HUBS & AUTHORITIES

HUBS :-

→ A HUB is a page with Many out-links

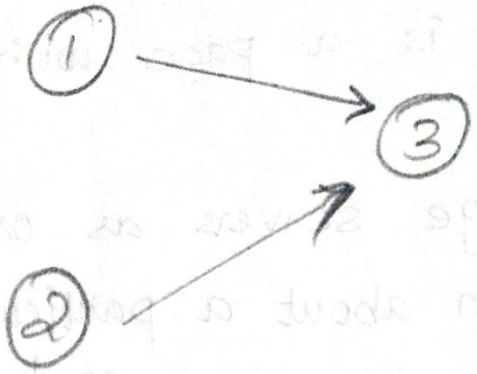
→ The page serves as organizer of information about a particular topic and points to many good authority pages on the topic.

AUTHORITIES :-

→ Authority is a page with many in-links

→ The idea is that the page may have good or authoritative content on some topic and thus many people trust it and link to it.

HITS ALGORITHM:



Step 1:

Find the adjacency Matrix of the graph.

(i.e)

$$A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

Step 2:

Find Matrix transpose

$$A^t = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 1 & 1 & 0 \end{bmatrix}$$

Assume the initial hub weigh vector is $u = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$

step: 3

Compute the authority weight vector

$$\boxed{V = A^t \cdot u}$$

$$V = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 1 & 1 & 0 \end{bmatrix} \cdot \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$$

step: 4

Then update hub weigh:

(i, e)

$$\boxed{u = A \cdot v}$$

Note :- This is A not A^t

$$u = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \\ 0 \end{bmatrix}$$

Results:-

Hub weights

$$\begin{bmatrix} 2 \\ 2 \\ 0 \end{bmatrix}$$

authority weights

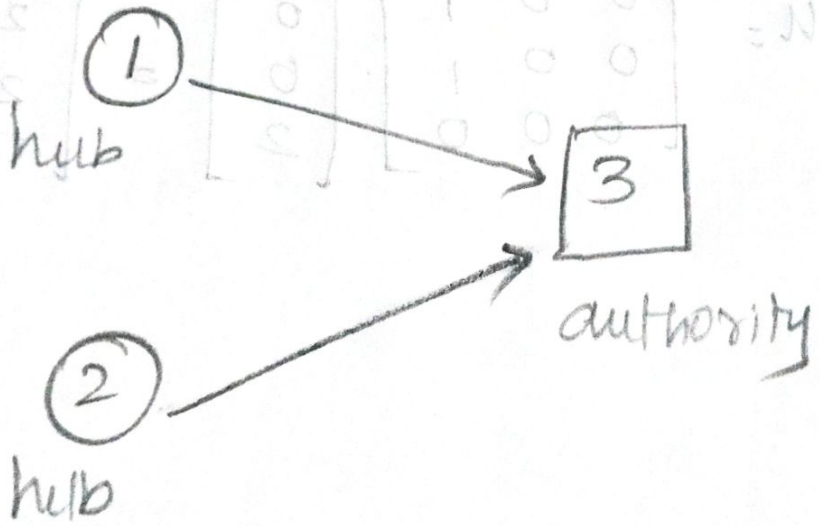
$$\begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$$

Node 1 is a hub since $2 > 0$

Node 2 is a hub since $2 > 0$

Node 3 is the Most authoritative since $0 < 2$

$\therefore$



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