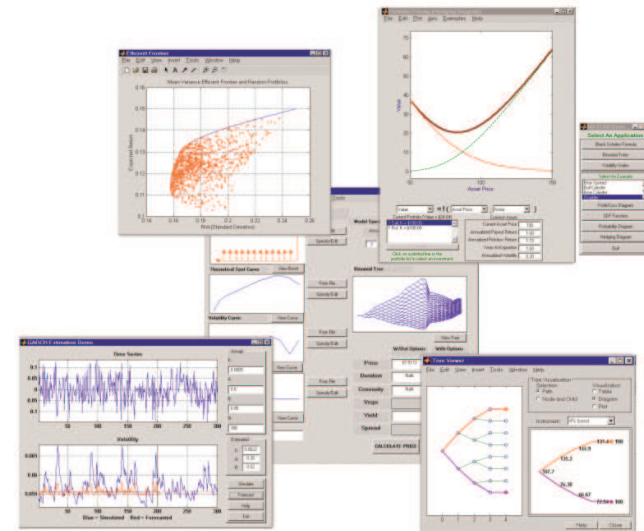


Statistics Tools in MATLAB



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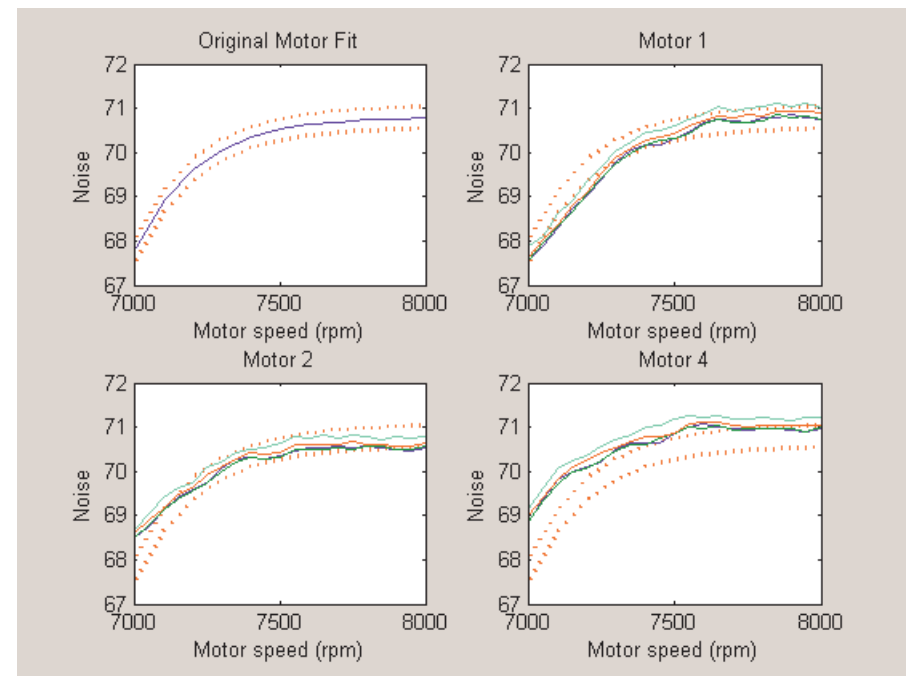
Sofia Mosesson, Sr. Application Engineer

