Generic Gaussian Elimination

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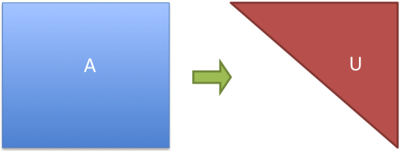
October 3, 2012

Today's Topic

Gaussian Elimination without Pivoting

LU Decomposition

Gaussian Elimination



- Given a matrix A
- Eliminates the lower triangular elements
- Solving linear equations
  - $Ax = b$
  - $U\hat{x} = \hat{b}$

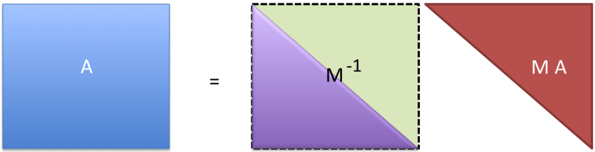
Gaussian Elimination

- Eliminates the lower triangular elements
- $M = M_{n-1} \times \cdots \times M_1$
- M_i is an elimentary matrix to eliminate the ith column

Gaussian Elimination

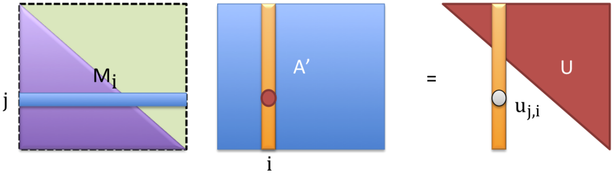
- Eliminates the lower triangular elements
- $M = M_{n-1} \times \cdots \times M_1$
- M_i is a lower triangular elimentary matrix

Gaussian Elimination



- Eliminates the lower triangular elements
- $M = M_{n-1} \times \cdots \times M_1$
- $M^{-1} = M_1^{-1} \times \cdots \times M_{n-1}$
- $U = M \times A, L = M^{-1}$

How to determine M_i?



- $u_{j,i} = m_{j,i} \cdot a_{i,i} + a_{j,i} = 0$ (*for* $j > i$)
- $m_{j,i} = -\frac{a_{j,i}}{a_{i,i}}$ (*for* $j > i$)
- $M_i(i+1:n,i) = -\frac{A(i+1:n,i)}{a_{i,i}}$

Thanks