

# The Improvement of Cybersecurity by Machine Learning: Battling advance threats cleverly

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Use 10-point type for the name(s) of the author(s) and 9-point type for the address(es) and the abstract. For the main text, please use 10-point type and single-line spacing. We recommend using Computer Modern Roman (CM) fonts, Times, or one of the similar typefaces widely used in photo-typesetting. (In these typefaces the letters have serifs, i.e., short endstrokes at the head and the foot of letters.) Italic type may be used to emphasize words in running text. Bold type and underlining should be avoided. With these sizes, the interline distance should be set so that some 45 lines occur on a full-text page.

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**Table 1.** Font sizes of headings. Table captions should always be positioned *above* the tables. The final sentence of a table caption should end without a period

Heading level	Example	Font size and style
Title (centered)	<b>Lecture Notes ...</b>	14 point, bold
1st-level heading	<b>1 Introduction</b>	12 point, bold
2nd-level heading	<b>2.1 Printing Area</b>	10 point, bold
3rd-level heading	<b>Headings.</b> Text follows ...	10 point, bold
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Here are some examples of headings: “Criteria to Disprove Context-Freeness of Collage Languages”, “On Correcting the Intrusion of Tracing Non-deterministic Programs by Software”, “A User-Friendly and Extendable Data Distribution System”, “Multi-flip Networks: Parallelizing GenSAT”, “Self-determinations of Man”.

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**Fig. 1.** One kernel at  $x_s$  (*dotted kernel*) or two kernels at  $x_i$  and  $x_j$  (*left and right*) lead to the same summed estimate at  $x_s$ . This shows a figure consisting of different types of lines. Elements of the figure described in the caption should be set in italics, in parentheses, as shown in this sample caption. The last sentence of a figure caption should generally end without a period

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$$\psi(u) = \int_0^T \left[ \frac{1}{2} (\Lambda_o^{-1}u, u) + N^*(-u) \right] dt. \quad (1)$$

Please punctuate a displayed equation in the same way as ordinary text but with a small space before the end punctuation.  $\LaTeX$  users can find more examples of how to typeset equations in the file `llncs.dem` (see Sect. 3).

## 2.5 Program Code

Program listings or program commands in the text are normally set in typewriter font, e.g., CMTT10 or Courier.

*Example of a Computer Program*

```
program Inflation (Output)
{Assuming annual inflation rates of 7%, 8%, and 10%,...
 years};
const
  MaxYears = 10;
var
  Year: 0..MaxYears;
  Factor1, Factor2, Factor3: Real;
begin
  Year := 0;
  Factor1 := 1.0; Factor2 := 1.0; Factor3 := 1.0;
  WriteLn('Year  7% 8% 10%'); WriteLn;
  repeat
    Year := Year + 1;
    Factor1 := Factor1 * 1.07;
    Factor2 := Factor2 * 1.08;
    Factor3 := Factor3 * 1.10;
    WriteLn(Year:5,Factor1:7:3,Factor2:7:3,Factor3:7:3)
  until Year = MaxYears
end.
```

(Example from Jensen K., Wirth N. (1991) Pascal user manual and report. Springer, New York)

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The superscript numeral used to refer to a footnote appears in the text either directly after the word to be discussed or – in relation to a phrase or a sentence – following the punctuation sign (comma, semicolon, or period). Footnotes should appear at the bottom of the normal text area, with a line of about 2 cm in  $\text{\LaTeX}$  and about 5 cm in Word set immediately above them.<sup>2</sup>

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`ftp://ftp.springer.de/pub/tex/latex/llncls/latex2e`

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**Mailserver:** Send an email message to `svserv@vax.ntp.springer.de` containing the line

```
get /tex/latex/llncls2e.zip  to get the LATEX2 $\epsilon$  style files,
get /tex/latex/llncls.zip    to get the LATEX style files, or
get /tex/plain/plncls.zip    to get the TEX style files.
```

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## References

1. van Leeuwen, J. (ed.): Computer Science Today. Recent Trends and Developments. Lecture Notes in Computer Science, Vol. 1000. Springer-Verlag, Berlin Heidelberg New York (1995)
2. Bruce, K.B., Cardelli, L., Pierce, B.C.: Comparing Object Encodings. In: Abadi, M., Ito, T. (eds.): Theoretical Aspects of Computer Software. Lecture Notes in Computer Science, Vol. 1281. Springer-Verlag, Berlin Heidelberg New York (1997) 415–438
3. Michalewicz, Z.: Genetic Algorithms + Data Structures = Evolution Programs. 3rd edn. Springer-Verlag, Berlin Heidelberg New York (1996)
4. Baldonado, M., Chang, C.-C.K., Gravano, L., Paepcke, A.: The Stanford Digital Library Metadata Architecture. Int. J. Digit. Libr. **1** (1997) 108–121

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