Individuals and Moving Range Charts – Known Mathematical Model

Data Science for Quality Management: X and Moving Range Charts for Non-Normally Distributed Data

with **Wendy Martin**

Learning objective:

Calculate Control Limits for data that is distributed exponentially

X and MR Charts Non-Normal Distributions

- To generate control limits, we would use the following procedure.
- For 3 standard error limits, we need to find the values associated with the center 99.73% (UNPL and LNPL) of the distribution.

X and MR Charts Non-Normal Distributions

- To accomplish this, we first generate the mean and lowest observed value associated with the data, so that we can obtain an estimate of Omicron from X_L (the minimum value).

X and MR Charts Non-Normal Distributions

```
nqtr(summary.continuous(RFP_Response_Time$Time, stat.min=T),5)
n 75
mean         15.84275
var          79.7072
min          6.76
g3.skewness 1.28236
g3test.p     0.00008
g4.kurtosis 1.72653
g4test.p     0.02277
```

X and MR Charts Non-Normal Distributions

- Next, using the natural tolerance function for the Exponential Low Distribution function in lolcat, obtain the LNPL and UNPL

```
> natural.tolerance.exp.low( )
```

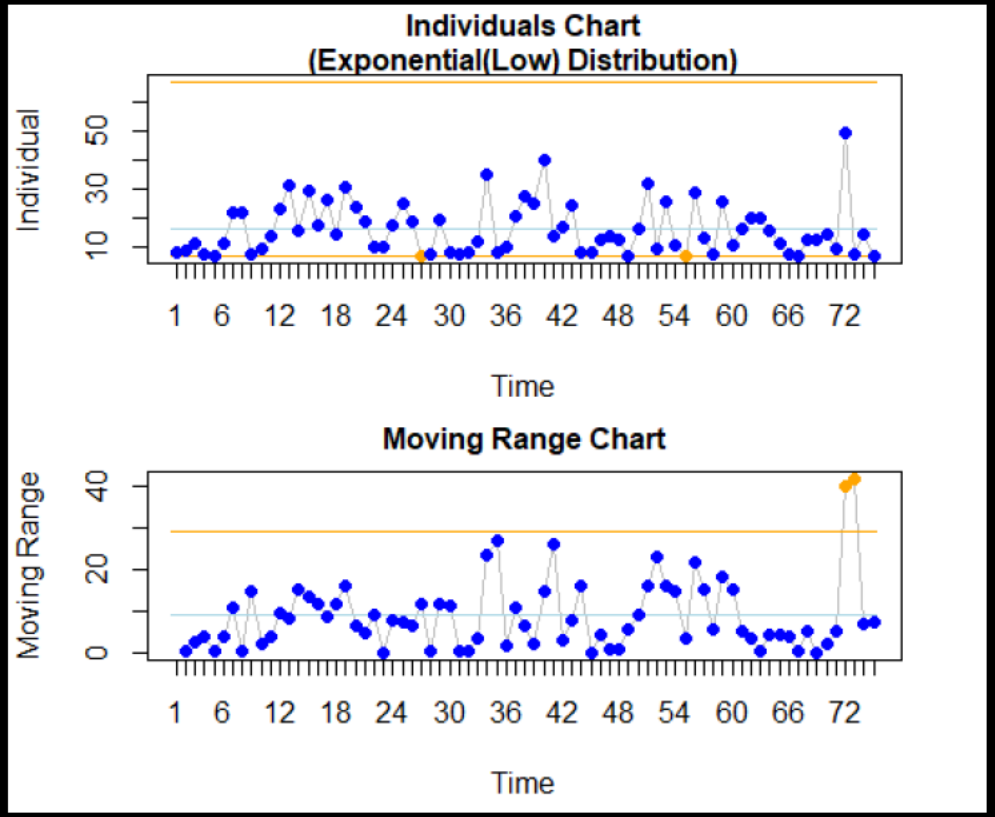
natural.tolerance	lower.limit	upper.limit	lower.area	upper.area
60.00338	6.77227	66.77565	0.00135	0.00135

X and MR Charts Non-Normal Distributions

- Next, using the variables chart for the Exponential Low Distribution function in lolcat, generate the chart

```
spc.chart.variables.individual.and.movingrange.exponential.low.simple(individuals =, low =)
```

X and MR Charts Non-Normal Distributions



Sources

The material used in the PowerPoint presentations associated with this course was drawn from a number of sources. Specifically, much of the content included was adopted or adapted from the following previously-published material:

- Luftig, J. An Introduction to Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1982
- Luftig, J. Advanced Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1984.
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- Littlejohn, R., Ouellette, S., & Petrovich, M. Black Belt Business Improvement Specialist Training, Luftig & Warren International, 2000
- Ouellette, S. Six Sigma Champion Training, ROI Alliance, LLC & Luftig & Warren, International, Southfield, MI 2005