

H.264 / MPEG 4 AVC Decoder Implementation

Fanyu Ran^a, Yang Zhou^b, and Yifei Zhou^c

^aStudent No.8657223, University of Ottawa

^bStudent No.8657223, University of Ottawa

^cStudent No.8657223, University of Ottawa

ABSTRACT

This document is prepared using LaTeX2e¹ and shows the desired format and appearance of a manuscript prepared for the Proceedings of the SPIE.* It contains general formatting instructions and hints about how to use LaTeX. The LaTeX source file that produced this document, `article.tex` (Version 3.4), provides a template, used in conjunction with `spie.cls` (Version 3.4). These files are available on the Internet at <https://www.overleaf.com>. The font used throughout is the LaTeX default font, Computer Modern Roman, which is equivalent to the Times Roman font available on many systems.

Keywords: Manuscript format, template, SPIE Proceedings, LaTeX

1. INTRODUCTION

Begin the Introduction below the Keywords. The manuscript should not have headers, footers, or page numbers. It should be in a one-column format. References are often noted in the text and cited at the end of the paper.

Table 1. Fonts sizes to be used for various parts of the manuscript. Table captions should be centered above the table. When the caption is too long to fit on one line, it should be justified to the right and left margins of the body of the text.

Article title	16 pt., bold, centered
Author names and affiliations	12 pt., normal, centered
Keywords	10 pt., normal, left justified
Abstract Title	11 pt., bold, centered
Abstract body text	10 pt., normal, justified
Section heading	11 pt., bold, centered (all caps)
Subsection heading	11 pt., bold, left justified
Sub-subsection heading	10 pt., bold, left justified
Normal text	10 pt., normal, justified
Figure and table captions	9 pt., normal
Footnote	9 pt., normal
Reference Heading	11 pt., bold, centered
Reference Listing	10 pt., normal, justified

Further author information:

Fanyu Ran: E-mail: aaa@tbk2.edu

Yang Zhou: E-mail: bba@cmp.com

Yifei Zhou: E-mail: bba@cmp.com

*The basic format was developed in 1995 by Rick Hermann (SPIE) and Ken Hanson (Los Alamos National Lab.).

Table 2. Margins and print area specifications.

Margin	A4	Letter
Top margin	2.54 cm	1.0 in.
Bottom margin	4.94 cm	1.25 in.
Left, right margin	1.925 cm	.875 in.
Printable area	17.15 x 22.23 cm	6.75 x 8.75 in.

LaTeX margins are related to the document's paper size. The paper size is by default set to USA letter paper. To format a document for A4 paper, the first line of this LaTeX source file should be changed to `\documentclass[a4paper]{spie}`.

Authors are encouraged to follow the principles of sound technical writing, as described in Refs. 2 and 3, for example. Many aspects of technical writing are addressed in the *AIP Style Manual*, published by the American Institute of Physics. It is available on line at <https://publishing.aip.org/authors>. A spelling checker is helpful for finding misspelled words.

An author may use this LaTeX source file as a template by substituting his/her own text in each field. This document is not meant to be a complete guide on how to use LaTeX. For that, please see the list of references at <http://latex-project.org/guides/> and for an online introduction to LaTeX please see 4.

2. PYTHON PROGRAMMING LANGUAGE OVERVIEW

We chose Python as the main programming language to implement this project.

Python is a widely used high-level, general-purpose, interpreted, dynamic programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java.

Although programs written in C/C++ mostly have significantly better performance than ones in Python, the tradeoff is verbosity. Due to the statement from Python's official website, Python code is typically 5-10 times shorter than equivalent C++ code.

The dynamic property and modern syntax of Python can eliminate much more noise in the code, making the idea behind the program more clear. For example, to calculate Fibonacci sequence in plain iterative method, we can implement it as below:

C:

```
long long int fibb(int n) {
    int fnow = 0, fnext = 1, tempf;
    while(--n>0){
        tempf = fnow + fnext;
        fnow = fnext;
        fnext = tempf;
    }
    return fnext;
}
```

Python:

```
def fibIter(n):
    if n < 2:
        return n
```

```

fibPrev = 1
fib = 1
for num in xrange(2, n):
    fibPrev, fib = fib, fib + fibPrev
return fib

```

As a project which aims to be a concept prototype, we care more about readability and productivity instead of performance. Python works well for this target.

3. H.264 DECODING OVERVIEW

4. SOFTWARE DESIGN OVERVIEW

5. H.264 AND IMPLEMENTATION DETAILS

Video and audio files can be included for publication. See Tab. ?? for the specifications for the multimedia files. Use a screenshot or another .jpg illustration for placement in the text. Use the file name to begin the caption. The text of the caption must end with the text “<http://dx.doi.org/doi.number.goes.here>” which tells the SPIE editor where to insert the hyperlink in the digital version of the manuscript.

Here is a sample illustration and caption for a multimedia file:

6. RESULT AND DESIGN EXPLORATION

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APPENDIX A. MISCELLANEOUS FORMATTING DETAILS

It is often useful to refer back (or forward) to other sections in the article. Such references are made by section number. When a section reference starts a sentence, Section is spelled out; otherwise use its abbreviation, for example, “In Sec. 2 we showed...” or “Section 2.1 contained a description...”. References to figures, tables, and theorems are handled the same way.

A.1 Formatting Equations

Equations may appear in line with the text, if they are simple, short, and not of major importance; e.g., $\beta = b/r$. Important equations appear on their own line. Such equations are centered. For example, “The expression for the field of view is

$$2a = \frac{(b+1)}{3c}, \quad (1)$$

where a is the ...” Principal equations are numbered, with the equation number placed within parentheses and right justified.

Equations are considered to be part of a sentence and should be punctuated accordingly. In the above example, a comma follows the equation because the next line is a subordinate clause. If the equation ends the sentence, a period should follow the equation. The line following an equation should not be indented unless it is meant to start a new paragraph. Indentation after an equation is avoided in LaTeX by not leaving a blank line between the equation and the subsequent text.

References to equations include the equation number in parentheses, for example, “Equation (1) shows ...” or “Combining Eqs. (2) and (3), we obtain...” Using a tilde in the LaTeX source file between two characters avoids unwanted line breaks.

A.2 Formatting Theorems

To include theorems in a formal way, the theorem identification should appear in a 10-point, bold font, left justified and followed by a period. The text of the theorem continues on the same line in normal, 10-point font. For example,

Theorem 1. For any unbiased estimator...

Formal statements of lemmas and algorithms receive a similar treatment.

ACKNOWLEDGMENTS

This unnumbered section is used to identify those who have aided the authors in understanding or accomplishing the work presented and to acknowledge sources of funding.

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