Practice

Code

1. Write R code to monitor the mean of each subgroup with a Shewhart control chart for a datafile called 'data.csv'.

2. Use an approach in R besides 'qcc'.

3. Use the 'bigfish' dataset from the qcc library in R to create a control chart.

Explanation

1. Explain the difference between phase 1 and phase 2 control charting applications in statistical process monitoring.

2. Explain the zero-state ARL.

3. When to use a univariate, multivariate and profile monitoring approach.

Knowledge Creation

1. Create a framework for using statistical process monitoring methods in my company.

2. Generate a template for the DMAIC process for a project.

3. Explain a control chart with a signal on it to my boss.

Learning

Code

1. Explain the following code. (We provide an uncommented code snippet that is modified based on the first research code question)

2. Rewrite the code above using base R only.

3. Rewrite the code below in Python. (We paste the uncommented code from the first research question)

Explanation

How many phases are there in statistical process control charts?

Knowledge Creation

Generate a course syllabus for a statistical process control for undergraduate students. The students have already completed two statistics courses. The course is a 3-credit hour course and is offered for 15 weeks.

Research

Code

1. Calculate the zero-state ARL of an EWMA control chart with smoothing constant 0.1 and control limit factor 3 in the in-control case. The data is normally distributed. Use Monte Carlo sim.

2. Explain this R function for approximating the ARL of a two-sided EWMA. What is the mathematical method underlying the function ewma.arl()?

3. Use the function to get the control limit factor cE for in-control ARL= 500

Explanation

1. Explain the practitioner-to-practitioner variability for setting up a control chart.

2. What is the general principle of a functional control chart?

3. Is the synthetic chart just another runs-rule chart?

Knowledge Creation

1. What are open issues in SPC research?

2. Which methods could be applied for calculating the average run length of a control chart?

3. Is there an explicit or analytical solution for the ARL of a two-sided EWMA control chart for exponentially distributed data?