Sidharth

2K18/MC/114

Experiment 3

Objective:

Demonstrating a Stochastic Process with Continuous Index Set (a) with discrete state space, (b) with continuous state space.

Theory:

A stochastic process is a family of random variables {X(t), t ∈ T} defined on a given probability space, indexed by parameter t, where t varies over an index set T. The values assumed byX(t) are called its states, and the set of all possible values forms the state pace of the process. Stochastic processes are classified on the basis of the underlying index set T and state space S. If T = {0,1,2,..}, or T = {0, ±1, ±2,..}, the stochastic process is said to be discrete parameter process and is usually indicated by {Xn} .The state space is classified as discrete if it is finite or countable and process is classified as continuous if it consists of an interval, finite or infinite of the real line.

Code:

A. Discrete state space

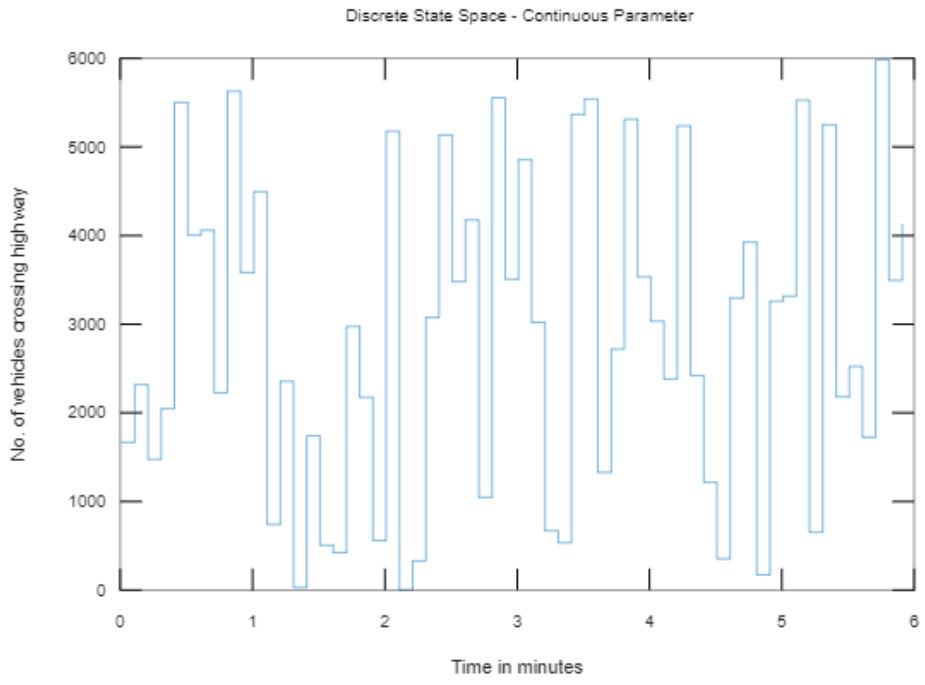
```
a= [0.01:0.1:6];

b= randi([0 6000],60,1);

pl = stairs(a,b);

xlabel('Time in minutes');

ylabel('No. of vehicles crossing highway');
```

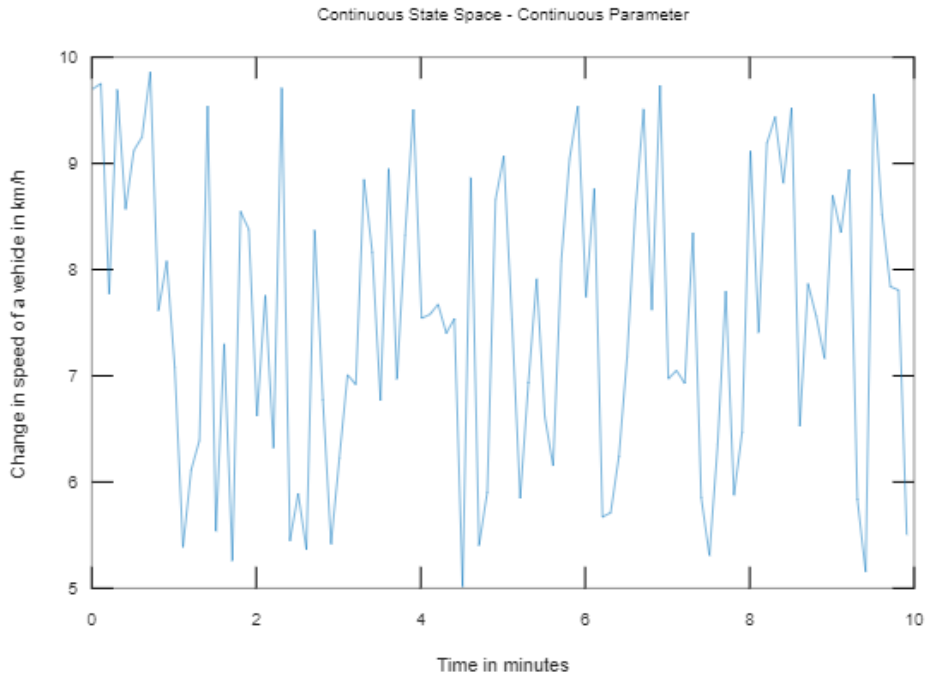
```
title(' Discrete State Space - Continuous Parameter');
```

B. Continuous state space.

```
a = [0.01:0.1:10];
b = 5 + 5.*rand(100,1);
pl = plot(a,b);
xlabel('Time in minutes');
ylabel('Change in speed of a vehicle in km/h');
title('Continuous State Space - Continuous Parameter');
```

Result:





Discussion:

The graphs for demonstrating a stochastic process with discrete index set

(A) with discrete state space, (Time vs No. of vehicles crossing highway)

(B) with continuous state space (Time vs Change in speed of a vehicle in km/h)

are obtained.