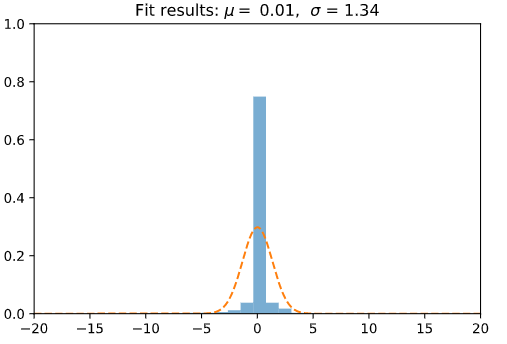
**Analysis over and White Noise Assumption**

**For each grid, the proposed Kalman filter model assumes the number of ride requests in the same time interval to be stable between two consecutive days. Also, the number of ride requests is stable between consecutive time intervals in the same day. Therefore, there are two noise assumptions in the model. For a time interval in day , first, the ride requests number difference (i.e., the process noise ) from the time interval of the previous day -1 is assumed to be white noise; second, the ride requests number difference (i.e., the measurement noise ) from previous time interval of day is assumed to be the white noise. These two assumptions are supported by our** **analysis of ride requests number distribution on two real-world datasets.**

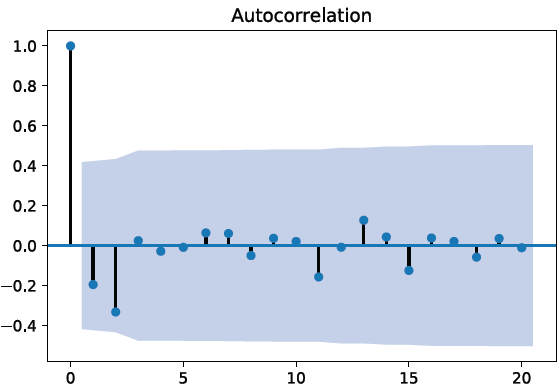
**and are white noise if the sequence of ride requests number differences is identically distributed with a mean of zero and are not autocorrelated. We checked these two conditions for both datasets.**

**On the San Francisco dataset, the distribution of process noise is shown as the following figure 1, the mean is 0.01 and the standard deviation is 1.34:**



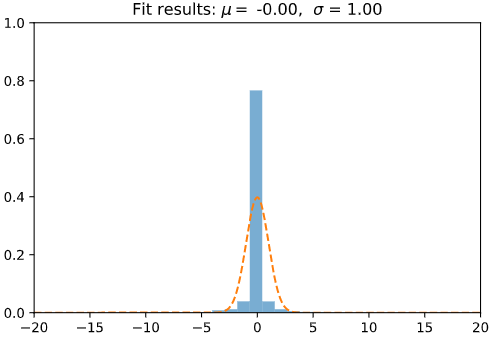
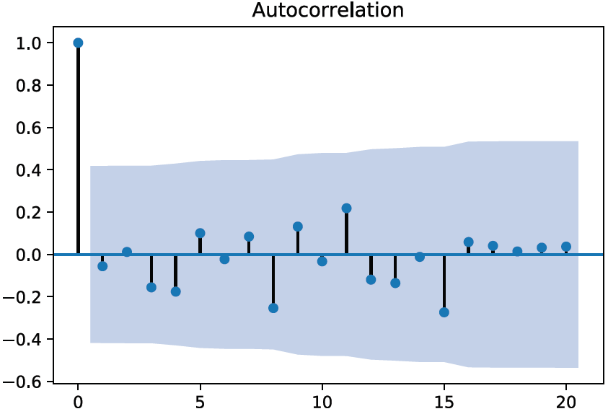
**Figure 1. Process noise distribution on SF**

**The correlogram of is shown in the following figure 2, where all spikes are within the 95% confidence interval. The correlogram does not show any obvious autocorrelation pattern of . Therefore, is assumed to be the white noise on San Francisco dataset.**



**Figure 2. Process noise autocorrelation on SF**

**Similarly, we checked on the San Francisco dataset. The distribution and correlogram are shown in Figure 3.**

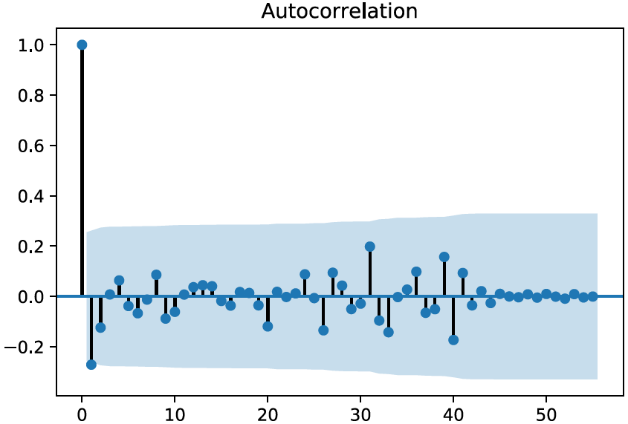
 

**Figure 3. measurement noise distribution and autocorrelation on SF**

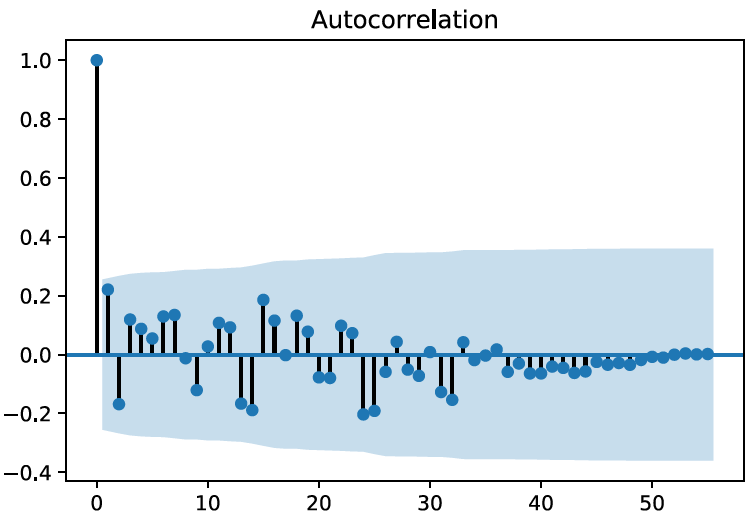
**Since is also identically distributed with a mean of zero and is not autocorrelated, it is assumed to be the white noise on San Francisco dataset.**

**The distribution and autocorrelation check of and on Wuhan dataset is shown in Figure 4 and Figure 5, respectively.**

Chart, histogram

Description automatically generated 

**Figure 4. Process noise distribution and autocorrelation on WH** Chart, line chart, histogram

Description automatically generated 

**Figure 5. measurement noise distribution and autocorrelation on WH**

**Based on the distribution and autocorrelation, it is assumed and are white noise on the Wuhan dataset.**

**Therefore, we assume and are white noise.**