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Teaching Statistics with Technology

'If I had only one day to live, I would live it in my statistics class ……..it would seem so much longer.'

-Quote in a university student calendar

The implications in the above quote would no longer apply.
Autograph would intuitively explain concepts and address issues on statistical analysis. The rigorously written texts can now be displayed colourfully, examples can be generated effortlessly motivating classroom discourse which is vital in our present day student-centered approach to teaching.
Autograph will transform an excruciatingly dull class to a lively and interesting one.

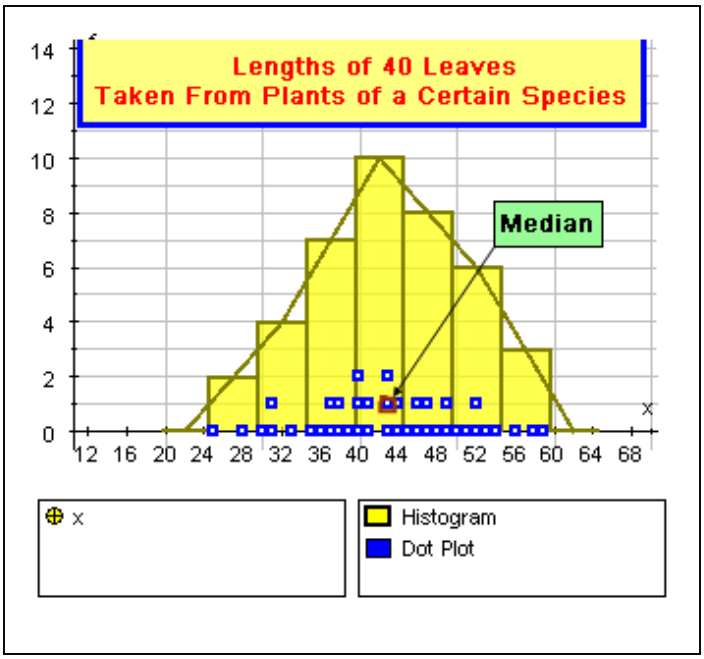
Here are a few examples :

To find the Median from grouped data.

The diagrams below show how
Data from Excel =>Statistics Page in Autograph => Grouped Data
- ⇨ Histogram =>Dot-plot

The lengths,in mm, of 40 leaves taken from plants of a certain species

40	4	47
52	37	46
49	58	40
31	47	33
54	43	39
31	35	47
38	45	46
53	44	40
25	43	33
52	37	39
43	47	47
44	46	46
50	40	
41	33	



The combination of the dot-plot and the Histogram explain clearly the Median formula namely

$$Median = L + \left(\frac{1/2N - F}{f} \right) C$$

With just a click we will be able to show that the median is actually the fraction value of the data(the circled one) of the class median added to the value of the lower boundary of the class.

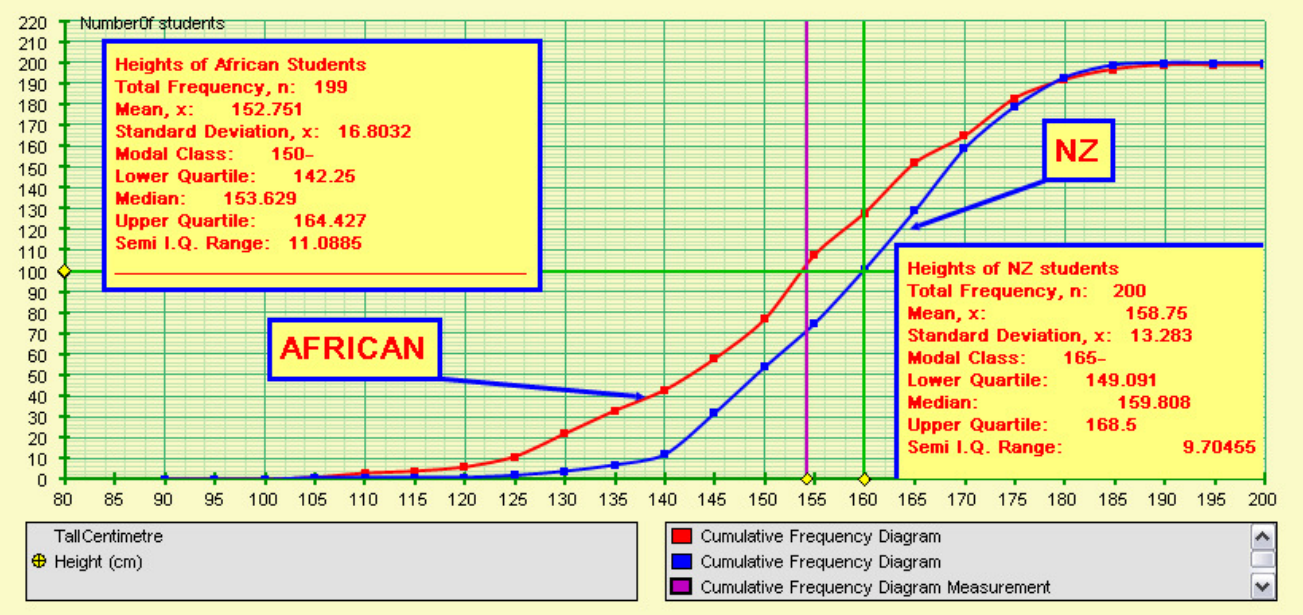
With the Dot-plot displayed further discussion on the spread of the distribution could be engaged in and clusters and outliers could be pointed out.

