EE239AS hw3 Cong Peng 904760493

1. (a) $P_r(N=n) \sim \text{Poisson}(\lambda s) = \dfrac{(\lambda s)^n e^{-\lambda s}}{n!}$

$$P_r(M=m \mid N=n) = \binom{n}{m} (1-p)^m p^{n-m}$$

$$P_r(M=m) = P_r(M=m \mid N=n) P_r(N=n)$$

$$= \frac{((1-p)\lambda s)^m e^{-(1-p)\lambda s}}{m!}$$

Hence, $M \sim \text{Poisson}((1-p)\lambda s)$

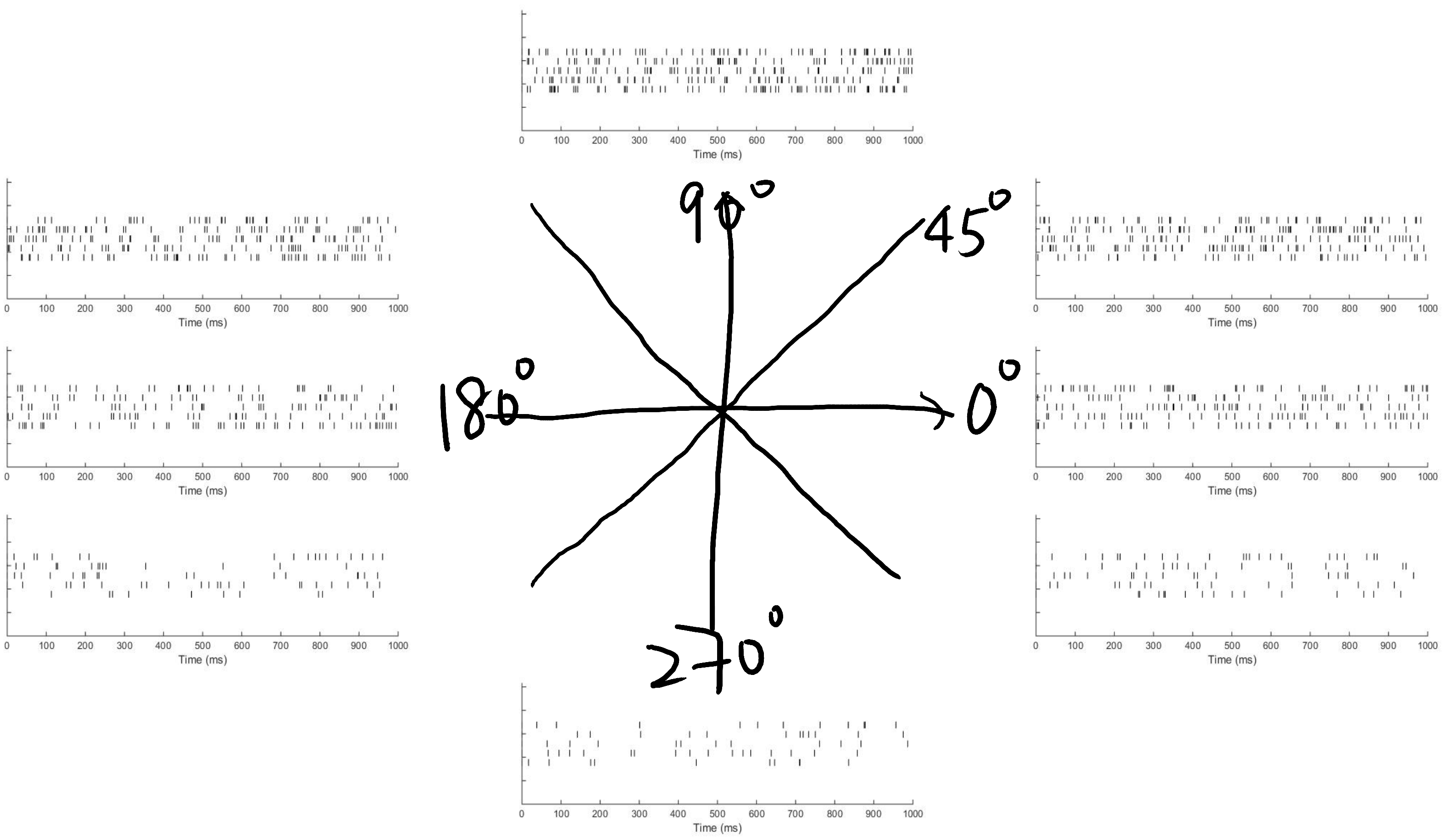
(b) rate : $(1-p)\lambda$

(c) Similarly, $N-M$ (# of spikes dropped within a T second is also a Poisson distribution at a rate of $p\lambda$

