Parameter Estimation for Infinite Lévy Processes via Sequential Monte Carlo

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1 The Model

For the purposes of this paper, we will be focusing on the Stochastic Volatility with Variance Gamma Jumps in Returns (SVVG). The model is as follows:

Stochastic Volatility with Variance Gamma Jumps (SVVG):

$$
\begin{aligned}
dY_t &= \mu dt + \sqrt{V_t}[\rho dW_{1t} + \sqrt{1-\rho^2}dW_{2t}] + dZ_t \\
dV_t &= \kappa(v - V_t)dt + \sigma_v \sqrt{V_t}dW_{1t} \\
dZ_t &= \gamma dG_t + \sigma_j \sqrt{dG_t}dB_t
\end{aligned}
\tag{1}
$$

Using Euler Discretization, we have the following:

$$
\begin{bmatrix} Y_{t+1} - Y_t \\ V_{t+1} - V_t \end{bmatrix}
$$

2 Sequential Monte Carlo

2.1 Importance Sampling