Topics

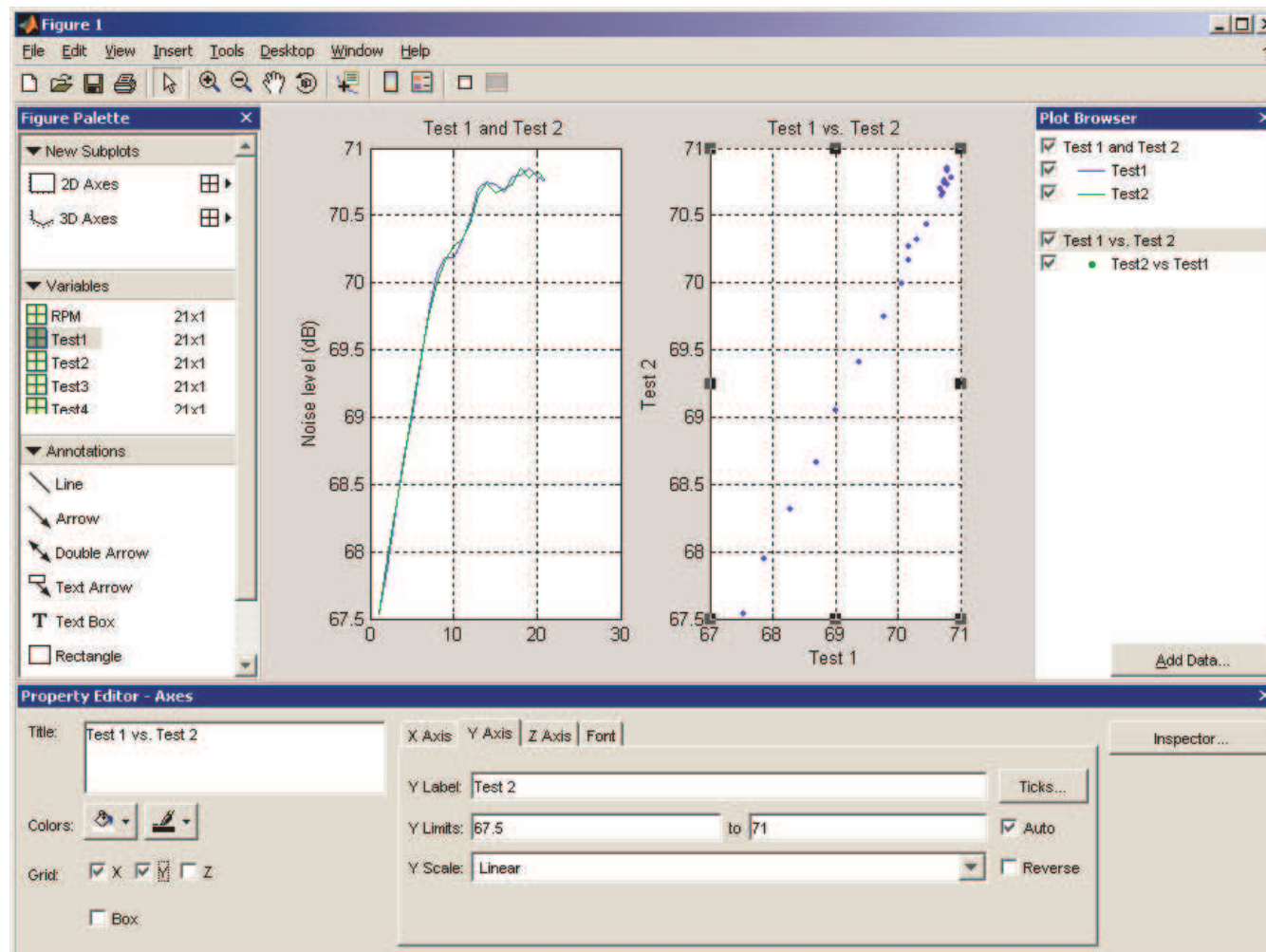
- Introduction example to MATLAB, Statistics Toolbox and Curve Fitting Toolbox
- Overview - What Can You Do with MATLAB and the Statistics Toolbox?

