Mars Rover Markorv Process

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차 례

Mars Rover Markov Process

Diagram

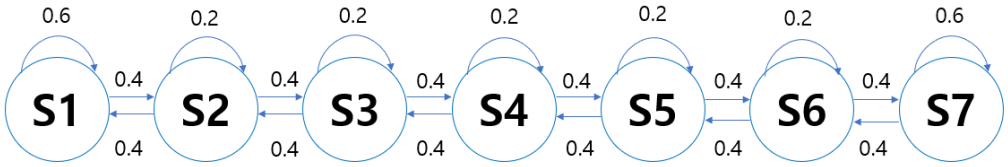

그림 1: Mars Rover MarkovProcess diagram

Transition matrix

$$P = \begin{pmatrix} 0.6 & 0.4 & 0 & 0 & 0 & 0 & 0 \\ 0.4 & 0.2 & 0.4 & 0 & 0 & 0 & 0 \\ 0 & 0.4 & 0.2 & 0.4 & 0 & 0 & 0 \\ 0 & 0 & 0.4 & 0.2 & 0.4 & 0 & 0 \\ 0 & 0 & 0 & 0.4 & 0.2 & 0.4 & 0 \\ 0 & 0 & 0 & 0 & 0.4 & 0.2 & 0.4 \\ 0 & 0 & 0 & 0 & 0 & 0.4 & 0.6 \end{pmatrix}$$

All state is recurrent

MC_simulation

```
import numpy as np

def MC_simul(this_state):
    u=np.random.random()

    state =["S1","S2","S3","S4","S5","S6","S7"]
    index=state.index(this_state)

    if this_state=="S1":
        if u<=0.4:
            next_state=state[index+1]
        else:
            next_state="S1"

    elif this_state=="S7":
        if u<=0.4:
            next_state=state[index-1]
        else:
            next_state='S7'

    else :
        if u<=0.4:
            next_state=state[index+1]
        elif u<=0.8:
            next_state=state[index-1]
        else :
            next_state=this_state

    return next_state

def reward_eval(path):
    reward=path.count('S1')*1+path.count('S7')*10
    return reward

MC_N=10000
spending_records=np.zeros((MC_N,))
for i in range(MC_N):
    path=['S4'] # starting point
```

```
    for t in range(9):
        this_state=path[-1]
        next_state=MC_simul(this_state)
        path.append(next_state)

    spending_records[i]=reward_eval(path)

print(np.mean(spending_records))
```

```
## 8.0335
```