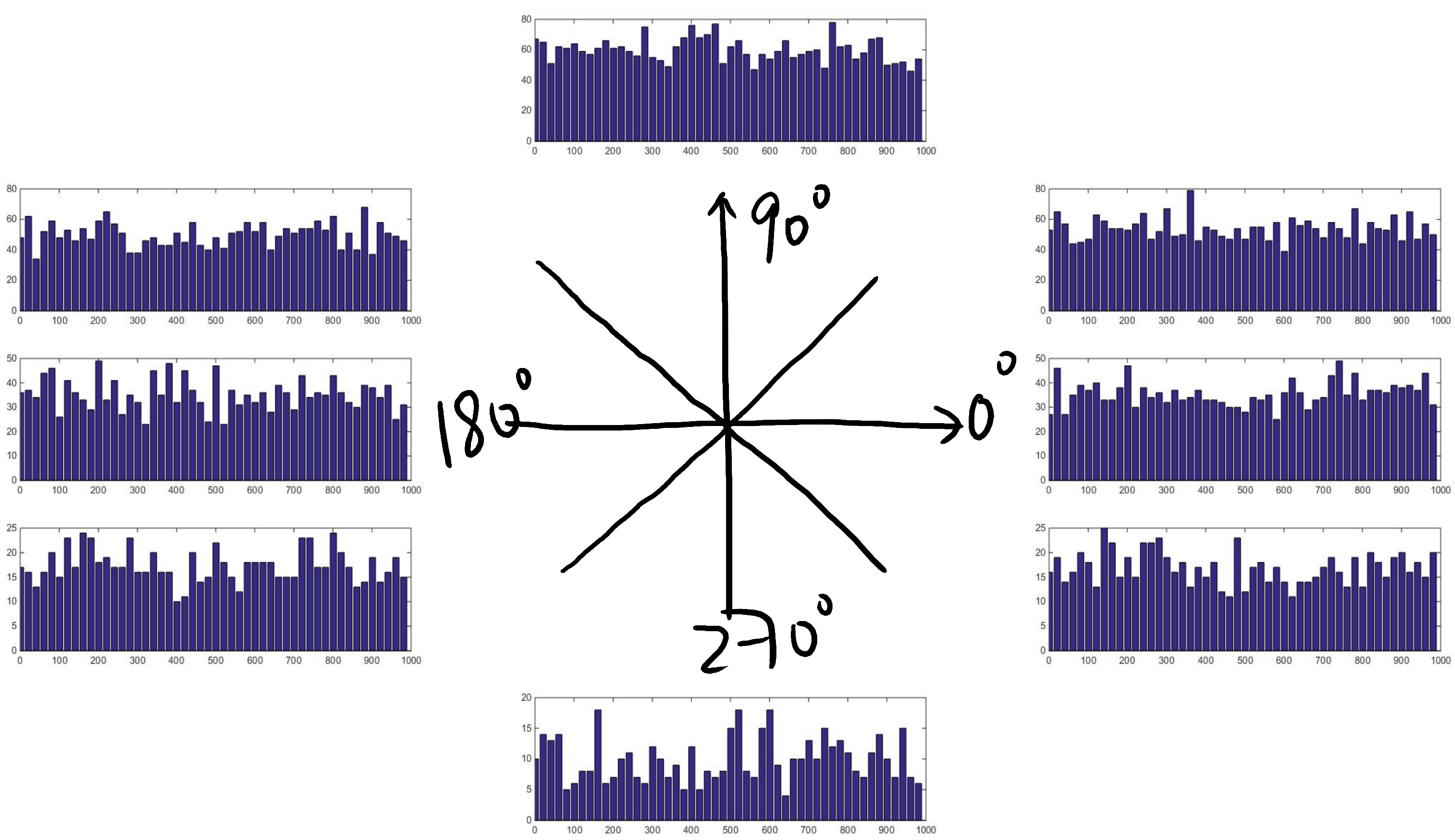
$$P_r(N-M=r) = \frac{(p\lambda s)^r e^{-p\lambda s}}{r!}$$

