Pattern
Recognition
Lab

FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG
FACULTY OF ENGINEERING

Part 1

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \tag{1}$$

Pattern
Recognition
Lab

FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG
FACULTY OF ENGINEERING

Part 1

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \tag{1}$$

$$\mathbf{Y} = \mathbf{X} + 2 = \begin{pmatrix} 3 & 3 \\ 3 & 3 \end{pmatrix} \tag{2}$$

Part 1

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \tag{1}$$

$$\mathbf{Y} = \mathbf{X}/2 = \frac{1}{2}\begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1/2 & 1/2 \\ 1/2 & 1/2 \end{pmatrix} \tag{2}$$

Part 1

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \tag{1}$$

$$\mathbf{Y} = \mathbf{X}/2 = \frac{1}{2}\begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1/2 & 1/2 \\ 1/2 & 1/2 \end{pmatrix} \tag{2}$$

$$L = \sum \mathbf{Y} = \frac{1}{2}\left(x_1 + x_2 + x_3 + x_4 \right) \tag{3}$$

Pattern
Recognition
Lab

FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG
FACULTY OF ENGINEERING

Part 1

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} \tag{1}$$

$$\mathbf{Y} = \mathbf{X}/2 = \frac{1}{2} \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 1/2 & 1/2 \\ 1/2 & 1/2 \end{pmatrix} \tag{2}$$

$$L = \sum \mathbf{Y} = \frac{1}{2} \left(x_1 + x_2 + x_3 + x_4 \right) \tag{3}$$

$$\frac{\partial L}{\partial \mathbf{X}} = \begin{pmatrix} \frac{\partial L}{\partial x_1} & \frac{\partial L}{\partial x_2} \\ \frac{\partial L}{\partial x_3} & \frac{\partial L}{\partial x_4} \end{pmatrix} = \begin{pmatrix} 1/2 & 1/2 \\ 1/2 & 1/2 \end{pmatrix} \tag{4}$$

Part 2

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 2 & 2 \\ 1 & 1 \end{pmatrix} \tag{5}$$

Pattern
Recognition
Lab

Part 2

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 2 & 2 \\ 1 & 1 \end{pmatrix} \tag{5}$$

$$\mathbf{Y} = \mathbf{X}^2 + 1 \tag{6}$$

Part 2

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 2 & 2 \\ 1 & 1 \end{pmatrix} \tag{5}$$

$$\mathbf{Y} = \mathbf{X}^2 + 1 \tag{6}$$

$$L = \sum \mathbf{Y} = \left(x_1^2 + 1\right) + \left(x_2^2 + 1\right) + \left(x_3^2 + 1\right) + \left(x_4^2 + 1\right) \tag{7}$$

Pattern
Recognition
Lab

FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG
FACULTY OF ENGINEERING

Part 2

$$\mathbf{X} = \begin{pmatrix} x_1 & x_2 \\ x_3 & x_4 \end{pmatrix} = \begin{pmatrix} 2 & 2 \\ 1 & 1 \end{pmatrix} \tag{5}$$

$$\mathbf{Y} = \mathbf{X}^2 + 1 \tag{6}$$

$$L = \sum \mathbf{Y} = \left(x_1^2 + 1\right) + \left(x_2^2 + 1\right) + \left(x_3^2 + 1\right) + \left(x_4^2 + 1\right) \tag{7}$$

$$\frac{\partial L}{\partial \mathbf{X}} = \begin{pmatrix} \frac{\partial L}{\partial x_1} & \frac{\partial L}{\partial x_2} \\ \frac{\partial L}{\partial x_3} & \frac{\partial L}{\partial x_4} \end{pmatrix} = \begin{pmatrix} 2x_1 & 2x_2 \\ 2x_3 & 2x_4 \end{pmatrix} \tag{8}$$