



Module 6:

Ideas on Non-parametric Statistics

Nonparametric Statistics

- Types of Data distributions
 - Up to now we have talked about Parametric Statistics
 - That is, data that is random and follows a known distribution; for example:
 - The Normal Distribution
 - Exponential Distribution
 - Poisson Distribution
 - Weibel Distribution
 - But what do we do if the Data in our Science Fair Project cannot be proven to follow a known distribution?

Nonparametric Statistics

- Enter Nonparametric or Distribution-free Statistics to the rescue
 - These methods do not depend on:
 - Estimates of the distribution like mean or standard deviation
 - Assumptions about the distribution like it follows the Normal distribution
 - These methods can be used to compare distributions without knowing the underlying distribution itself

Nonparametric Statistics

- Median
 - If your data tested against the Normal distribution fails, indicating that mean and standard deviation are poor estimates for your data, then the use of the Median may show where the center of the distribution of your data lies
 - This will show the point where 50% of the data is above and 50% is below the median value

Median

- To determine the Median:
 - Order the data in ascending or descending order by value
 - Count the number of data points
 - Divide the total number of data points by 2
 - Locate the data point corresponding to that value
 - If it occurs between data points, calculate the average of the two values as the Median
- For an example, see Module 2 slide 5

Nonparametric Statistics

- Mode
 - The data value or values that appear the most often in your data.
 - For discrete measurements, the mode is a whole number (such as 25 or 26 but not 25.7)
 - For continuous measurements, the mode could be 25 or 26 and any value between
 - The Mode is determined from a plot of the data (frequency table) and may be a fractional value

Mode

- To determine the Mode:
 - Arrange the data points in order by value
 - Look for multiple instances of any value
 - The value with the largest number of data points is the Mode
- For an example, see Module 2 Slide 7

Nonparametric Statistics

- For other advanced nonparametric methods consult a text from the bibliography.
- Types of Nonparametric statistics
 - Permutation tests
 - Rank tests
 - Robust regression
 - Rank estimators
 - Other nonparametric procedures