2. Homogeneous Poisson process

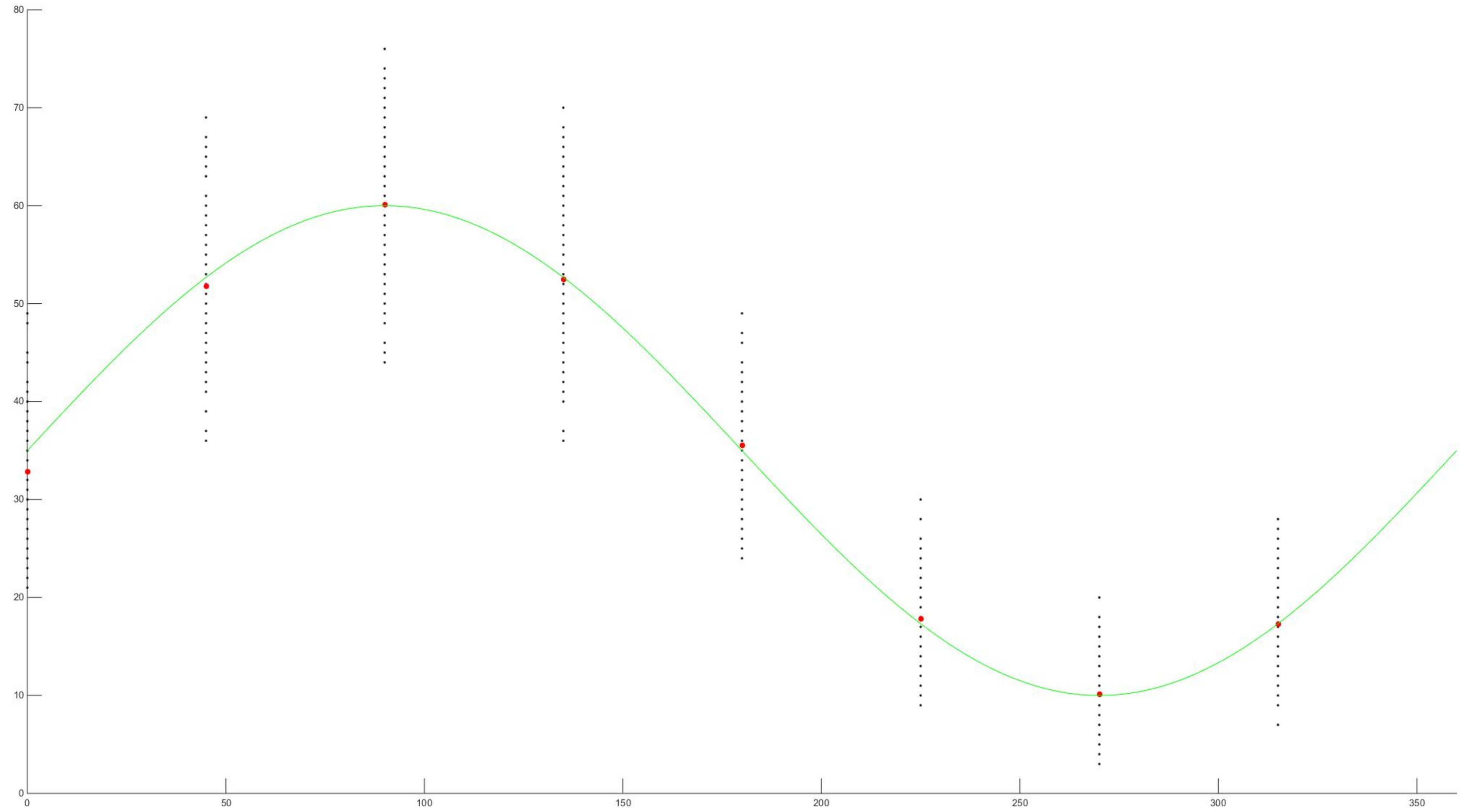
(a) Spike trains



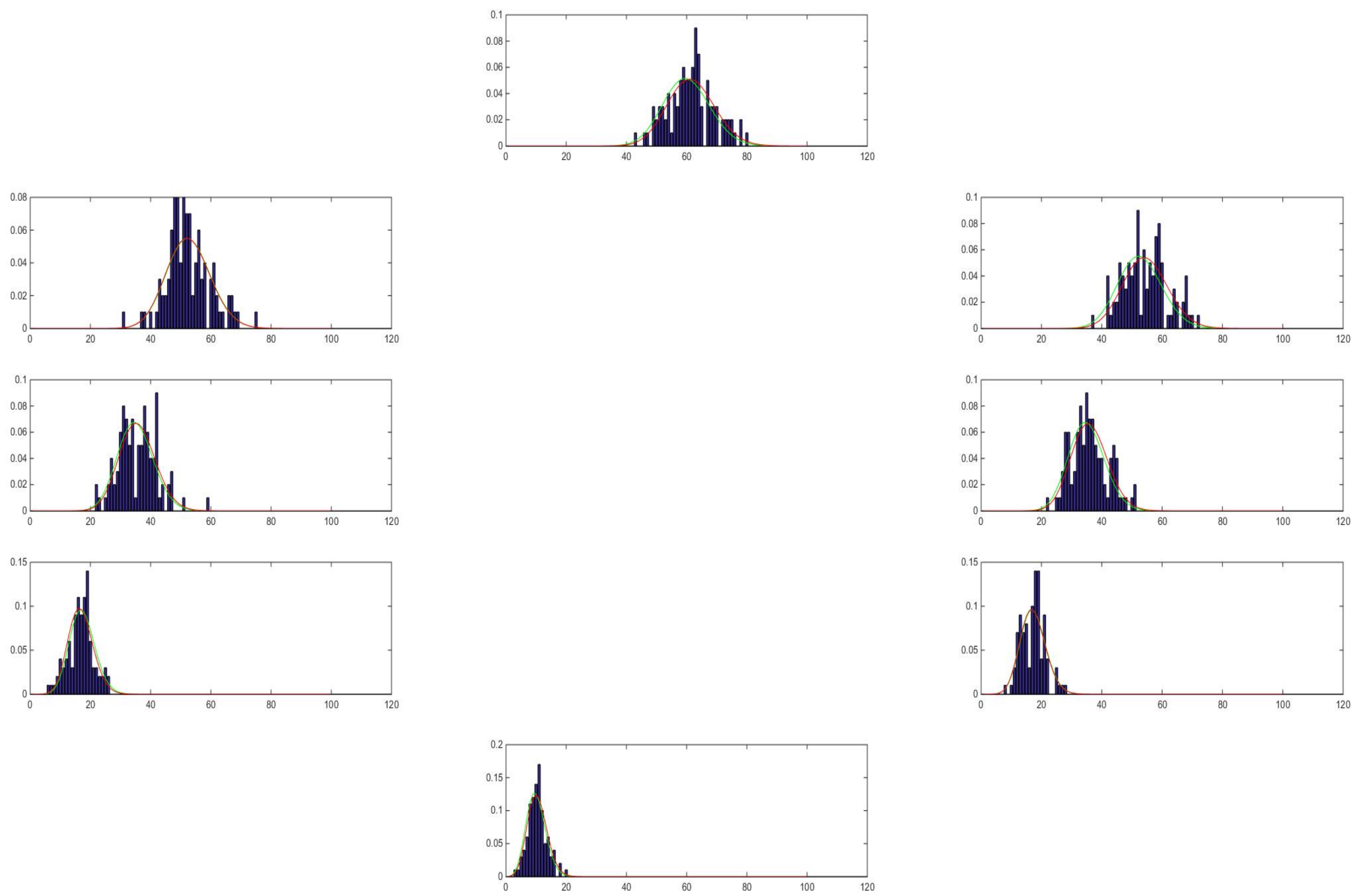