Motor Noise Study

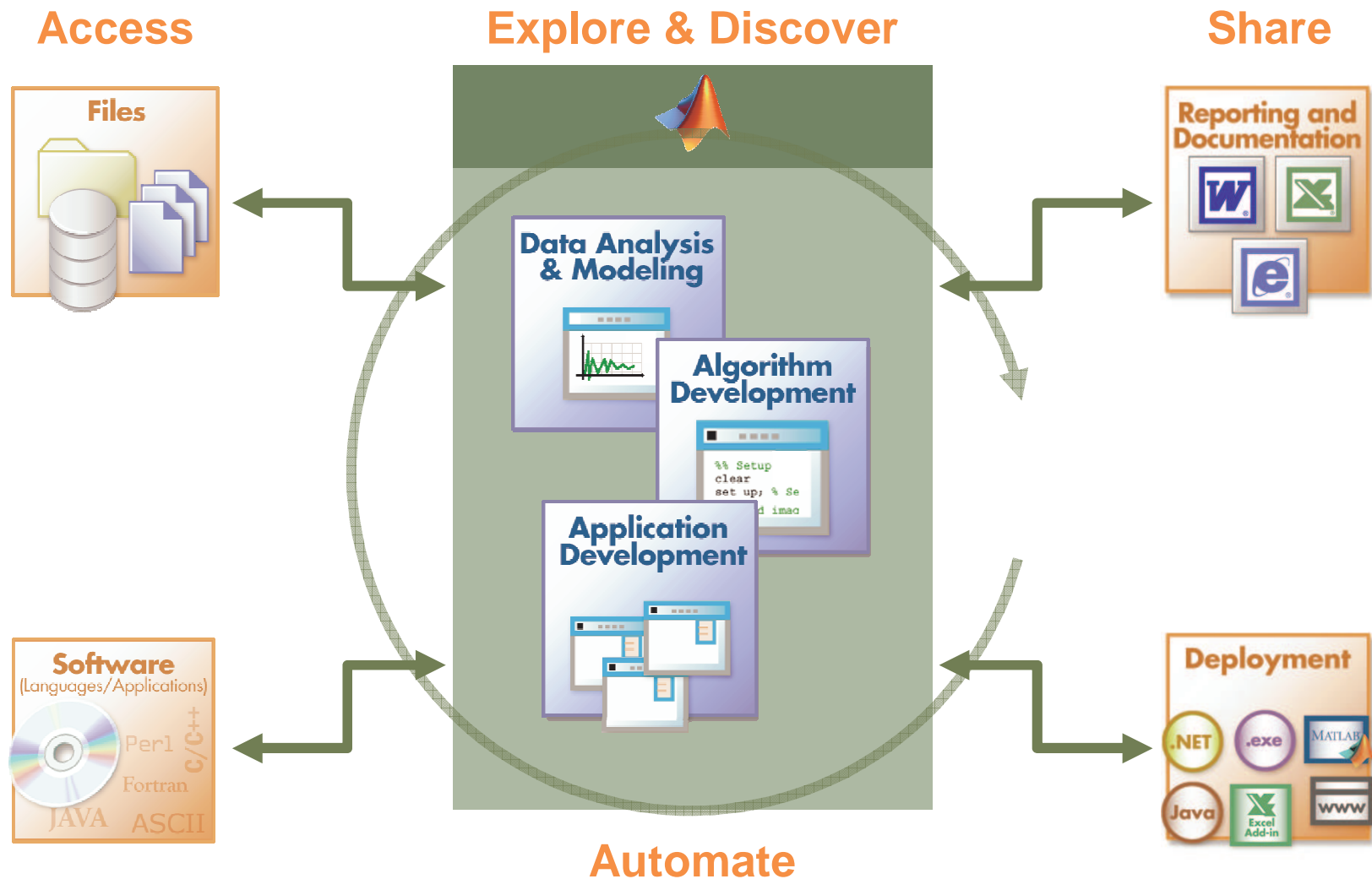
- **Original motor did not meet weight specifications**
- **Analyze four variations of original motor**
- **Evaluate noise data to determine design change impact**
 - Conducted four tests per motor



Demonstration: Data Analysis In MATLAB



Technical Computing Workflow

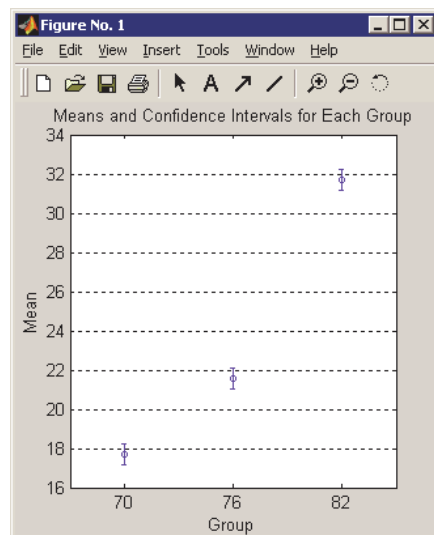


What Can You Do with MATLAB and the Statistics Toolbox?

