

A Sample *Proceedings of the VLDB Endowment* Paper in LaTeX Format*

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ABSTRACT

The abstract for your paper for the PVLDB Journal submission. The template and the example document are based on the ACM SIG Proceedings templates. This file is part of a package for preparing the submissions for review. These files are in the camera-ready format, but they do not contain the full copyright note. Note that after the notification of acceptance, there will be an updated style file for the camera-ready submission containing the copyright note.

1. INTRODUCTION

The *proceedings* are the records of a conference. ACM, as well as PVLDB, seeks to give these conference by-products a uniform, high-quality appearance. To do this, ACM / PVLDB has some rigid requirements for the format of the proceedings documents: there is a specified format (balanced double columns), a specified set of fonts (Arial or Helvetica and Times Roman) in certain specified sizes (for instance, 9 point for body copy), a specified live area (18×23.5 cm [$7'' \times 9.25''$]) centered on the page, specified size of margins (2.54cm [$1''$] top and bottom and 1.9cm [$.75''$] left and right; specified column width (8.45cm [$3.33''$]) and gutter size (.083cm [$.33''$]).

*for use with vldb.cls

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[‡]The secretary disavows any knowledge of this author's actions.

[§]This author is the one who did all the really hard work.

The good news is, with only a handful of manual settings¹, the L^AT_EX document class file handles all of this for you.

The remainder of this document is concerned with showing, in the context of an “actual” document, the L^AT_EX commands specifically available for denoting the structure of a proceedings paper, rather than with giving rigorous descriptions or explanations of such commands.

2. PROBLEM STATEMENT

We formally define the problem as follows. Consider an input set of i images, and without loss of generality, assume each image is square and is composed of m^2 pixels. We wish to store our set of images in a database using lossy compression such that we minimize the total space used by the database subject to certain *quality* constraints based on similarity metrics. There are many possible formulations of these quality constraints; we detail those that we considered for this paper in section TODO. Beyond mathematical metrics, subjective methods are also interesting to consider for formulating the quality constraints; one could imagine a scenario in which image quality is assessed by humans through a crowdsourced system, perhaps using an engine such as Amazon's Mechanical Turk TODO: cite. We consider such subjective similarity metrics outside the scope of this paper and focus on the mathematical metrics for now.

We wish to construct a database that trades off minimizing the amount of required space with maximizing read and write speeds of the data. In the following sections, we discuss models for estimating these values. We construct our compressed representation in the following way: First, we segment each image into a certain number of image patches. Next, we store a set of precomputed image patch “exemplars” in an auxiliary table. Finally, rather than represent each patch in each image explicitly, we approximate it by instead storing a pointer to the “most similar” exemplar. We

¹Two of these, the `\numberofauthors` and `\alignauthor` commands, you have already used; another, `\balancecolumns`, will be used in your very last run of L^AT_EX to ensure balanced column heights on the last page.

discuss similarity later in section TODO as we discuss our quality constraints. For this paper, we consider all patches to be the same size and each image to contain the same number of patches.

3. ANALYSIS

Assume for now that we choose to store p patches in our auxiliary table. In practice, we choose p to be a function $p: \text{Function} \rightarrow \mathbb{N}$ which maps from our similarity metric to a number of patches to store. Assume also that each patch is square and composed of n^2 pixels, where n is a user defined parameter. We further assume that each pixel requires 8 bytes to store and that each pointer is 8 bytes (a standard integer for a 64-bit system). Under this "image only" scheme, in the case where we have i images, the cost c_i to store all the images in our database is:

$$c_i(i, m) = 8im^2 \quad (1)$$

In the case where we store pointers to patches, we have two tables: one table to store pointers to image patch exemplars, and a second table to store the exemplar data themselves. Under this "patch pointer" scheme, in the case where we have i images and p patches, the cost c_p to store all the images in our database is:

$$c_p(i, p, m, n) = 8i\left(\frac{m}{n}\right)^2 + 8pn^2 \quad (2)$$

The first term is the cost of storing the pointer data, while the second term is the cost of storing the patch exemplars themselves.

3.1 Type Changes and *Special Characters*

We have already seen several typeface changes in this sample. You can indicate italicized words or phrases in your text with the command `\textit`; emboldening with the command `\textbf` and typewriter-style (for instance, for computer code) with `\texttt`. But remember, you do not have to indicate typestyle changes when such changes are part of the *structural* elements of your article; for instance, the heading of this subsection will be in a sans serif² typeface, but that is handled by the document class file. Take care with the use³ the curly braces in typeface changes; they mark the beginning and end of the text that is to be in the different typeface.

