

Step	Algorithm: $A := \text{LU\_BLK\_VAR3}(A)$
1a	$\{A = \hat{A}$
4	$A \rightarrow \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), L \rightarrow \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right), U \rightarrow \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right)$ <p>where <math>A_{TL}</math> is <math>0 \times 0</math>, <math>L_{TL}</math> is <math>0 \times 0</math>, <math>U_{TL}</math> is <math>0 \times 0</math></p>
2	$\left\{ \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) = \left( \begin{array}{c c} L \setminus U_{TL} & U_{TR} \\ \hline \hat{A}_{BL} & \hat{A}_{BR} \end{array} \right) \wedge L_{TL}U_{TL} = \hat{A}_{TL} \mid L_{TL}U_{TR} = \hat{A}_{TR} \right\}$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left\{ \begin{array}{l} \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) = \left( \begin{array}{c c} L \setminus U_{TL} & U_{TR} \\ \hline \hat{A}_{BL} & \hat{A}_{BR} \end{array} \right) \wedge L_{TL}U_{TL} = \hat{A}_{TL} \mid L_{TL}U_{TR} = \hat{A}_{TR} \wedge m(A_{TL}) < \\ m(A) \end{array} \right\}$
5a	<p><b>Determine block size <math>b</math></b></p> $\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c cc} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ A_{20} & A_{21} & A_{22} \end{array} \right), \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \rightarrow \dots, \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \rightarrow \dots$ <p>where <math>A_{11}</math> is <math>b \times b</math>, <math>L_{11}</math> is <math>b \times b</math>, <math>U_{11}</math> is <math>b \times b</math></p>
6	{
8	<p>update line 1</p> <p>:</p> <p>update line n</p>
7	}
5b	$\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c cc} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ A_{20} & A_{21} & A_{22} \end{array} \right), \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \leftarrow \dots, \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \leftarrow \dots$
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	endwhile
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Step	Algorithm: $A := \text{LU\_BLK\_VAR3}(A)$
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4	
	where
2	{
3	while do
2,3	{ ^ }
5a	Determine block size $b$
	where
6	{
8	
7	{
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	endwhile
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	$\neg($ )
1b	{



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1a	$\{A = \hat{A}$
4	$A \rightarrow \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), L \rightarrow \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right), U \rightarrow \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right)$ <p>where <math>A_{TL}</math> is <math>0 \times 0</math>, <math>L_{TL}</math> is <math>0 \times 0</math>, <math>U_{TL}</math> is <math>0 \times 0</math></p>
2	$\left\{ \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) = \left( \begin{array}{c c} L \setminus U_{TL} & U_{TR} \\ \hline \hat{A}_{BL} & \hat{A}_{BR} \end{array} \right) \wedge L_{TL}U_{TL} = \hat{A}_{TL} \mid L_{TL}U_{TR} = \hat{A}_{TR} \right\}$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left\{ \begin{array}{c} \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) = \left( \begin{array}{c c} L \setminus U_{TL} & U_{TR} \\ \hline \hat{A}_{BL} & \hat{A}_{BR} \end{array} \right) \wedge L_{TL}U_{TL} = \hat{A}_{TL} \mid L_{TL}U_{TR} = \hat{A}_{TR} \wedge m(A_{TL}) < \\ m(A) \end{array} \right\}$
5a	<p><b>Determine block size <math>b</math></b></p> $\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c c} A_{00} & A_{01} \ A_{02} \\ \hline A_{10} & A_{11} \ A_{12} \\ A_{20} & A_{21} \ A_{22} \end{array} \right), \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \rightarrow \dots, \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \rightarrow \dots$ <p>where <math>A_{11}</math> is <math>b \times b</math>, <math>L_{11}</math> is <math>b \times b</math>, <math>U_{11}</math> is <math>b \times b</math></p>
6	{
8	<p>update line 1</p> <p>:</p> <p>update line n</p>
7	}
5b	$\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c} A_{00} \ A_{01} & A_{02} \\ \hline A_{10} \ A_{11} & A_{12} \\ A_{20} \ A_{21} & A_{22} \end{array} \right), \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \leftarrow \dots, \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \leftarrow \dots$
2	$\left\{ \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) = \left( \begin{array}{c c} L \setminus U_{TL} & U_{TR} \\ \hline \hat{A}_{BL} & \hat{A}_{BR} \end{array} \right) \wedge L_{TL}U_{TL} = \hat{A}_{TL} \mid L_{TL}U_{TR} = \hat{A}_{TR} \right\}$
	endwhile
2,3	$\left\{ \begin{array}{c} \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) = \left( \begin{array}{c c} L \setminus U_{TL} & U_{TR} \\ \hline \hat{A}_{BL} & \hat{A}_{BR} \end{array} \right) \wedge L_{TL}U_{TL} = \hat{A}_{TL} \mid L_{TL}U_{TR} = \hat{A}_{TR} \wedge \neg(m(A_{TL}) < \\ m(A) \end{array} \right\}$
1b	$\{A = L \setminus U \wedge LU = \hat{A}$

	Algorithm: $A := \text{LU\_BLK\_VAR3}(A)$
	$A \rightarrow \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), L \rightarrow \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right), U \rightarrow \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right)$ <p>where <math>A_{TL}</math> is <math>0 \times 0</math>, <math>L_{TL}</math> is <math>0 \times 0</math>, <math>U_{TL}</math> is <math>0 \times 0</math></p>
	while $m(A_{TL}) < m(A)$ do
	<p><b>Determine block size <math>b</math></b></p> $\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c cc} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ A_{20} & A_{21} & A_{22} \end{array} \right), \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \rightarrow \dots, \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \rightarrow \dots$ <p>where <math>A_{11}</math> is <math>b \times b</math>, <math>L_{11}</math> is <math>b \times b</math>, <math>U_{11}</math> is <math>b \times b</math></p>
	<p>update line 1</p> <p>:</p> <p>update line n</p>
	$\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{cc c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ A_{20} & A_{21} & A_{22} \end{array} \right), \left( \begin{array}{c c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \leftarrow \dots, \left( \begin{array}{c c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \leftarrow \dots$
	endwhile

**Algorithm:**  $A := \text{LU\_BLK\_VAR3}(A)$

$$A \rightarrow \left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right), L \rightarrow \left( \begin{array}{c|c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right), U \rightarrow \left( \begin{array}{c|c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right)$$

**where**  $A_{TL}$  is  $0 \times 0$ ,  $L_{TL}$  is  $0 \times 0$ ,  $U_{TL}$  is  $0 \times 0$

**while**  $m(A_{TL}) < m(A)$  **do**

**Determine block size**  $b$

$$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c|cc} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ A_{20} & A_{21} & A_{22} \end{array} \right), \left( \begin{array}{c|c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \rightarrow \dots, \left( \begin{array}{c|c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \rightarrow \dots$$

**where**  $A_{11}$  is  $b \times b$ ,  $L_{11}$  is  $b \times b$ ,  $U_{11}$  is  $b \times b$

update line 1

:

update line n

$$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{cc|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ A_{20} & A_{21} & A_{22} \end{array} \right), \left( \begin{array}{c|c} L_{TL} & L_{TR} \\ \hline L_{BL} & L_{BR} \end{array} \right) \leftarrow \dots, \left( \begin{array}{c|c} U_{TL} & U_{TR} \\ \hline U_{BL} & U_{BR} \end{array} \right) \leftarrow \dots$$

**endwhile**