



# Introduction to Machine Learning

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**DSLA COURSE**

ROHIT PADEBETTU

# Machine Learning – What?

What does Machine Learning mean to you?

**"Giving computers the ability to learn without being explicitly programmed."**

– Arthur Samuel

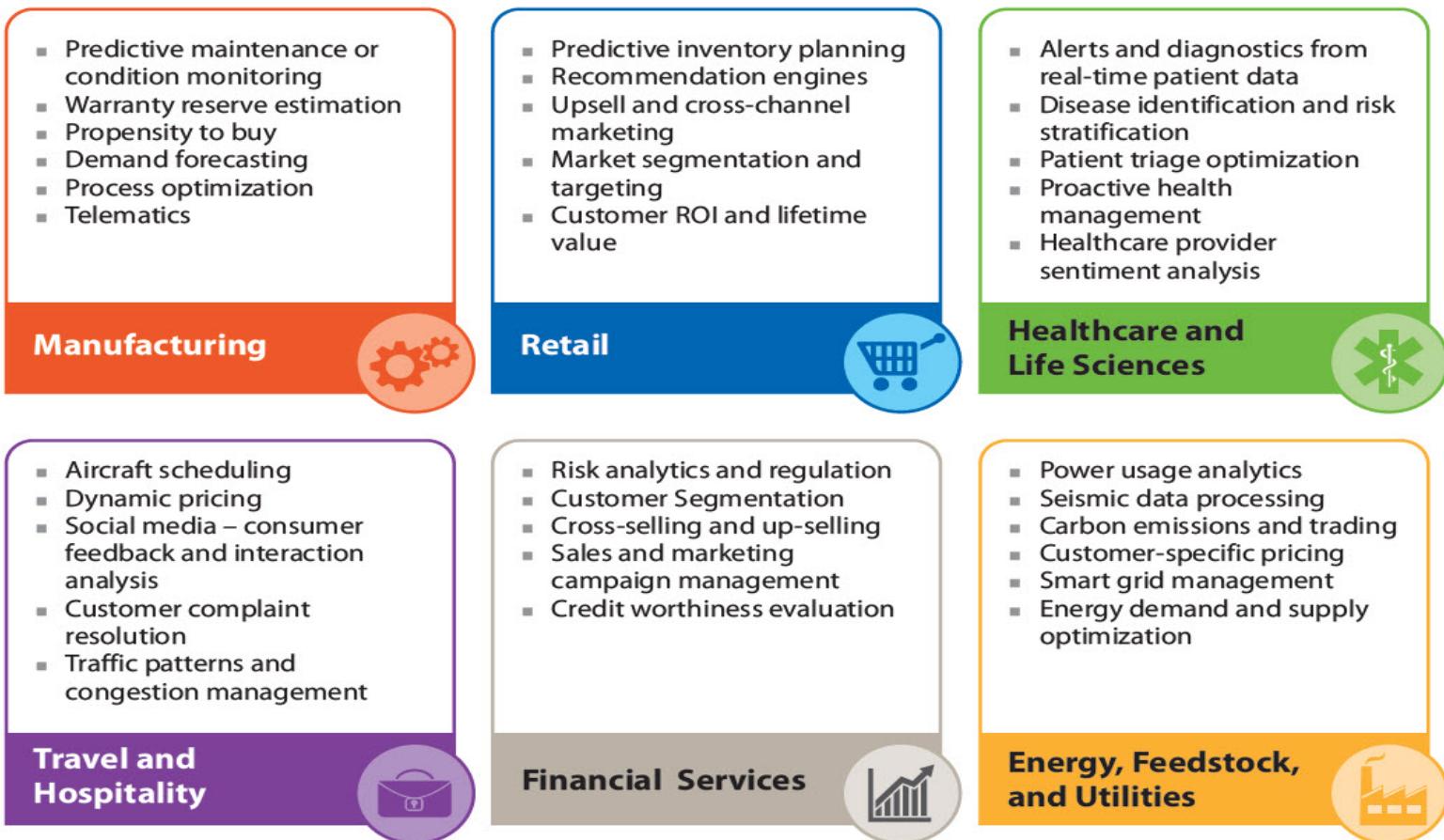
**Traditional Programming**



**Machine Learning**



# Machine Learning – Where?



***"Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young. The greatest thing in life is to keep your mind young."***

