Lab - 12
Set 12: Modelling stock price variations as a Bachelier-Wiener process

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CS302, Modelling and Simulation

This lab utilizes data from January 1997 to April 2019 to simulate price changes of NIFTY-listed businesses as a Batchelor-Wiener process. The pertinent equations and parameter values were replicated, and six graphs were created. From the modeling experiment, three key results were found.

I. Introduction

The forward relative change of a stock price, S, in a finite time interval, Δt, is given by

$$\frac{\Delta S}{S} = a\Delta t + b\Delta W \tag{1}$$

where ΔW expresses a Wiener process about a background exponential growth of S.

II. Graphs

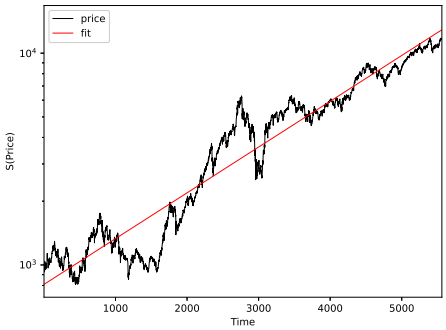

FIG. 1: Plot of x and y versus time, with $A = 2.18 \times 10^{-3}$ day^{-1} and $B = 0.44$ day^{-1} and Δt=1/24 day.

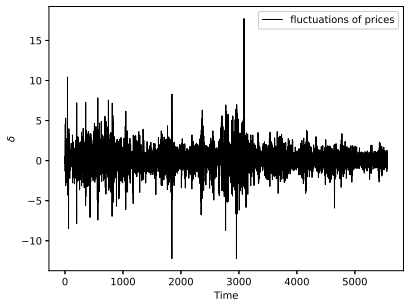

FIG. 2: Plot of x and y vs time with a logarithmic scale with $A = 2.18 \times 10^{-3}$ day^{-1} and $B = 0.44$ day^{-1} and Δt=1/24 day.

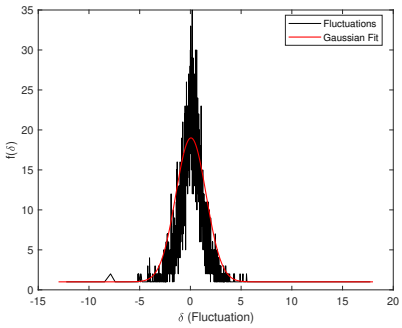

FIG. 3: Plot of z(t) vs time with $A = 2.18 \times 10^{-3}$ day^{-1} and $B = 0.44$ day^{-1} and Δt=1/24 day.

Maximum value of x is 295.569 on 6th day (6.46 days to be precise) of the infection spread.

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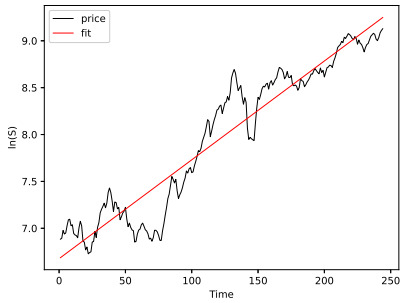

FIG. 4: Plot of z(t) vs time with a logarithmic scale with $A = 2.18 \times 10^{-3}$ day^{-1} and $B = 0.44$ day^{-1} and Δt=1/24 day.

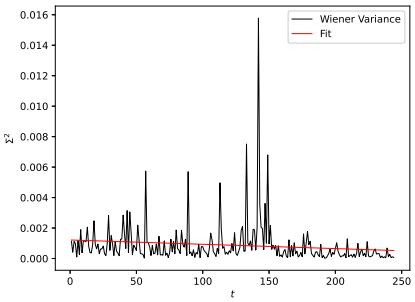

FIG. 5: Plot of x vs y, R = 3.77, $\rho = 201.8$ with $A = 2.18 \times 10^{-3}$ day^{-1} and $B = 0.44$ day^{-1} and Δt=1/24 day.

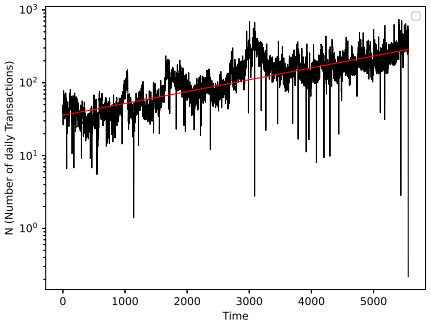

FIG. 6: Plot of x(t) vs time

III. Conclusion