You can use whatever symbols, accented characters, or non-English characters you need anywhere in your document; you can find a complete list of what is available in the *L^AT_EX User's Guide*[?].

3.2 Math Equations

You may want to display math equations in three distinct styles: inline, numbered or non-numbered display. Each of the three are discussed in the next sections.

3.2.1 Inline (In-text) Equations

A formula that appears in the running text is called an inline or in-text formula. It is produced by the **math** environment, which can be invoked with the usual `\begin`.

²A third footnote, here. Let's make this a rather short one to see how it looks.

³A fourth, and last, footnote.

. .\end construction or with the short form `$. . . $`. You can use any of the symbols and structures, from α to ω , available in L^AT_EX[?]; this section will simply show a few examples of in-text equations in context. Notice how this equation: $\lim_{n \rightarrow \infty} x = 0$, set here in in-line math style, looks slightly different when set in display style. (See next section).

3.2.2 Display Equations

A numbered display equation – one set off by vertical space from the text and centered horizontally – is produced by the **equation** environment. An unnumbered display equation is produced by the **displaymath** environment.

Again, in either environment, you can use any of the symbols and structures available in L^AT_EX; this section will just give a couple of examples of display equations in context. First, consider the equation, shown as an inline equation above:

$$\lim_{n \rightarrow \infty} x = 0 \quad (3)$$

Notice how it is formatted somewhat differently in the **displaymath** environment. Now, we'll enter an unnumbered equation:

$$\sum_{i=0}^{\infty} x + 1$$

and follow it with another numbered equation:

$$\sum_{i=0}^{\infty} x_i = \int_0^{\pi+2} f \quad (4)$$

just to demonstrate L^AT_EX's able handling of numbering.

3.3 Citations

Citations to articles [?, ?, ?, ?], conference proceedings [?] or books [?, ?] listed in the Bibliography section of your article will occur throughout the text of your article. You should use BibTeX to automatically produce this bibliography; you simply need to insert one of several citation commands with a key of the item cited in the proper location in the .tex file [?]. The key is a short reference you invent to uniquely identify each work; in this sample document, the key is the first author's surname and a word from the title. This identifying key is included with each item in the .bib file for your article.

The details of the construction of the .bib file are beyond the scope of this sample document, but more information can be found in the *Author's Guide*, and exhaustive details in the *L^AT_EX User's Guide*[?].

This article shows only the plainest form of the citation command, using `\cite`. This is what is stipulated in the SIGS style specifications. No other citation format is endorsed.

3.4 Tables

Because tables cannot be split across pages, the best placement for them is typically the top of the page nearest their initial cite. To ensure this proper "floating" placement of tables, use the environment **table** to enclose the table's contents and the table caption. The contents of the table itself must go in the **tabular** environment, to be aligned properly in rows and columns, with the desired horizontal and vertical rules. Again, detailed instructions on **tabular** material is found in the *L^AT_EX User's Guide*.

Table 1: Frequency of Special Characters

Non-English or Math	Frequency	Comments
\emptyset	1 in 1,000	For Swedish names
π	1 in 5	Common in math
$\$$	4 in 5	Used in business
Ψ_1^2	1 in 40,000	Unexplained usage



Figure 1: A sample black and white graphic (.pdf format).

Immediately following this sentence is the point at which Table 1 is included in the input file; compare the placement of the table here with the table in the printed dvi output of this document.

To set a wider table, which takes up the whole width of the page’s live area, use the environment **table*** to enclose the table’s contents and the table caption. As with a single-column table, this wide table will “float” to a location deemed more desirable. Immediately following this sentence is the point at which Table 2 is included in the input file; again, it is instructive to compare the placement of the table here with the table in the printed dvi output of this document.

3.5 Figures

Like tables, figures cannot be split across pages; the best placement for them is typically the top or the bottom of the page nearest their initial cite. To ensure this proper “floating” placement of figures, use the environment **figure** to enclose the figure and its caption.

This sample document contains examples of .pdf files to be displayable with L^AT_EX (See Figures 1 and 2). More details on each of these is found in the *Author’s Guide*.

As was the case with tables, you may want a figure that spans two columns. To do this, and still to ensure proper “floating” placement of tables, use the environment **figure*** to enclose the figure and its caption (See Figure 3). And don’t forget to end the environment with figure*, not figure!

Note that only .pdf files were used; if you want to include .ps or .eps formats, you can use the \epsfig or \psfig commands as appropriate for the different file types.

