METODI ITERATIVI

$$Ax = b \qquad A = (a_{ij})$$

$$x^{(k+1)} = P x^{(k)} + q \qquad P = M^{-1}N$$

$$A = M - N \qquad q = M^{-1} b$$

$$M = \begin{bmatrix} a_{11} & & 0 \\ & \ddots & \\ 0 & & a_{nn} \end{bmatrix} \quad (\text{Jacobi})$$

APPLICABILITÀ $\Leftrightarrow$ $a_{ii} \neq 0 \quad i = 1 \dots n$

$$x^{(k+1)} = P x^{(k)} + q \Leftrightarrow M x^{(k+1)} = N x^{(k)} + b$$

for $i = 1 : n$

$$x_i^{(k+1)} = \left(b_i - \sum_{\substack{j=1 \\ j \neq i}}^{n} a_{ij} x_j^{(k)} \right) / a_{ii}$$

end

costo = mm2(A) × iterazione

$M = \begin{pmatrix} a_{11} & & 0 \\ & \ddots & \\ a_{n1} & & a_{nn} \end{pmatrix}$ (Gauss-Seidel)

Applicabile $\Leftrightarrow$ $a_{ii} \neq 0$ - $i = 1 \dots n$

$$M x^{(k+1)} = N x^{(k)} + b$$

$$\sum_{l=1}^{j} a_{jl} x_l^{(k+1)} = b_j - \sum_{l=j+1}^{n} a_{jl} x_l^{(k)}$$

$$x_1^{(k+1)} = \left(b_1 - \sum_{l=2}^{n} a_{1l} x_l^{(k)} \right) / a_{11};$$

for $j = 2 : n$

$$x_j^{(k+1)} = \left(b_j - \sum_{l=j+1}^{n} a_{jl} x_l^{(k)} - \sum_{l=1}^{j-1} a_{jl} x_l^{(k+1)} \right) / a_{jj};$$

end

Cost = norm(A) V iteration.

$$A = \begin{bmatrix} a^2+1 & -a & & \\ -a & \ddots & \ddots & \\ & \ddots & \ddots & -a \\ & & -a & a^2+1 \end{bmatrix}$$

$\| x^{(k+1)} - x^{(k)} \| \le tol$ o $k \le k_{max}$

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