

$$X_1 = [1, 0, 0, 1]^T \quad X_2 = [1, 1, 0, 1]^T \quad X_3 = [1, 1, 0, 0]^T$$

+ Transform to bipolar vectors:

$$X_1 = [1, -1, -1, 1]^T \quad X_2 = [1, 1, -1, 1]^T \quad X_3 = [1, 1, -1, -1]^T$$

+ Weight matrix $T = \frac{1}{4} \begin{bmatrix} 0 & 1 & -3 & 1 \\ 1 & 0 & -1 & -1 \\ -3 & -1 & 0 & -1 \\ 1 & -1 & -1 & 0 \end{bmatrix}$

Test stability of X_1, X_2, X_3

$$T \cdot X_1 = \frac{1}{4} \begin{bmatrix} 3 \\ 1 \\ -3 \\ 3 \end{bmatrix} \rightarrow \text{sgn}(TX_1) = \begin{bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{bmatrix} = X_1' \neq X_1$$

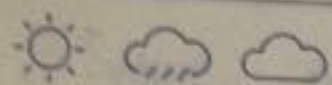
→ need to iterate again:

$$T \cdot X_1' = \frac{1}{4} \begin{bmatrix} 5 \\ 1 \\ -5 \\ 1 \end{bmatrix} \rightarrow \text{sgn}(TX_1') = \begin{bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{bmatrix} = X_1' = X_2$$

X_1 is not stable, it converges to X_2 ($[1, 1, -1, 1]^T$)

$$T \cdot X_2 = \frac{1}{4} \begin{bmatrix} 5 \\ 1 \\ -5 \\ 1 \end{bmatrix} \rightarrow \text{sgn}(TX_2) = \begin{bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{bmatrix} = X_2$$

→ X_2 is stable



Thứ ngày

$$\rightarrow T \cdot X_3 = \frac{1}{4} \begin{bmatrix} 3 \\ 3 \\ -3 \\ 1 \end{bmatrix} \rightarrow \text{sgn}(T \cdot X_3) = \begin{bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{bmatrix} = X_3' \neq X_3$$

\rightarrow need to iterate again.

$$T \cdot X_3' = \frac{1}{4} \begin{bmatrix} 5 \\ 1 \\ -5 \\ 1 \end{bmatrix} \rightarrow \text{sgn}(T \cdot X_3) = \begin{bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{bmatrix} = X_3' = X_2$$

$\rightarrow X_3$ is not stable, it converges to X_2 .

<u>CONCLUDE</u> :	$X_1 \rightarrow X_2$ (not stable)	
	$X_2 \rightarrow X_2$ (stable)	
	$X_3 \rightarrow X_2$ (stable)	
	not	

"I certify that this assignment is entirely my own work, performed independently and without any help from the sources which are not allowed"