ASQ CRE Prep course

Lesson II. A. 5. c.

Non-Parametric Methods

Reliability & Comparisons

A few more nonparametric techniques

NONPARAMETRIC TECHNIQUES CONTINUED

Kaplan-Meier Reliability Estimator

- **Reliability function estimator (also called survival function)**
- **Conservative approach often used in patient survival studies**

- **Let's say we have 20 units on test for 200 hours.**
- **6 have failed at times 10, 32, 56, 98, 122 and 181 hours**
- **4 were removed at 50, 100, 125, and 150 hours**
- **Remaining 10 units ran till 200 hours.**

K-M Order failures and Count survivors

T_i	Failure Time	N_i
1	10	20
2	32	19
3	56	17
4	98	16
5	122	14
6	181	11

K-M Reliability Function Values

T_i	Failure Time	N_i	$R(T_i)$
1	10	20	0.95
2	32	19	0.947
3	56	17	0.941
4	98	16	0.938
5	122	14	0.929
6	181	11	0.909

$$R(t_1) = \frac{n_1 - 1}{n_1} = \frac{19}{20} = 0.95$$

$$R(t_i) = R(t_{i-1}) \times \frac{n_i - 1}{n_i}$$

Mann-Whitney U Test

- **Ordinal data**
- **Check if two sets of data came from same population**
- **Rank order combined data**
- **Tally rank scores for each group – should be about the same**

Brand	LifeY (months)	Rank
X	2	1.5
X	2	1.5
X	3	3
X	4	4.5
Y	4	4.5
Y	5	6
X	6	7.5
Y	6	7.5
Y	7	8
Y	8	9
Y	10	10

Wilcoxon-Mann-Whitney Rank Sum Test

- **Compare two groups of data**
- **Did they come from two populations with the same mean?**
- **Data combined and sorted in increasing rank order**
- **Use sum of smaller dataset's rank values**

Levene's Test

- **Testing samples to determine if they have the same variance**
- **2 or more data sets**

- **Use F distribution for critical region**

Mood's Median Test

- **Compare medians of two data sets**
- **Hypothesis test structure**
- **Robust to outliers**
- **2 or more data sets**

The Non-Parametric table is you friend

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Lesson II. A. 6.

Sample Size Determination