3.6 Theorem-like Constructs

Other common constructs that may occur in your article



Figure 2: A sample black and white graphic (.pdf format) that has been resized with the includegraphics command.

are the forms for logical constructs like theorems, axioms, corollaries and proofs. There are two forms, one produced by the command \newtheorem and the other by the command \newdef; perhaps the clearest and easiest way to distinguish them is to compare the two in the output of this sample document:

This uses the **theorem** environment, created by the \newtheorem command:

THEOREM 1. *Let f be continuous on $[a, b]$. If G is an antiderivative for f on $[a, b]$, then*

$$\int_a^b f(t)dt = G(b) - G(a).$$

The other uses the **definition** environment, created by the \newdef command:

Definition 1. *If z is irrational, then by e^z we mean the unique number which has logarithm z :*

$$\log e^z = z$$

Two lists of constructs that use one of these forms is given in the *Author’s Guidelines*.

There is one other similar construct environment, which is already set up for you; i.e. you must *not* use a \newdef command to create it: the **proof** environment. Here is a example of its use:

PROOF. Suppose on the contrary there exists a real number L such that

$$\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = L.$$

Then

$$\begin{aligned} l &= \lim_{x \rightarrow c} f(x) = \lim_{x \rightarrow c} \left[gx \cdot \frac{f(x)}{g(x)} \right] \\ &= \lim_{x \rightarrow c} g(x) \cdot \lim_{x \rightarrow c} \frac{f(x)}{g(x)} = 0 \cdot L = 0, \end{aligned}$$

which contradicts our assumption that $l \neq 0$. \square

Complete rules about using these environments and using the two different creation commands are in the *Author’s Guide*; please consult it for more detailed instructions. If you need to use another construct, not listed therein, which you want to have the same formatting as the Theorem or the Definition[?] shown above, use the \newtheorem or the \newdef command, respectively, to create it.

A Caveat for the T_EX Expert

Because you have just been given permission to use the \newdef command to create a new form, you might think you can use T_EX’s \def to create a new command: *Please refrain from doing this!* Remember that your L^AT_EX source code is primarily intended to create camera-ready copy, but may be converted to other forms – e.g. HTML. If you inadvertently omit some or all of the \defs recompilation will be, to say the least, problematic.

4. CONCLUSIONS

This paragraph will end the body of this sample document. Remember that you might still have Acknowledgments or Appendices; brief samples of these follow. There is

Table 2: Some Typical Commands

Command	A Number	Comments
<code>\alignauthor</code>	100	Author alignment
<code>\numberofauthors</code>	200	Author enumeration
<code>\table</code>	300	For tables
<code>\table*</code>	400	For wider tables

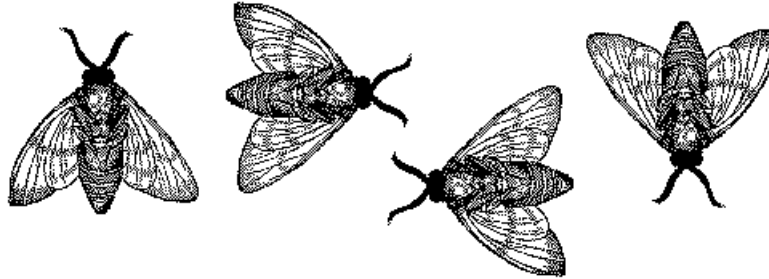


Figure 3: A sample black and white graphic (.pdf format) that needs to span two columns of text.

still the Bibliography to deal with; and we will make a disclaimer about that here: with the exception of the reference to the L^AT_EX book, the citations in this paper are to articles which have nothing to do with the present subject and are used as examples only.

5. ACKNOWLEDGMENTS

This section is optional; it is a location for you to acknowledge grants, funding, editing assistance and what have you. In the present case, for example, the authors would like to thank Gerald Murray of ACM for his help in codifying this *Author's Guide* and the `.cls` and `.tex` files that it describes.

5.1 References

Generated by bibtex from your `.bib` file. Run latex, then bibtex, then latex twice (to resolve references).

APPENDIX

You can use an appendix for optional proofs or details of your evaluation which are not absolutely necessary to the core understanding of your paper.

A. FINAL THOUGHTS ON GOOD LAYOUT

Please use readable font sizes in the figures and graphs. Avoid tempering with the correct border values, and the spacing (and format) of both text and captions of the PVLDB format (e.g. captions are bold).

At the end, please check for an overall pleasant layout, e.g. by ensuring a readable and logical positioning of any floating figures and tables. Please also check for any line overflows, which are only allowed in extraordinary circumstances (such as wide formulas or URLs where a line wrap would be counterintuitive).

Use the `balance` package together with a `\balance` command at the end of your document to ensure that the last page has balanced (i.e. same length) columns.