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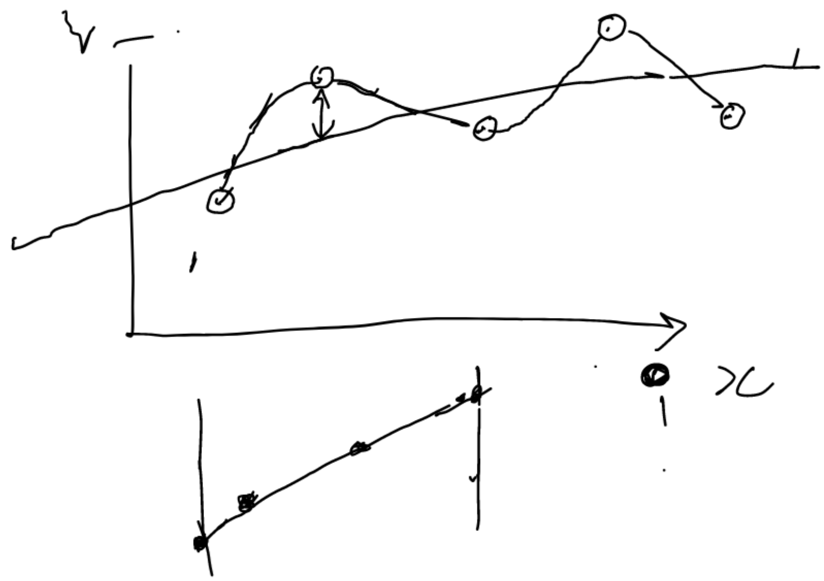
1. Интерполяция

$x : y$

2. Аппроксимация



3. Классиф.

4. Параметрич. идентиф.

$y(t)$

$$\begin{cases} \dfrac{\partial y(t)}{\partial t} = f(y(t), \theta, t) \\ y(0) = y_0 \end{cases}$$

$a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n = b_1$

$a_{21}x_1 + a_2$

$\cdot \left(-\frac{a_{21}}{a_{11}}\right)$

$$\begin{cases} a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n = b_1 \\ a_{21}x_1 + a_{22}x_2 + \ldots + a_{2n}x_n = b_2 \\ \ldots \\ a_{n1}x_1 + a_{n2}x_2 + \ldots + a_{nn}x_n = b_n \end{cases}$$

СЛАУ $\qquad -\frac{a_{n1}}{a_{11}}$

$$\underset{n\times n}{A} = \begin{pmatrix} a_{11} & a_{12} & \ldots & a_{1n} \\ a_{21} & a_{22} & \ldots & a_{2n} \\ \vdots & & \ddots & \vdots \\ a_{n1} & a_{n2} & \ldots & a_{nn} \end{pmatrix} \quad x = \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{pmatrix} \quad b = \begin{pmatrix} b_1 \\ b_2 \\ \vdots \\ b_n \end{pmatrix}$$

