

Retrieval and Mining

Assignment 6

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1 PageRank

The Markov chain is ergodic. Since every node has a path to the other nodes, its irreducible, and every node has a path directly to itself, so its aperiodic.

By definition, we know that if $P(n) = P(n-1)$, and $P(n) = A \cdot P(n-1)$, then it become steady-state distribution.

```
import numpy as np
A = np.array([[0.1, 0.6, 0.3], [0.1, 0.25, 0.65], [0.3, 0.5, 0.2]])
P = np.array([[1, 1, 1]])
P2 = np.dot(A.transpose(), P)
idx = 1
while np.array_equal(P2, P) == False:
    idx += 1
    P = P2
    P2 = np.dot(A.transpose(), P)
print(idx, P)
```

With the python code above, I found that after it will become the steady-state distribution after 29 transitions. The distribution is [0.5437 1.2535 1.2098] for point 1, point 2 and point 3 respectively.