The chart below shows the heights of African and NZ students.
The statistical analysis displayed was generated by Autograph. This gives us time to have an interesting discourse in the classroom and maybe an eye-opener to ' Who is taller ?'

The other CFD measurements can also be easily displayed:-

- ➔ Lower Quartile
- ➔ Upper Quartile

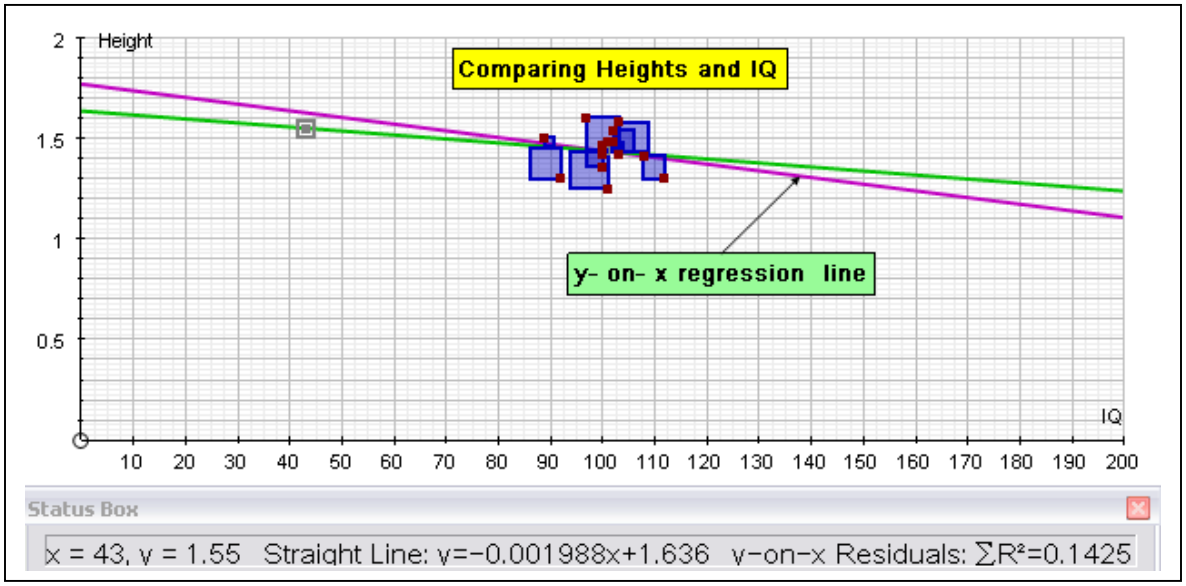
More time can be spent in studying the Information and understanding the formulas of the various CFD measurements and their implications.
Undoubtedly this would be a more interesting session than doing stereo-typed questions from the text-book.



Also Box Plots, Histogram and the Cumulative Frequency Curve can be colourfully combined in one window to show their 'connectedness' making the study a wholesome experience.I shall show this in my presentation.

