line can also be referred by labeling, for example, the command $y = x + z$ in line 4 can be referred by putting `\label{line4}` just after that command in the algorithm. The template in **Algorithm 1** requires the use of

```
\usepackage[linesnumbered, ruled]{
    algorithm2e}
```

IX. THEOREM, LEMMA, PROPOSITION, COROLLARY, AND DEFINITION

This section describes how to create theorems, lemmas, propositions, corollaries, definitions, and proofs. Here's an example to create a theorem:

```
\begin{theorem}\label{theorem_1}
Content of the first theorem.
\end{theorem}

\begin{proof}
Here's the proof for the the first
    theorem.
\end{proof}
```

TABLE III
CAPTION OF TABLE.

Column 1	Column 2	Column 3	Column 4
Row 1	LaTeX is a very useful and professional system to produce documents, especially for the publication of scientific documents. Researchers should learn to use LaTeX.	Researchers should learn to use LaTeX.	Researchers should learn to use LaTeX.
Row 2	LaTeX is a very useful and professional system to produce documents, especially for the publication of scientific documents. Researchers should learn to use LaTeX.	Researchers should learn to use LaTeX.	Researchers should learn to use LaTeX.
Row 3	Researchers should learn to use LaTeX.		

Algorithm 1: Caption of algorithm.

```
Inputs: inputs of algorithm.
Outputs: outputs of algorithm.
begin
    y = x + z;
    for i = 1 to n do
        another command;
        foreach x ∈ X do
            if condition then
                do something;
            end
        end
    end
    while condition is satisfied do
        another command;
        if condition then
            do something;
        else
            do something else;
        end
    end
    return solution;
end
```

The above script produces the following:

Theorem 1: Content of the first theorem.

Proof: Here's the proof for the the first theorem. ■

For creating a lemma, a proposition, a corollary, or a definition, simply replace `theorem` by `lemma`, `proposition`, `corollary`, or `definition`, respectively. The following can be created:

Lemma 1: Content of the first lemma.

Proposition 1: Content of the first proposition.

Corollary 1: Content of the first corollary.

Definition 1: Content of the first definition.

X. APPENDIX

Appendix is started by using `\appendix`.