• Descriptive statistics

Quickly summarize data with the `grpstats` function.

```
>> [Group_Means, Standard_Error, ...  
Counts, Year] = grpstats(MPG, year, 0.6)
```

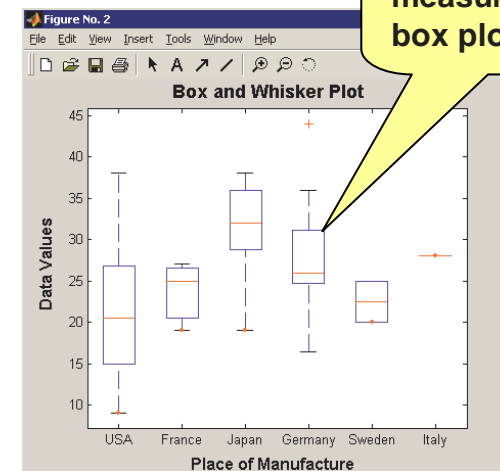


```
Group_Means =  
17.6897  
21.5735  
31.7097
```

```
Standard_Error =  
0.9915  
1.0100  
0.9685
```

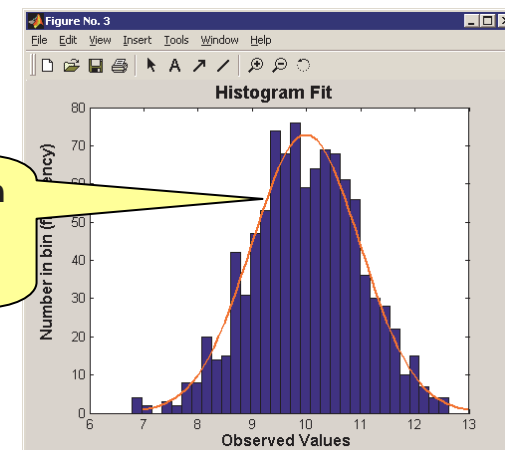
```
Counts =  
29  
34  
31
```

```
Year =  
'70'  
'76'  
'82'
```



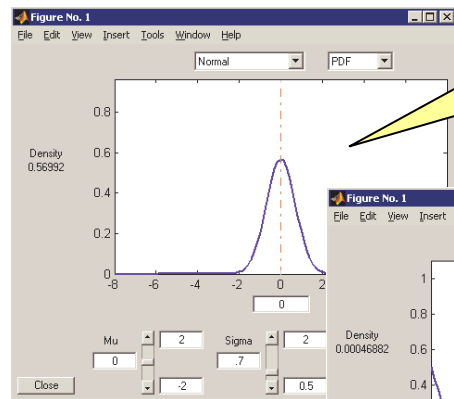
Visualize key measures with box plots.

View trends with histograms and fitting routines.

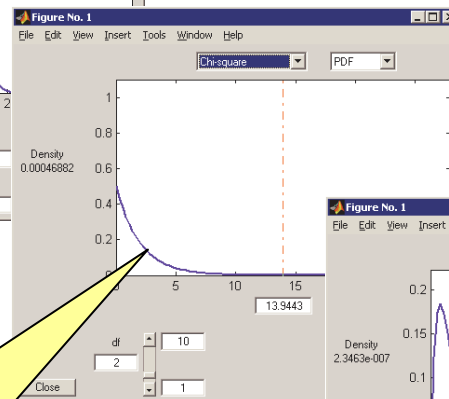


What Can You Do with MATLAB and the Statistics Toolbox?

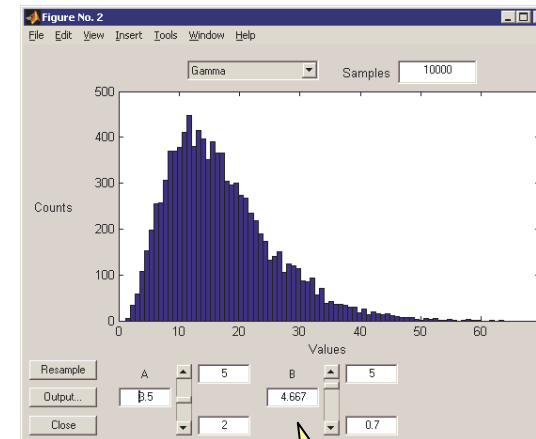
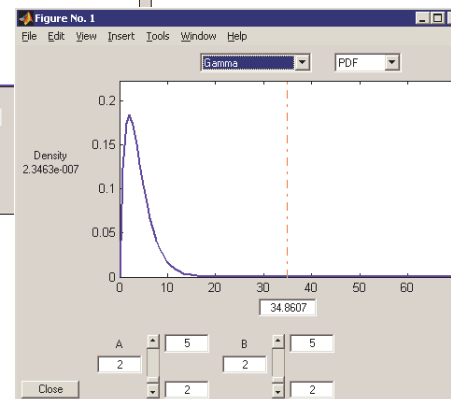
- Probability distributions



Use the **disttool** GUI to explore distributions.