– Henry Ford

# Machine Learning – How?

## Supervised Learning

- Classification
- Regression
- Ranking

## Unsupervised Learning

- Clustering
- Association Mining
- Segmentation
- Dimension Reduction

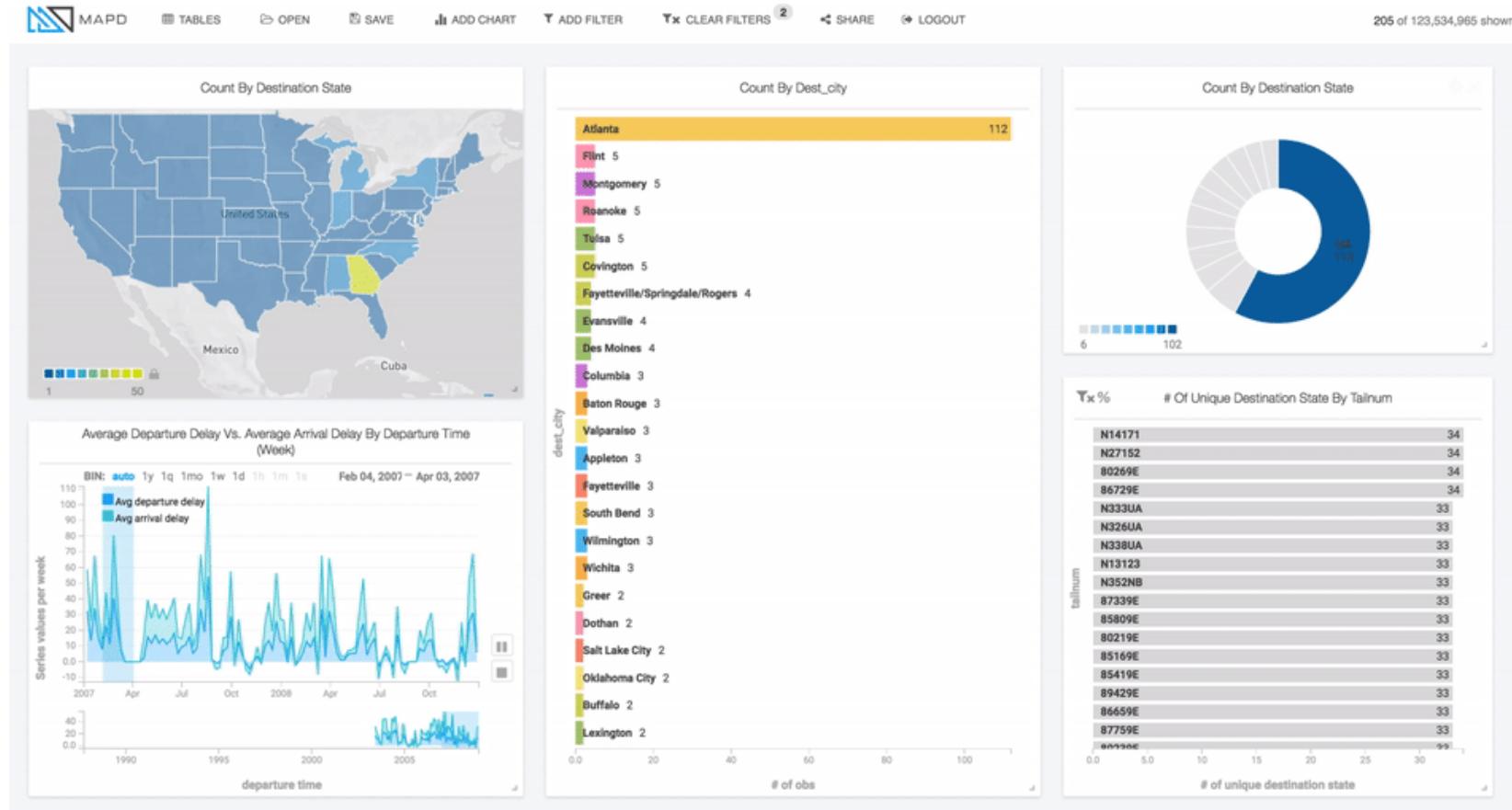
## Reinforcement Learning

- Decision Process
- Reward System
- Recommendation Systems

**“Prediction is difficult, especially about the future”**

- Yogi Berra

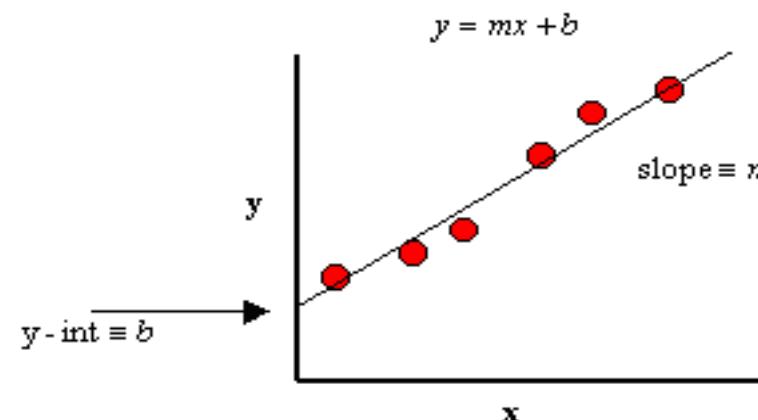
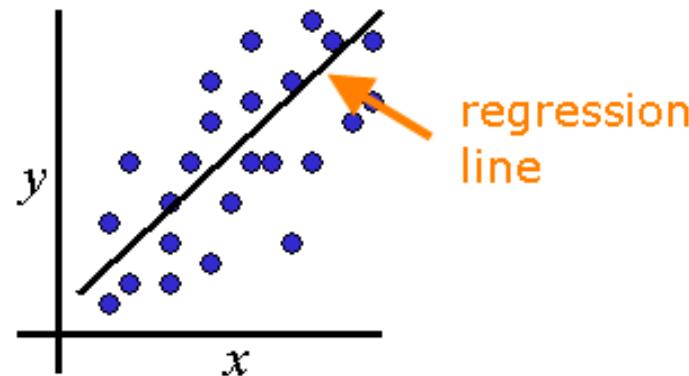
# Machine Learning – Why?