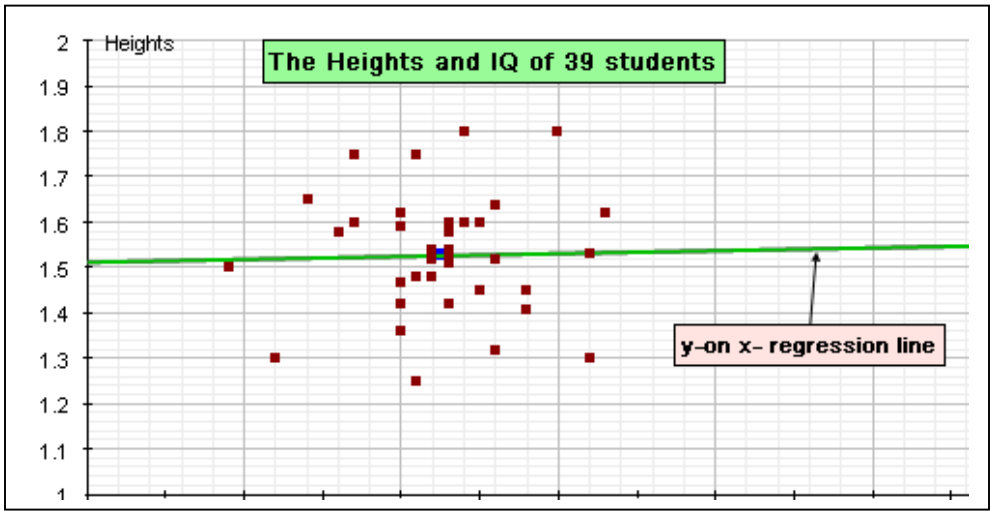
Making Predictions with Linear Regression
According to the Graph there seems to be a downward trend.
Does this mean that you are cleverer if you are shorter ?

(The Green line can be animated to align with the regression line and when that happens the residuals will be the least.
Thus showing that the regression line is the line of best fit for the **given data** .)



Statistical Analysis of the above graph	
x:	IQ
y:	Height (m)
Number of points, n:	15
Mean, x:	100.7
Mean, y:	1.435
Standard Deviation, x:	5.312
Standard Deviation, y:	0.09878
y-on-x Regression Line:	y=-0.003315x+1.769
x-on-y Regression Line:	x=-9.587y+114.4

Below is a graphical representation of a bigger collection of data and the relationship mentioned above does not apply at all. This is a good example where the value of **' n'** can make a big difference to the validity of a true relationship .



Statistical Analysis of the above graph

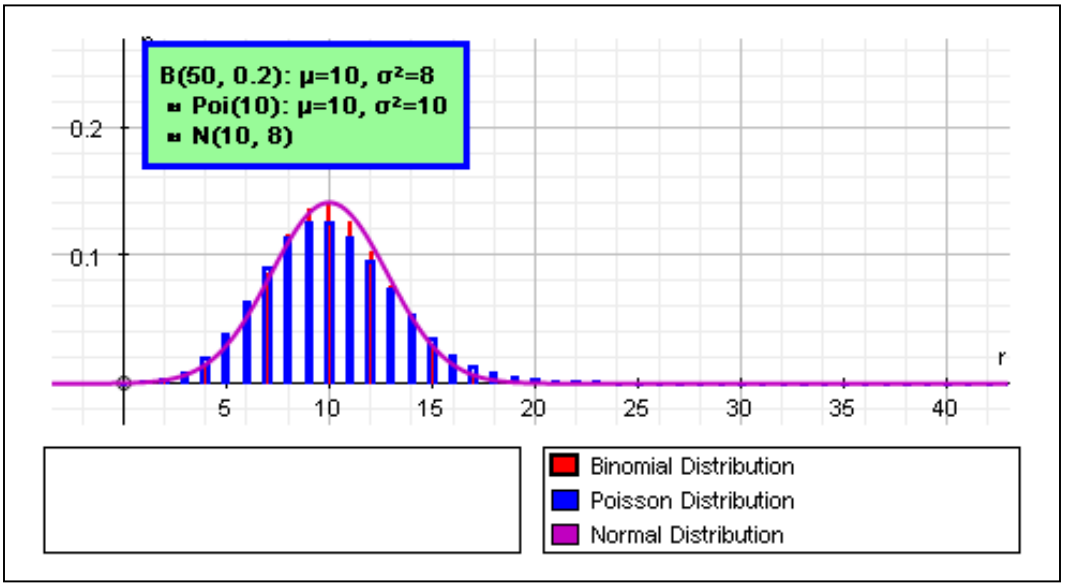
y:	Height (m)
Number of points, n:	39
Mean, x:	102.4
Mean, y:	1.526
Standard Deviation, x:	5.002
Standard Deviation, y:	0.1287
Correlation Coeff, r:	0.02468
y-on-x Regression Line:	y=0.0006353x+1.461
x-on-y Regression Line:	x=0.9588y+101