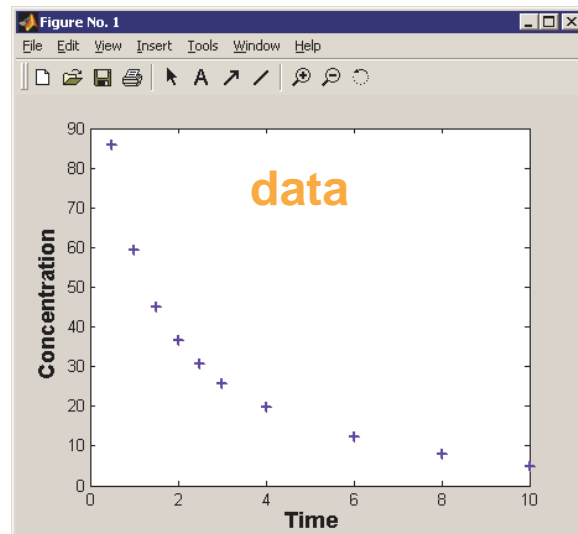
Over 20 distributions are represented.



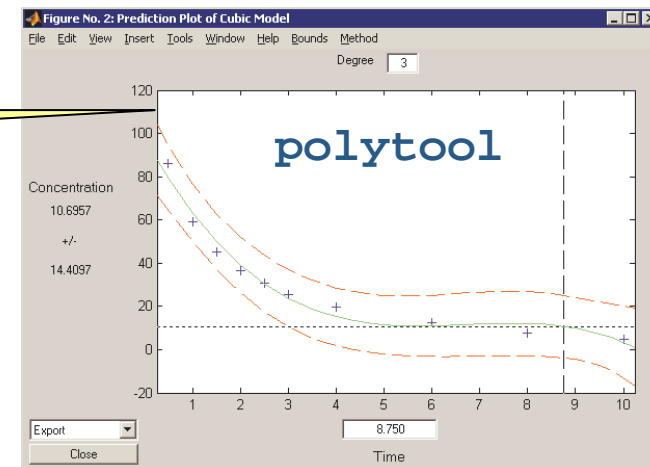
Use the **randtool** GUI to generate data from distributions.

What Can You Do with MATLAB and the Statistics Toolbox?