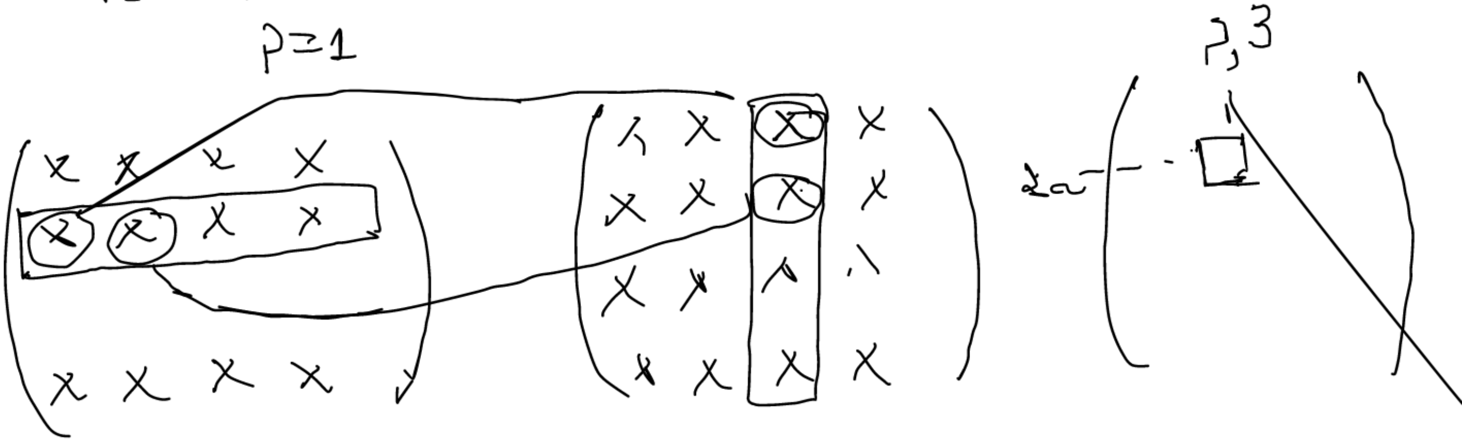
$$Ax = b$$

$$Ax = \begin{pmatrix} \sum_{i=1}^{n} a_{1i}x_i \\ \sum_{i=1}^{n} a_{2i}x_i \end{pmatrix}$$

$$\boxed{\underset{n \times m}{A} \cdot \underset{m \times k}{B} = \underset{n \times k}{C}}$$

$$\underset{n \times n}{A} \cdot \underset{n \times 1}{x} = \underset{n \times 1}{R}$$

$$C_{ij} = \sum_{p=1}^{m} a_{ip} \cdot b_{pj}$$



A B C

$$Ax = b$$

$$a'_{11} x_1 + a'_{12} x_2 + a'_{13} x_3 + \dots + a'_{1n} x_n = b'_1$$

$$0 + a'_{22} x_2 + a'_{23} x_3 + \dots + a'_{2n} x_n = b'_2$$

$$0 + 0 + a'_{33} x_3 + \dots + a'_{3i} x_n = b'_3$$

$$\vdots$$

$$0 + 0 + \dots a_{n-1n-1} x_{n-1} + a'_{n-1n} x_n = b'_{n-1}$$

$$0 + 0 + 0 + \dots + a'_{nn} \boxed{x_n} = b'_n$$

$$x_n = \frac{b'_n}{a'_{nn}}, \quad x_{n-1} = \frac{b'_{n-1} - a'_{n-1n} x_n}{a'_{n-1n-1}}$$

$$x_i = \frac{b'_i - \sum_{j=i+1}^{n} a'_{ij} x_j}{a'_{ii}}$$

$$\left(\begin{array}{cccc|c} a_{11} & a_{12} & \dots & a_{1n} & b_1 \\ a_{21} & a_{22} & \dots & a_{2n} & b_2 \\ \vdots & & & & \\ a_{n1} & a_{n2} & \dots & a_{nn} & b_n \end{array}\right) \sim$$

$$\sim \left(\begin{array}{ccc|c} \ddots & & * & b_1' \\ & \ddots & & b_2' \\ & & & \vdots \\ 0 & & \ddots & b_n' \end{array}\right)$$

$$A \cdot A^{-1} = A^{-1} \cdot A = E$$

$$(A^{-1})^{-1} = A$$

$$E = \begin{pmatrix} 1 & & & 0 \\ & 1 & & \\ & & 1 & \\ & & & \ddots \\ 0 & & & 1 \end{pmatrix}$$

$$a \cdot \frac{1}{a} = 1$$

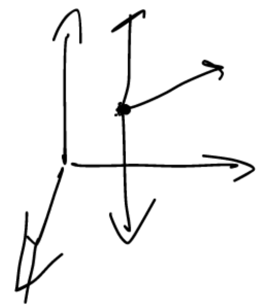
$$(A \mid E) \sim \boxed{(E \mid A')} \sim (E \mid A^{-1})$$

$$Ax = b \quad | \, A^{-1}$$

$$\underbrace{A^{-1}A}_{E}x = A^{-1}b$$

$$\boxed{x = A^{-1} \cdot b}$$

$\det(A)$



$$\begin{cases} x + y + z = 5 \\ 2x + y + z = 10 \\ 3x + 2y + z = 15 \end{cases}$$

