

AN EXAMPLE ARTICLE*

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Abstract. This is an example SIAM L^AT_EX article. This can be used as a template for new articles. Abstracts must be able to stand alone and so cannot contain citations to the paper's references, equations, etc. An abstract must consist of a single paragraph and be concise. Because of online formatting, abstracts must appear as plain as possible. Any equations should be inline.

Key words. example, L^AT_EX

AMS subject classifications. 68Q25, 68R10, 68U05

1. Introduction. The introduction introduces the context and summarizes the manuscript. It is important to clearly state the contributions of this piece of work. The next two paragraphs are text filler, generated by the `lipsum` package.

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The paper is organized as follows. Our main results are in [section 2](#), our new algorithm is in [section 3](#), experimental results are in [section 4](#), and the conclusions follow in [section 5](#).

2. Main results. We interleave text filler with some example theorems and theorem-like items.

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Here we state our main result as [Theorem 1](#); the proof is deferred to [section S2](#).

THEOREM 1 (*LDL^T Factorization* [1]). *If $A \in \mathbb{R}^{n \times n}$ is symmetric and the principal submatrix $A(1 : k, 1 : k)$ is nonsingular for $k = 1 : n - 1$, then there exists a unit*

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lower triangular matrix L and a diagonal matrix

$$D = \text{diag}(d_1, \dots, d_n)$$

such that $A = LDL^T$. The factorization is unique.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

THEOREM 2 (Mean Value Theorem). *Suppose f is a function that is continuous on the closed interval $[a, b]$. and differentiable on the open interval (a, b) . Then there exists a number c such that $a < c < b$ and*

$$f'(c) = \frac{f(b) - f(a)}{b - a}.$$

In other words,

$$f(b) - f(a) = f'(c)(b - a).$$

Observe that [Theorems 1](#) and [2](#) and [Corollary 3](#) correctly mix references to multiple labels.

COROLLARY 3. *Let $f(x)$ be continuous and differentiable everywhere. If $f(x)$ has at least two roots, then $f'(x)$ must have at least one root.*

Proof. Let a and b be two distinct roots of f . By [Theorem 2](#), there exists a number c such that

$$f'(c) = \frac{f(b) - f(a)}{b - a} = \frac{0 - 0}{b - a} = 0. \quad \square$$

Note that it may require two L^AT_EX compilations for the proof marks to show.

Display matrices can be rendered using environments from `amsmath`:

$$(1) \quad S = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \quad \text{and} \quad C = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}.$$

Equation [\(1\)](#) shows some example matrices.

We calculate the Fréchet derivative of F as follows:

$$(2a) \quad \begin{aligned} F'(U, V)(H, K) &= \langle R(U, V), H\Sigma V^T + U\Sigma K^T - P(H\Sigma V^T + U\Sigma K^T) \rangle \\ &= \langle R(U, V), H\Sigma V^T + U\Sigma K^T \rangle \end{aligned}$$

$$(2b) \quad = \langle R(U, V)V\Sigma^T, H \rangle + \langle \Sigma^T U^T R(U, V), K^T \rangle.$$

[Equation \(2a\)](#) is the first line, and [\(2b\)](#) is the last line.

3. Algorithm. Sed gravida lectus ut purus. Morbi laoreet magna. Pellentesque eu wisi. Proin turpis. Integer sollicitudin augue nec dui. Fusce lectus. Vivamus faucibus nulla nec lacus. Integer diam. Pellentesque sodales, enim feugiat cursus volutpat, sem mauris dignissim mauris, quis consequat sem est fermentum ligula. Nullam justo lectus, condimentum sit amet, posuere a, fringilla mollis, felis. Morbi

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 84 Curabitur diam tortor, mollis et, viverra ac, tempus vel, metus.
 85 Our analysis leads to the algorithm in [Algorithm 1](#).

Algorithm 1 Build tree

```

Define  $P := T := \{\{1\}, \dots, \{d\}\}$ 
while  $\#P > 1$  do
  Choose  $C' \in \mathcal{C}_p(P)$  with  $C' := \operatorname{argmin}_{C \in \mathcal{C}_p(P)} \varrho(C)$ 
  Find an optimal partition tree  $T_{C'}$ 
  Update  $P := (P \setminus C') \cup \{\bigcup_{t \in C'} t\}$ 
  Update  $T := T \cup \{\bigcup_{t \in \tau} t : \tau \in T_{C'} \setminus \mathcal{L}(T_{C'})\}$ 
end while
return  $T$ 

```

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 87 ligula id pede. Maecenas tincidunt diam nec velit. Praesent convallis sapien ac est.
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 89 placerat nunc. Sed tempus rutrum wisi. Duis accumsan gravida purus. Nunc nunc.
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 93 vitae aliquam ipsum sapien vel enim. Maecenas suscipit cursus mi.

94 **4. Experimental results.** Quisque facilisis auctor sapien. Pellentesque gravida
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 99 malesuada adipiscing. Etiam eleifend neque sed quam. Nulla facilisi. Proin a ligula.
 100 Sed id dui eu nibh egestas tincidunt. Suspendisse arcu.

101 [Figure 1](#) shows some example results. Additional results are available in the
 102 supplement in [Table S1](#).

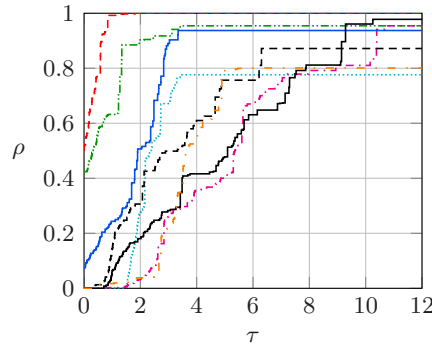


FIG. 1. Example figure using external image files.

103 Maecenas dui. Aliquam volutpat auctor lorem. Cras placerat est vitae lectus.

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5. Conclusions. Some conclusions here.

Appendix A. An example appendix. Ut auctor, augue porta dignissim vestibulum, arcu diam lobortis velit, vel scelerisque risus augue sagittis risus. Maecenas eu justo. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris congue ligula eget tortor. Nullam laoreet urna sed enim. Donec eget eros ut eros volutpat convallis. Praesent turpis. Integer mauris diam, elementum quis, egestas ac, rutrum vel, orci. Nulla facilisi. Quisque adipiscing, nulla vitae elementum porta, sem urna volutpat leo, sed porta enim risus sed massa. Integer ac enim quis diam sodales luctus. Ut eget eros a ligula commodo ultricies. Donec eu urna viverra dolor hendrerit feugiat. Aliquam ac orci vel eros congue pharetra. Quisque rhoncus, justo eu volutpat faucibus, augue leo posuere lacus, a rhoncus purus pede vel est. Proin ultrices enim.

A.1. Test. An example subsection.

Appendix B. An example appendix without any name.

Appendix. An example appendix without a number. See [Appendix B](#) for an appendix with no title.

Acknowledgments. We would like to acknowledge the assistance of volunteers in putting together this example manuscript and supplement.

REFERENCES

- [1] GENE H. GOLUB AND CHARLES F. VAN LOAN, *Matrix Computations*, The Johns Hopkins University Press, Baltimore, 4th ed., 2013.