(b) Spike histogram



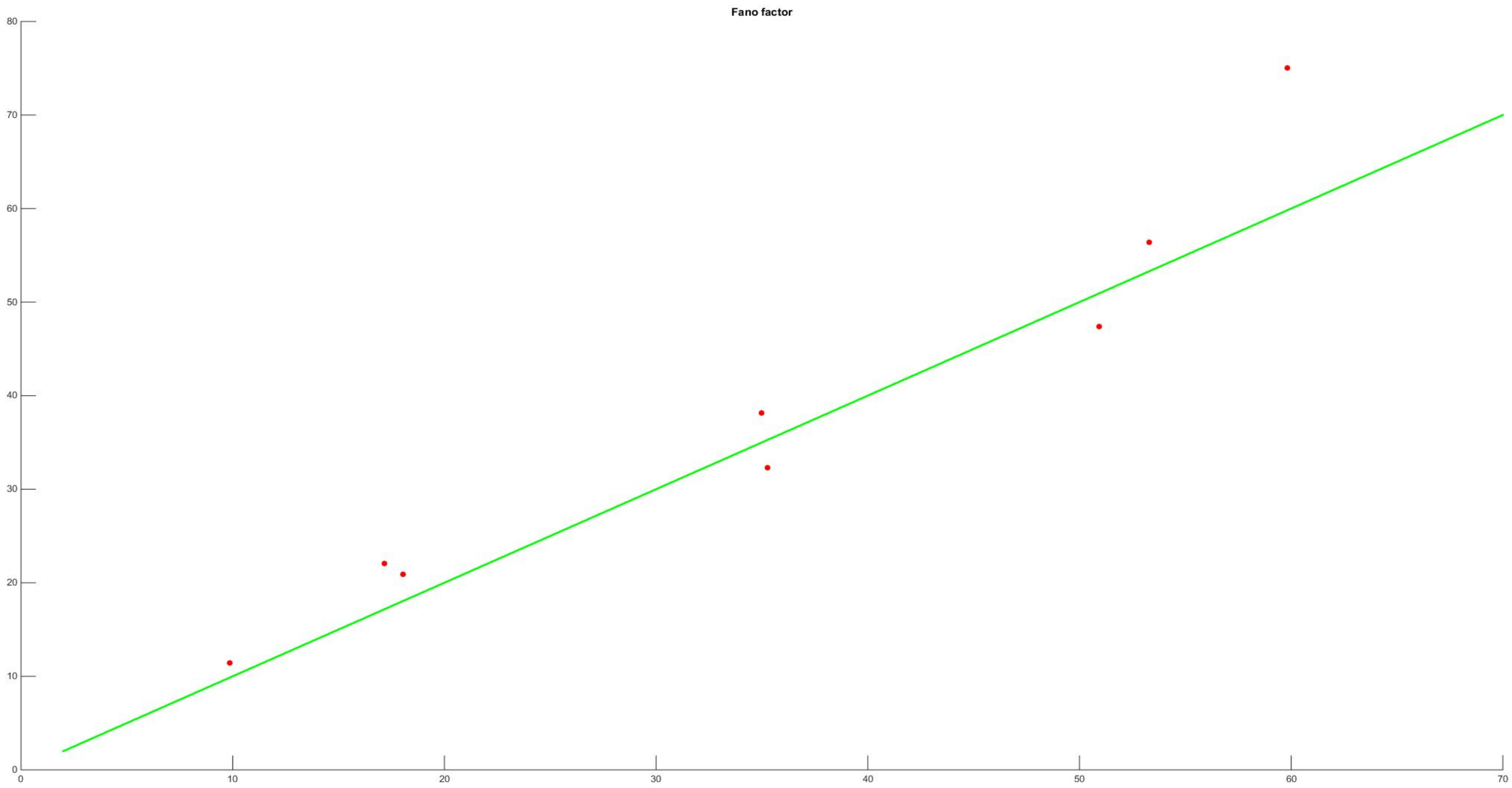
(c) Tuning curve



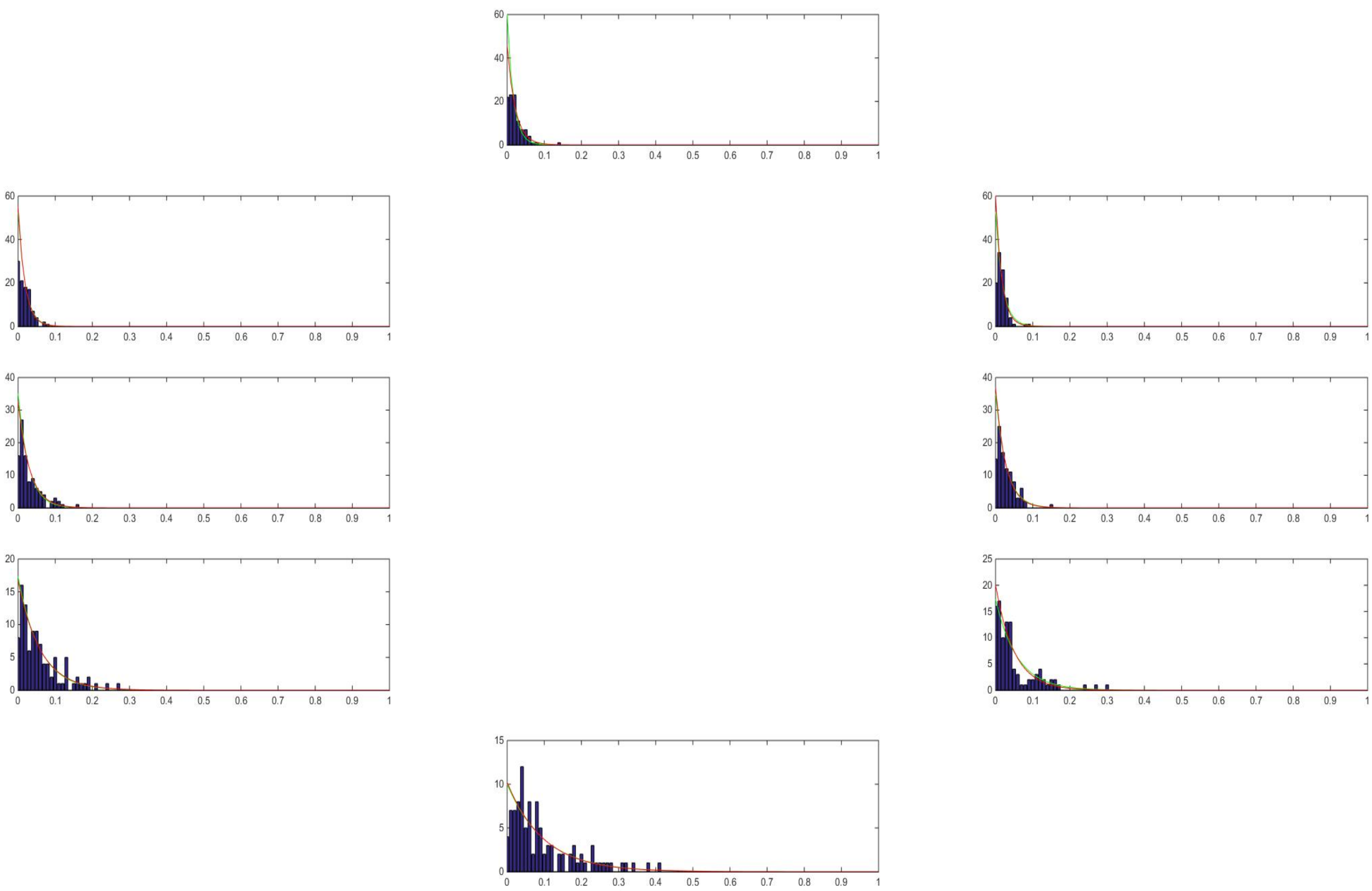
