Random Walk

Hyunwoo Gu

1 Random Walk

We apply the **recurrence criteria** to the random walk induced by the Markov matrix

random walk process at hand has a stationary distribution if and only if

Now consider the system of equations

We can prescribed γ_0, γ_1 arbitrarily and then

Therefore, we have

- $\sum_{i=0}^{\infty} \frac{1}{p_i \pi_i} = \infty$: recurrent
  - $\sum_{i=0}^{\infty} \pi_i = \infty$: null recurrent
  - $\sum_{i=0}^{\infty} \pi_i < \infty$: positive recurrent
- $\sum_{i=0}^{\infty} \frac{1}{p_i \pi_i} < \infty$: transient