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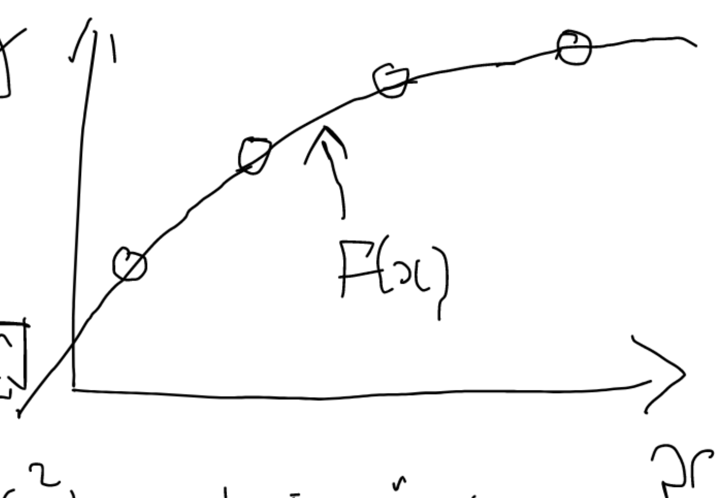
x	x_0	x_1		x_n
y	y_0	y_1	$\dots$	y_n



$$F(x) = a_0 + a_1 \boxed{x} + a_2 \boxed{x^2} + \dots + a_n \boxed{x^n}$$

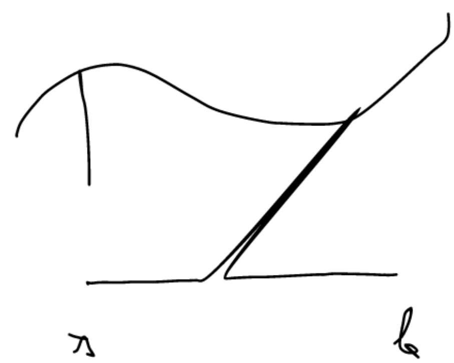
$$\begin{cases} F(x_0) = y_0 \\ F(x_1) = y_1 \\ F(x_2) = y_2 \\ \vdots \\ F(x_n) = y_n \end{cases} \qquad \begin{cases} a_0 + a_1 \cdot x_0 + a_2 x_0^2 + \dots + a_n x_0^n = y_0 \\ a_0 + a_1 \cdot x_1 + a_2 x_1^2 + \dots + a_n x_1^n = y_1 \\ a_0 + a_1 \cdot x_2 + a_2 x_2^2 + \dots + a_n x_2^n = y_2 \\ a_0 + a_1 x_n + a_2 x_n^2 + \dots + a_n x_n^n = y_n \end{cases}$$

$$F(x) = y_0 l_0(x) + y_1 l_1(x) + \dots + y_n l_n(x)$$

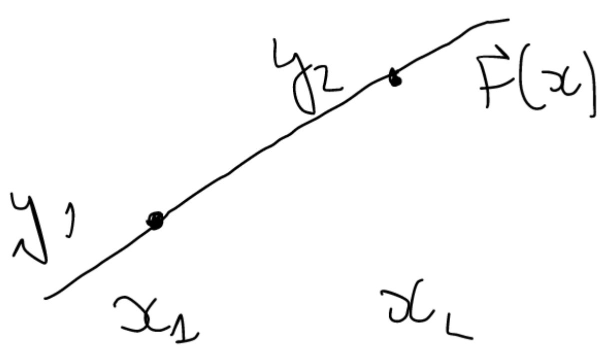
$$l_i(x_i) = 1$$

$$l_j(x_j) = 0$$

$$i \neq j$$



$$l_i(x) = \frac{(x_0 - x)(x_1 - x)\dots(x_{i-1} - x)(x_{i+1} - x)\dots(x_n - x)}{(x_0 - x_i)(x_1 - x_i)\dots(x_{i-1} - x_i)(x_{i+1} - x_i)\dots(x_n - x_i)}$$



$$F(x) = y_1 \frac{x_2 - x}{x_2 - x_1} + y_2 \frac{(x_1 - x)}{x_1 - x_2} = a_0 + a_1 x$$

$$F(x_1) = y_1$$

$$F(x_2) = y_2$$

$f(x) = x^3 + x^2 + x$