

Table 3: The other two real datasets come from the baseline. We use the same setting in our experiment ( $B=20$ ) to evaluate the five methods, the results are shown below. The Bee-Dance dataset records the pixel locations in x and y dimensions and angle differences of bee movements. Text language detection was created from a data set containing text from 17 different languages.

	Bee-Dance	Text language
BOCPDMS	0.167	F
NODE	0.372	0.571
Mstats-CPD	0.341	0.394
KL-CPD	0.401	0.532
KSD-CPD	<b>0.474</b>	<b>0.589</b>

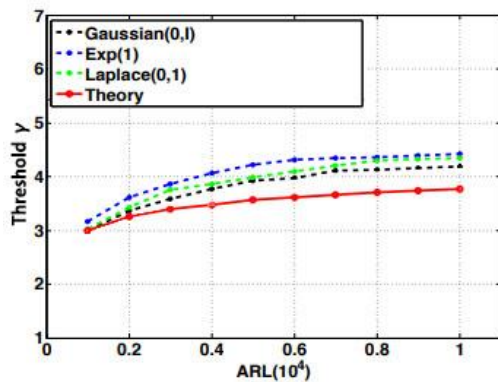


Figure 1: The simulation results are obtained from 5000 direct Monte Carlo trials. Theorem 5.1 shows that  $ARL \sim O(e^{\gamma^2})$ . We validate our theoretical ARL approximation through simulations on time series data (with 10,000 data points) under various null distributions, such as standard normal, exponential, and Laplace using 5,000 Monte Carlo trials. We adjust the threshold  $\gamma$ , run the time series without change point and record the ARL when a false alarm is reported.