(d) Count distribution



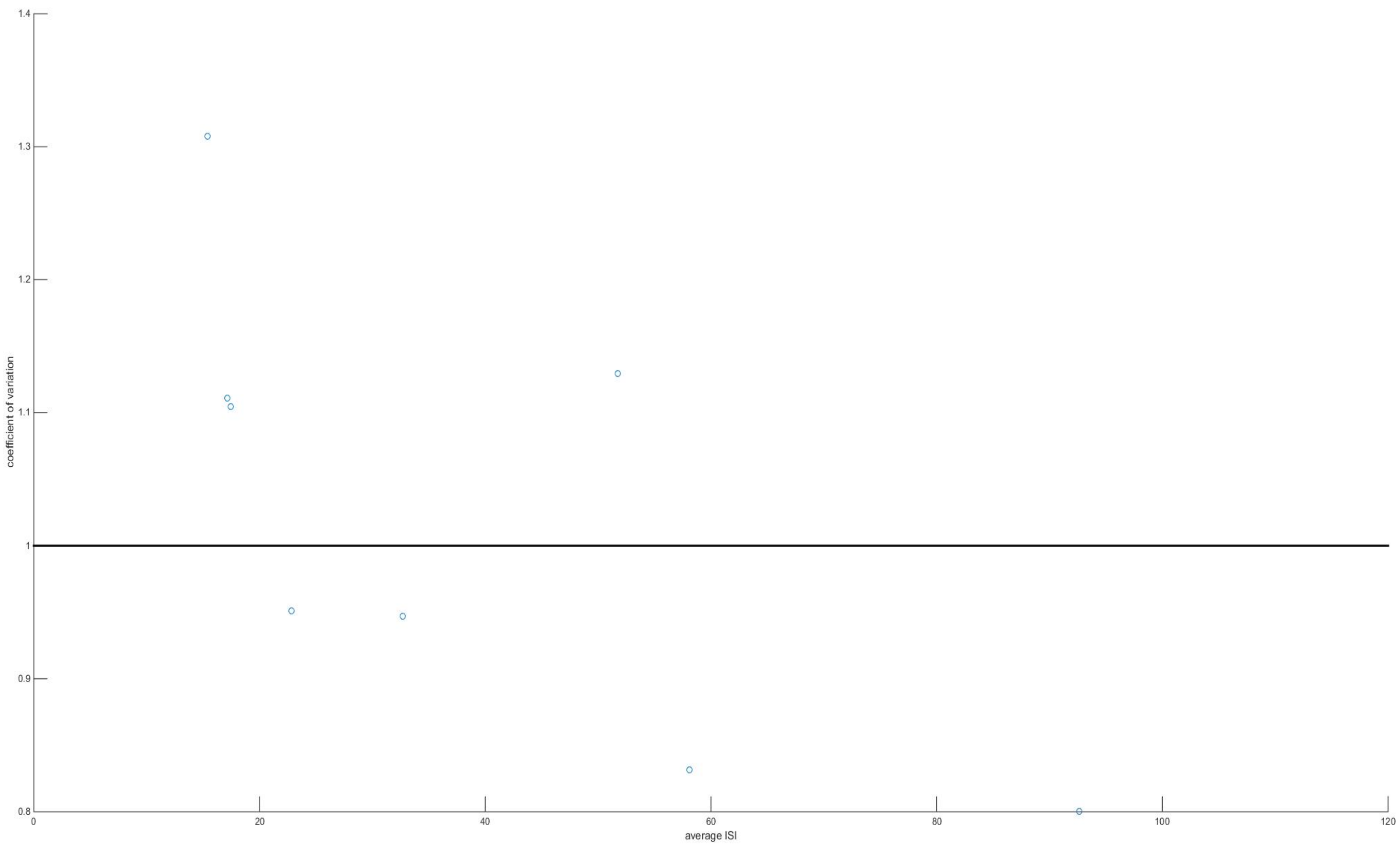
(e) Fano Factor



(f) ISI distribution

