

矩阵运算

矩阵定义:

$$P = 2, A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ 1 & 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 3 & 2 & 1 \\ 3 & 2 & 1 \\ 3 & 2 & 1 \end{bmatrix}, C = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}, D = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, E = \begin{bmatrix} 2 \end{bmatrix}$$

矩阵转置:

$$A^T = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 2 & 2 \\ 3 & 3 & 3 \end{bmatrix}, B^T = \begin{bmatrix} 3 & 3 & 3 \\ 2 & 2 & 2 \\ 1 & 1 & 1 \end{bmatrix}, C^T = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, D^T = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}, E^T = \begin{bmatrix} 2 \end{bmatrix}$$

常数运算:

$$A + P = \begin{bmatrix} 3 & 4 & 5 \\ 3 & 4 & 5 \\ 3 & 4 & 5 \end{bmatrix}, A - P = \begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix}, A \times P = \begin{bmatrix} 2 & 4 & 6 \\ 2 & 4 & 6 \\ 2 & 4 & 6 \end{bmatrix}, A \div P = \begin{bmatrix} 0.50 & 1 & 1.5 \\ 0.50 & 1 & 1.5 \\ 0.50 & 1 & 1.5 \end{bmatrix}$$

$$P + A = \begin{bmatrix} 3 & 4 & 5 \\ 3 & 4 & 5 \\ 3 & 4 & 5 \end{bmatrix}, P - A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix}, P \times A = \begin{bmatrix} 2 & 4 & 6 \\ 2 & 4 & 6 \\ 2 & 4 & 6 \end{bmatrix}, P \div A = \begin{bmatrix} 2 & 1.0 & 0.66 \\ 2 & 1.0 & 0.66 \\ 2 & 1.0 & 0.66 \end{bmatrix}$$

$$C + P = \begin{bmatrix} 3 & 4 & 5 \end{bmatrix}, C - P = \begin{bmatrix} -1 & 0 & 1 \end{bmatrix}, C \times P = \begin{bmatrix} 2 & 4 & 6 \end{bmatrix}, C \div P = \begin{bmatrix} 0.50 & 1 & 1.5 \end{bmatrix}$$

$$P + C = \begin{bmatrix} 3 & 4 & 5 \end{bmatrix}, P - C = \begin{bmatrix} 1 & 0 & -1 \end{bmatrix}, P \times C = \begin{bmatrix} 2 & 4 & 6 \end{bmatrix}, P \div C = \begin{bmatrix} 2 & 1.0 & 0.66 \end{bmatrix}$$

$$D + P = \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}, D - P = \begin{bmatrix} -1 \\ 0 \\ 1 \end{bmatrix}, D \times P = \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}, D \div P = \begin{bmatrix} 0.50 \\ 1 \\ 1.5 \end{bmatrix}$$

$$P + D = \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}, P - D = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}, P \times D = \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}, P \div D = \begin{bmatrix} 2 \\ 1 \\ 0.66 \end{bmatrix}$$

矩阵运算:

$$A + B = \begin{bmatrix} 4 & 4 & 4 \\ 4 & 4 & 4 \\ 4 & 4 & 4 \end{bmatrix}, A - B = \begin{bmatrix} -2 & 0 & 2 \\ -2 & 0 & 2 \\ -2 & 0 & 2 \end{bmatrix}, A \times B = \begin{bmatrix} 18 & 12 & 6 \\ 18 & 12 & 6 \\ 18 & 12 & 6 \end{bmatrix}, A \div B = \begin{bmatrix} 0.33 & 1 & 3 \\ 0.33 & 1 & 3 \\ 0.33 & 1 & 3 \end{bmatrix}$$

