**Experiment 09**

**Aim:** Write a program to implement HITS algorithm.

**Code:**

import numpy as np

def hits\_algorithm(adjacency\_matrix, max\_iter=100, tol=1e-6):

    num\_nodes = adjacency\_matrix.shape[0]

    hub\_scores = np.ones(num\_nodes)

    authority\_scores = np.ones(num\_nodes)

    for \_ in range(max\_iter):

        new\_authority\_scores = np.dot(adjacency\_matrix.T, hub\_scores)

        new\_authority\_scores /= np.linalg.norm(new\_authority\_scores, 2)

        new\_hub\_scores = np.dot(adjacency\_matrix, new\_authority\_scores)

        new\_hub\_scores /= np.linalg.norm(new\_hub\_scores, 2)

        if np.linalg.norm(new\_authority\_scores - authority\_scores, 2) < tol and \

           np.linalg.norm(new\_hub\_scores - hub\_scores, 2) < tol:

            break

        authority\_scores = new\_authority\_scores

        hub\_scores = new\_hub\_scores

    return hub\_scores, authority\_scores

adjacency\_matrix = np.array([

    [0, 1, 1, 0],

    [1, 0, 1, 1],

    [0, 1, 0, 1],

    [0, 0, 1, 0]

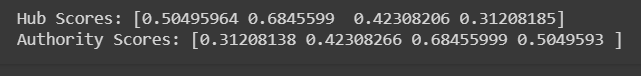
])

hub\_scores, authority\_scores = hits\_algorithm(adjacency\_matrix)

print("Hub Scores:", hub\_scores)

print("Authority Scores:", authority\_scores)

**Output:**

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