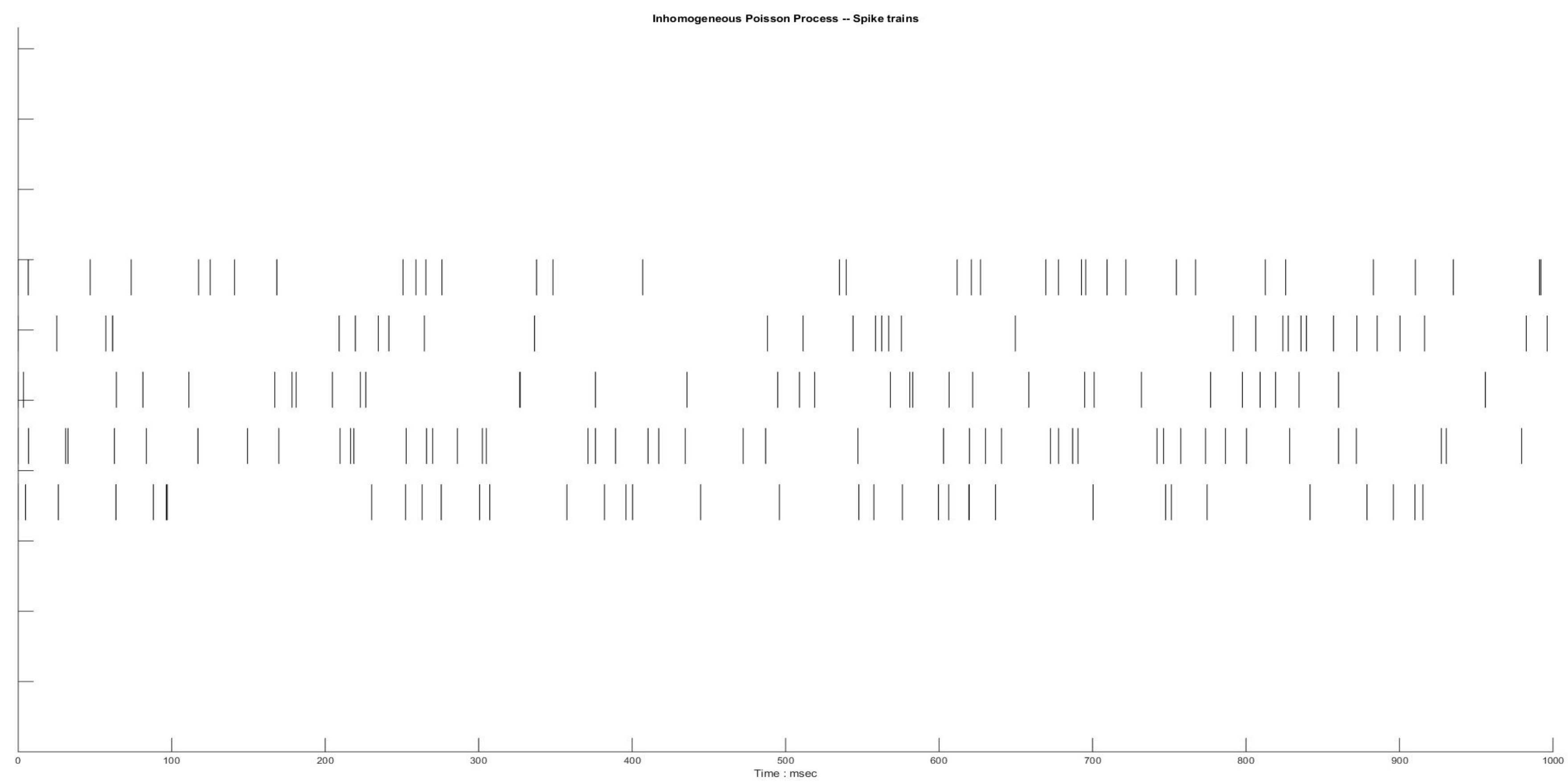


(g) Coefficient of variation

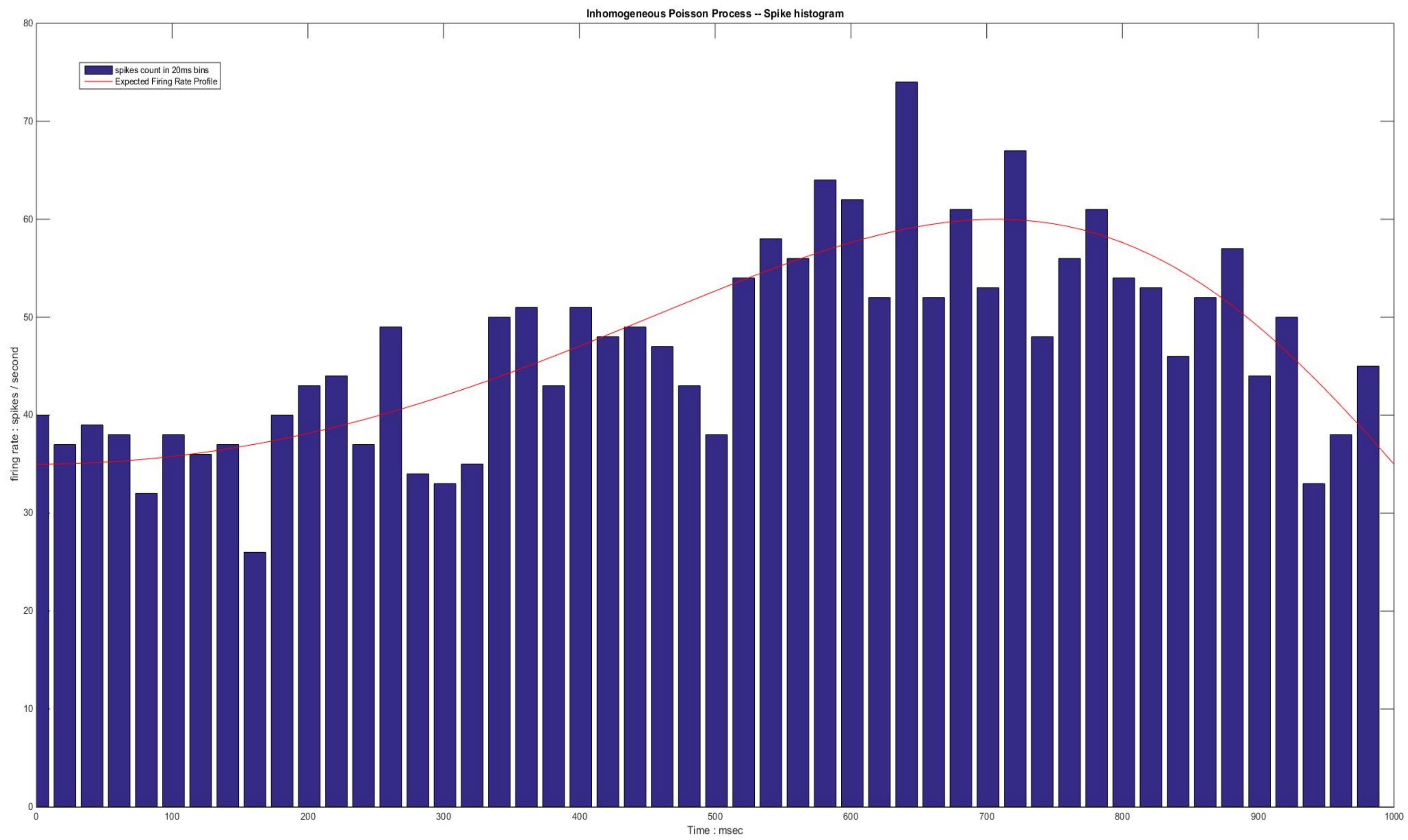


3. Inhomogenous Poisson Process