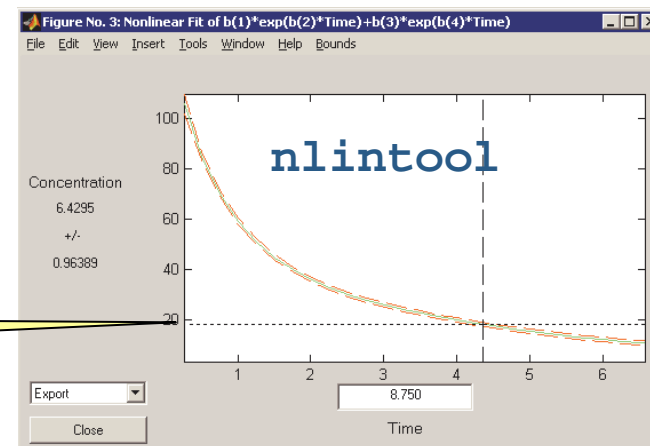
- Data modeling



Linear methods



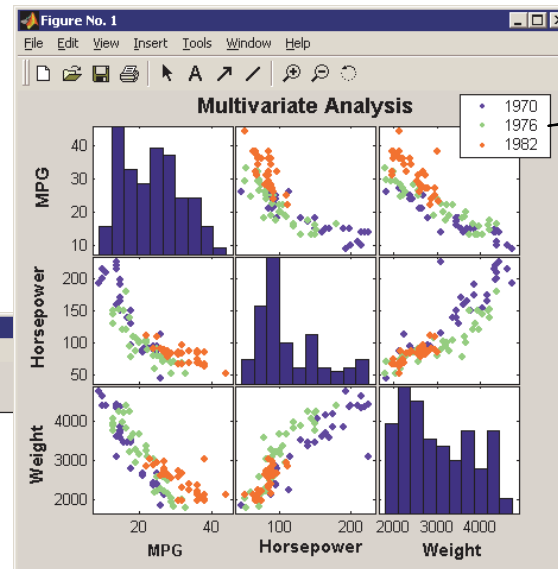
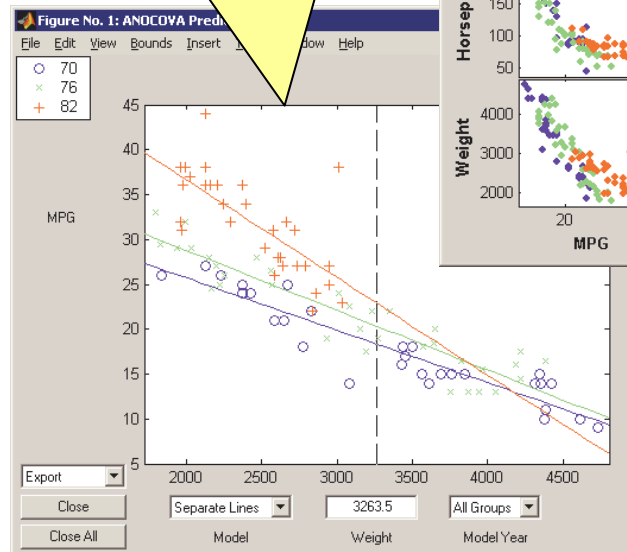
Nonlinear methods



What Can You Do with MATLAB and the Statistics Toolbox?

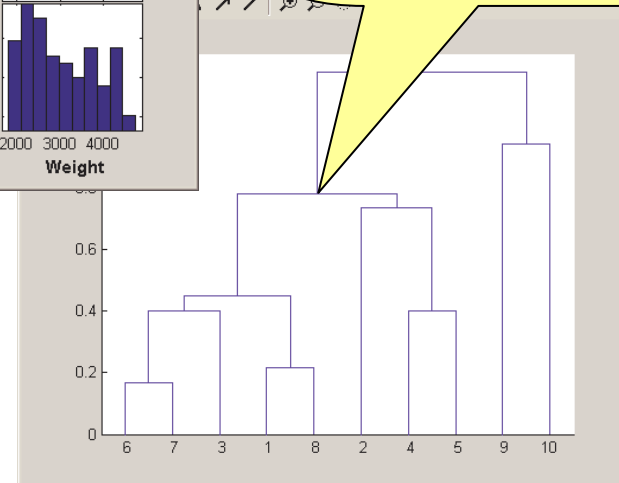
- **Multivariate statistics**

Analysis of variance (ANOVA) and analysis of covariance (ANCOVA) tools let you assess whether data sets from different groups have different characteristics.



Visualize and assess group-to-group differences in a data set.

Perform analysis using a hierarchical tree.

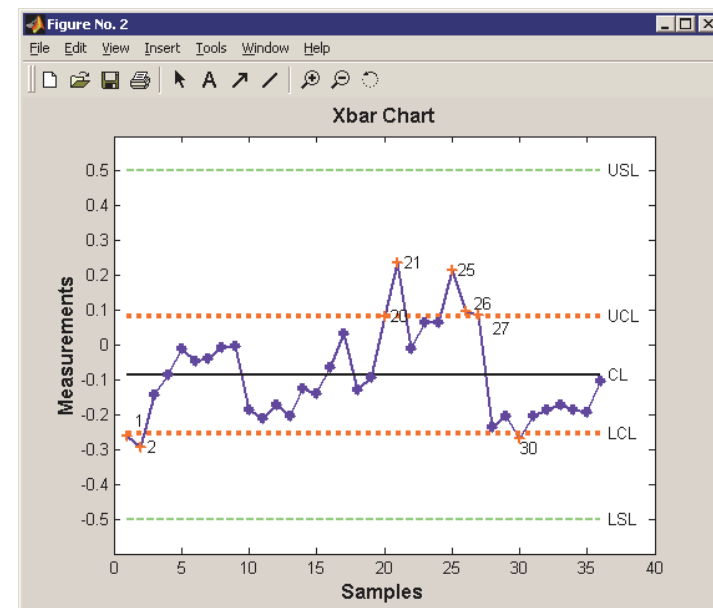


What Can You Do with MATLAB and the Statistics Toolbox?

- Design of experiments
- Statistical process control
- Hypothesis testing

```
>> load gas
>> [h,pval,ci] = ...
ztest(price1/100,1.15,0.04)
h =
    0
pval =
    0.8668
ci =
    1.1340    1.1690
```

Functions for
hypothesis testing



Tools for industrial statistics