**Question 6.1**

*Describe a situation or problem from your job, everyday life, current events, etc., for which a Change Detection model would be appropriate. Applying the CUSUM technique, how would you choose the critical value and the threshold?*

# Here’s one answer.

# Bird flu is a common disease in certain parts of East Asia, Middle East and West Africa. Public health organizations (such as CDC) want to identify a potential outbreak as soon as possible so that action can be taken to stop its spread. CUSUM can be used to monitor the number of cases of this disease, and detect a change when the number of cases rises above a threshold, indicating a possible outbreak.

# Ideally, the CUSUM statistic St should remain smaller than the threshold if an epidemic is not going to occur, and quickly cross the threshold if an epidemic is going to occur. In some uses of CUSUM, a typical choice for threshold T is 5 standard deviations, while C will be half of a standard deviation. But in the case of a potentially-deadly epidemic, those “standard” values are probably too conservative. The cost of a false alarm is much lower than the cost of waiting too long to detect a change. Therefore, to save lives, the values of both T and C should be lower (and can be calibrated based on previous data).