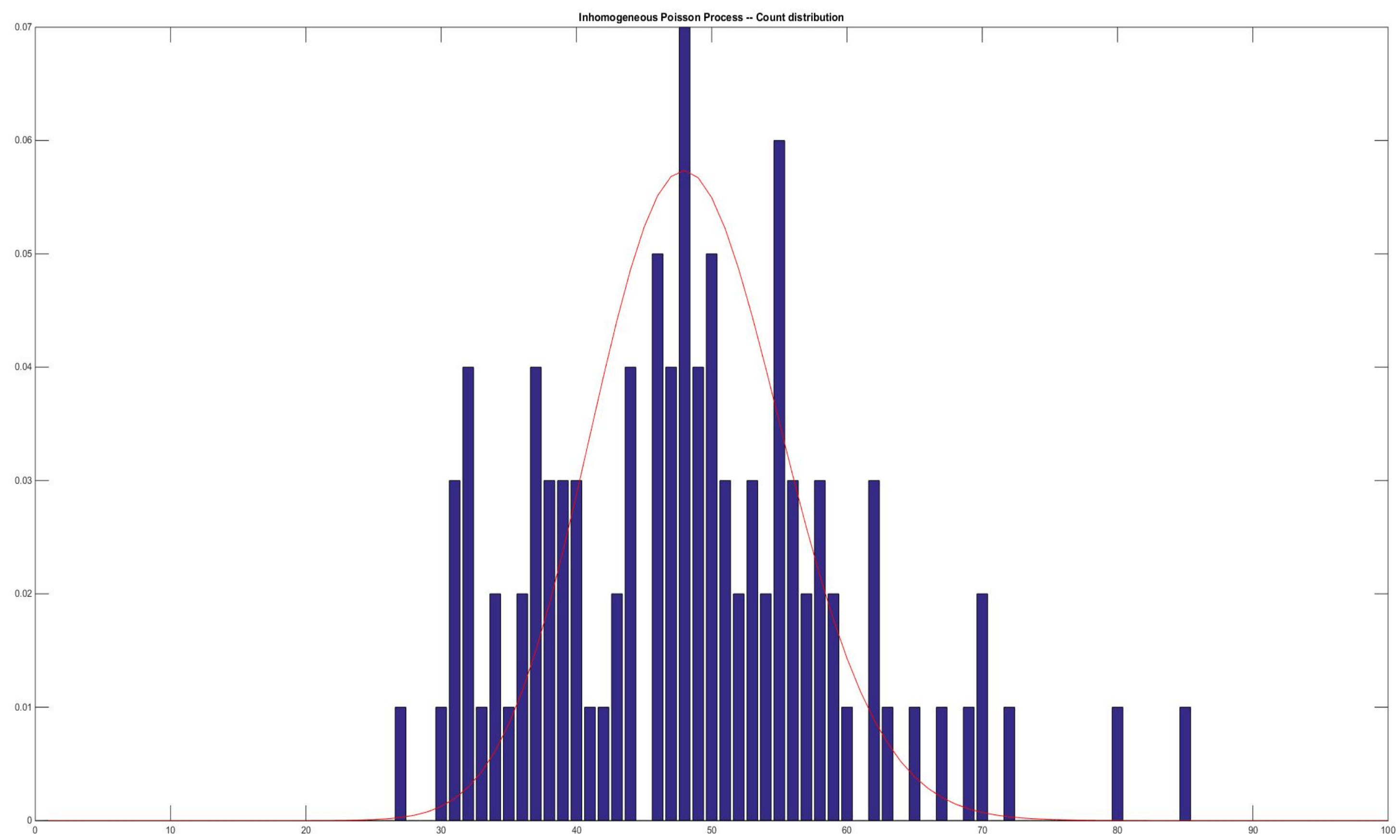
(a) Spike Trains



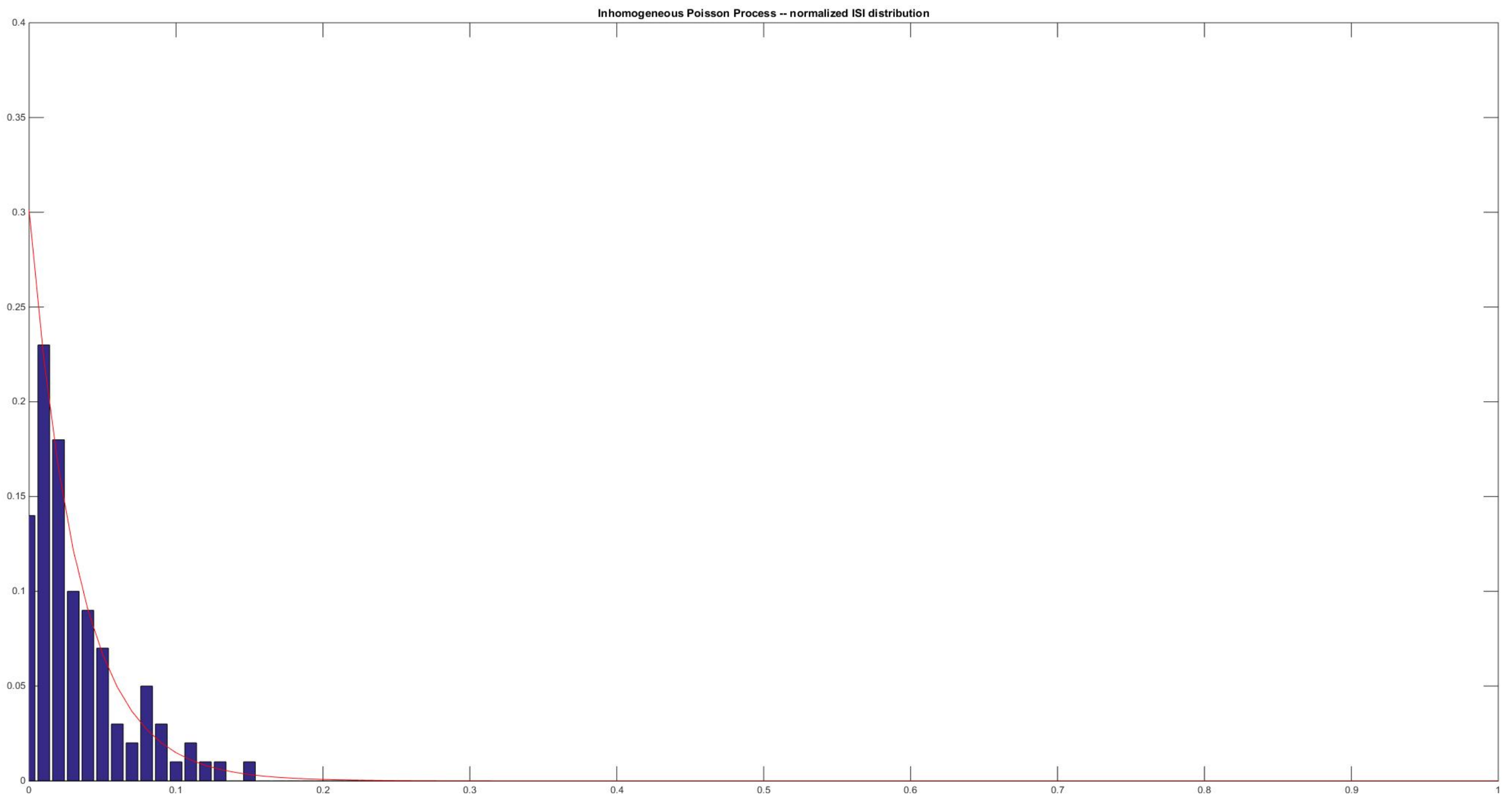
(b) Spike histogram



(c) Count distribution



(d) ISI distribution



4. Real Neural data

(a) Spike trains

(b) Spike histogram

(c) Tuning curve