$$B + A = \begin{bmatrix} 4 & 4 & 4 \\ 4 & 4 & 4 \\ 4 & 4 & 4 \end{bmatrix}, B - A = \begin{bmatrix} 2 & 0 & -2 \\ 2 & 0 & -2 \\ 2 & 0 & -2 \end{bmatrix}, B \times A = \begin{bmatrix} 6 & 12 & 18 \\ 6 & 12 & 18 \\ 6 & 12 & 18 \end{bmatrix}, B \div A = \begin{bmatrix} 3 & 1 & 0.33 \\ 3 & 1 & 0.33 \\ 3 & 1 & 0.33 \end{bmatrix}$$

$$A + C = \begin{bmatrix} 2 & 4 & 6 \\ 2 & 4 & 6 \\ 2 & 4 & 6 \end{bmatrix}, A - C = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}, A \times C = \begin{bmatrix} ERROR \end{bmatrix}, A \div C = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$C + A = \begin{bmatrix} 2 & 4 & 6 \\ 2 & 4 & 6 \\ 2 & 4 & 6 \end{bmatrix}, C - A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}, C \times A = \begin{bmatrix} 6 & 12 & 18 \end{bmatrix}, C \div A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

$$A + D = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}, A - D = \begin{bmatrix} 0 & 1 & 2 \\ -1 & 0 & 1 \\ -2 & 1 & 0 \end{bmatrix}, A \times D = \begin{bmatrix} 14 \\ 14 \\ 14 \end{bmatrix}, A \div D = \begin{bmatrix} 1 & 2 & 3 \\ 0.50 & 1 & 1.5 \\ 0.33 & 0.66 & 1 \end{bmatrix}$$

$$D + A = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}, D - A = \begin{bmatrix} 0 & -1 & -2 \\ 1 & 0 & -1 \\ 2 & 1 & 0 \end{bmatrix}, D \times A = [ERROR], D \div A = \begin{bmatrix} 1.0 & 0.50 & 0.33 \\ 2 & 1 & 0.66 \\ 3 & 1.5 & 1 \end{bmatrix}$$

$$A + E = \begin{bmatrix} 3 & 4 & 5 \\ 3 & 4 & 5 \\ 3 & 4 & 5 \end{bmatrix}, A - E = \begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix}, A \times E = [ERROR], A \div E = \begin{bmatrix} 0.50 & 1 & 1.5 \\ 0.5 & 1 & 1.5 \\ 0.5 & 1 & 1.5 \end{bmatrix}$$

$$E + A = \begin{bmatrix} 3 & 4 & 5 \\ 3 & 4 & 5 \\ 3 & 4 & 5 \end{bmatrix}, E - A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 0 & -1 \\ 1 & 0 & -1 \end{bmatrix}, E \times A = [ERROR], E \div A = \begin{bmatrix} 2.0 & 1 & 0.66 \\ 2 & 1 & 0.66 \\ 2 & 1 & 0.66 \end{bmatrix}$$

$$C + D = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}, C - D = \begin{bmatrix} 0 & 1 & 2 \\ -1 & 0 & 1 \\ -2 & -1 & 0 \end{bmatrix}, C \times D = \begin{bmatrix} 14 \end{bmatrix}, C \div D = \begin{bmatrix} 1 & 2 & 3 \\ 0.5 & 1 & 1.50 \\ 0.33 & 0.66 & 1 \end{bmatrix}$$

$$D + C = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 4 & 5 \\ 4 & 5 & 6 \end{bmatrix}, D - C = \begin{bmatrix} 0 & -1 & -2 \\ 1 & 0 & -1 \\ 2 & 1 & 0 \end{bmatrix}, D \times C = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}, D \div C = \begin{bmatrix} 1.00 & 0.50 & 0.33 \\ 2 & 1 & 0.66 \\ 3 & 1.5 & 1 \end{bmatrix}$$

源码示例:

```
import numpy as nm
P=2
A=nm.mat([[1,2,3],[1,2,3],[1,2,3]])
B=nm.mat([[3,2,1],[3,2,1],[3,2,1]])
C=nm.mat([[1,2,3]])
D=nm.mat([[1],[2],[3]])
E=nm.mat([[2]])
```