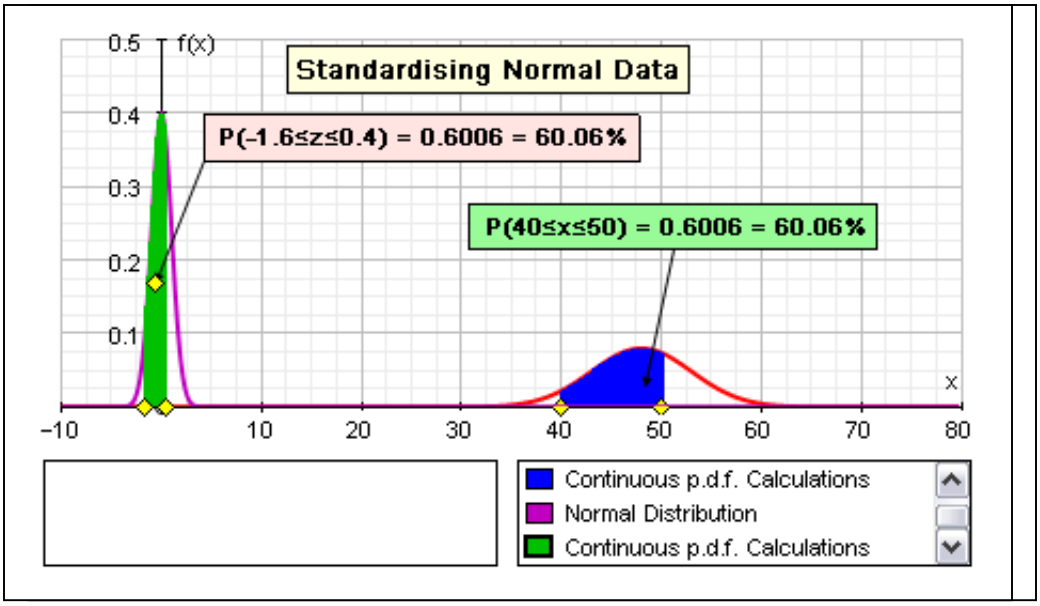
Perhaps the following quote is appropriate at this juncture :

'There was once a young manager named Hess
Whose forecasts were always a mess,
So his boss did appear,
And in voice loud and clear,
Said, "Hess, son, try regression, or consider another career!"

A first Course 5thEdition
Donald H. Sanders

Discrete Probability Distribution is another exercise where Autograph can bring 'Enlightenment'. The animation of the parameters , **n** and **p** will add more meaning to the students' understanding of the effects of n and p on the distribution.
The Binomial can also show a Normal or Poisson approximation as a dependent object. The animation feature will show how the Poisson will fit the Binomial when **p** is very low





When you see the above examples in action I know you will be convinced that technology is a great asset in the teaching of Statistics and the signature software for this is none other than ***Autograph.***

Due to space constraints I will end now with
Some Quotable Quotations Usable In a Probability and Statistics Class

- **"***Lest men suspect your tale untrue ,keep probability in view----------* ***JohnCoy***
- **"***A reasonable probability is the only certainty "……****E.W.Howe***
- *"A thousand probabilities do not make one fact."……****Italian Proverb***
- *"The laws of probability, so true in general,*
  *so fallacious in particular "……****Edward Gibbon***
- *It is probable that many things will happen contrary*
  to probability…… ***.Anonymous***

……Social Science and Mathematics
Oct 1979…pages 486-492

References:

Autograph is inspired by

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