**“Don’t you want to build something like this ? ”**

**- Yours Truly**

# Machine Learning – Linear Regression

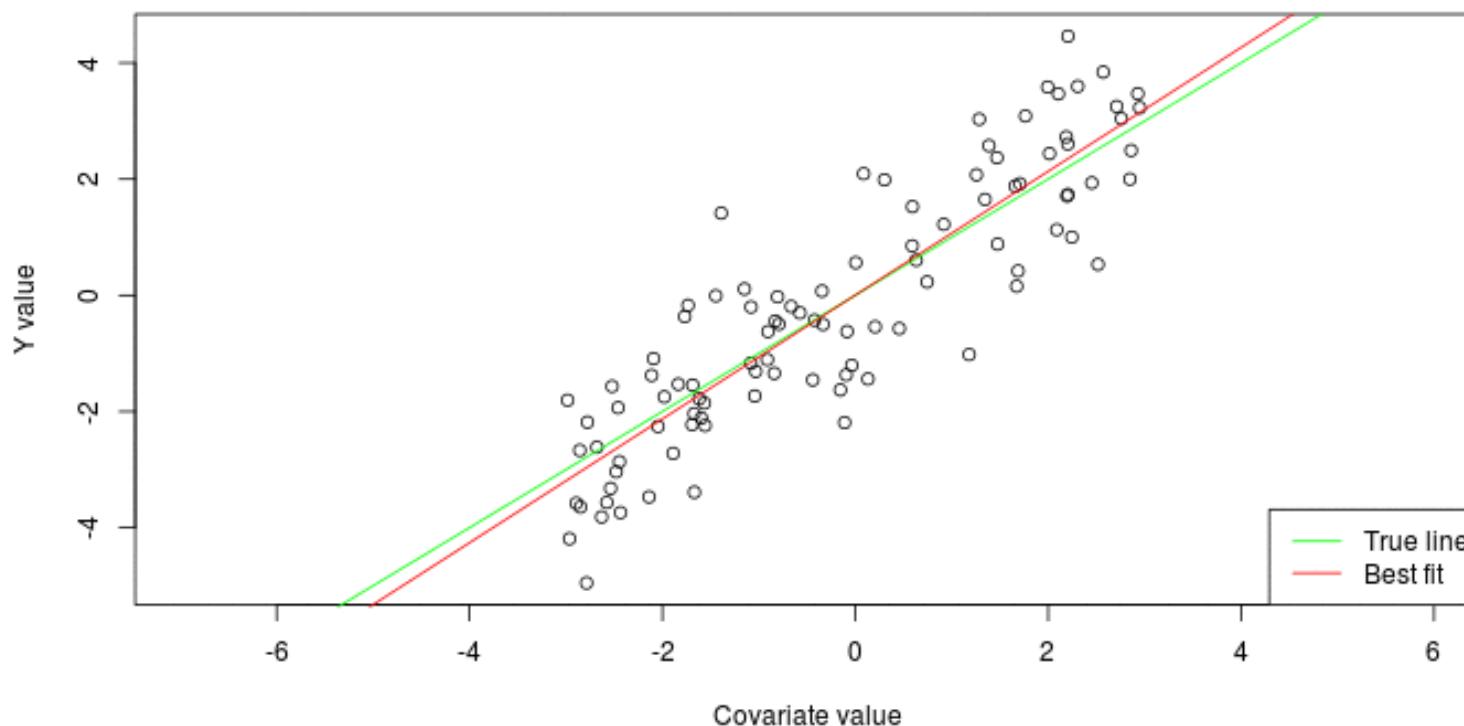


## What is a Linear Regression?

- How many points necessary to draw a line?
- Ex: Time vs Distance problem

# Linear Regression – RMSE

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Best Fit Line  
Minimizes  
**R**oot  
**M**ean  
**S**squared  
**E**rror

# Instructor Case - Motor Trends

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*Can you predict the Mileage of a car given its Weight?*

Model	mpg	cyl	disp	hp	drat	wt	qsec
Mazda RX4	21	6	160	110	3.9	2.62	16.46
Mazda RX4 Wag	21	6	160	110	3.9	2.875	17.02
Datsun 710	22.8	4	108	93	3.85	2.32	18.61
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44
Hornet Sportabout	18.7	8	360	175	3.15	3.44	17.02

# Instructor Case - Motor Trends

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*Step 1 : Arrange the data in this form*

Model	mpg	wt
Mazda RX4	21	2.62
Mazda RX4 Wag	21	2.875
Datsun 710	22.8	2.32
Hornet 4 Drive	21.4	3.215
Hornet Sportabout	18.7	3.44

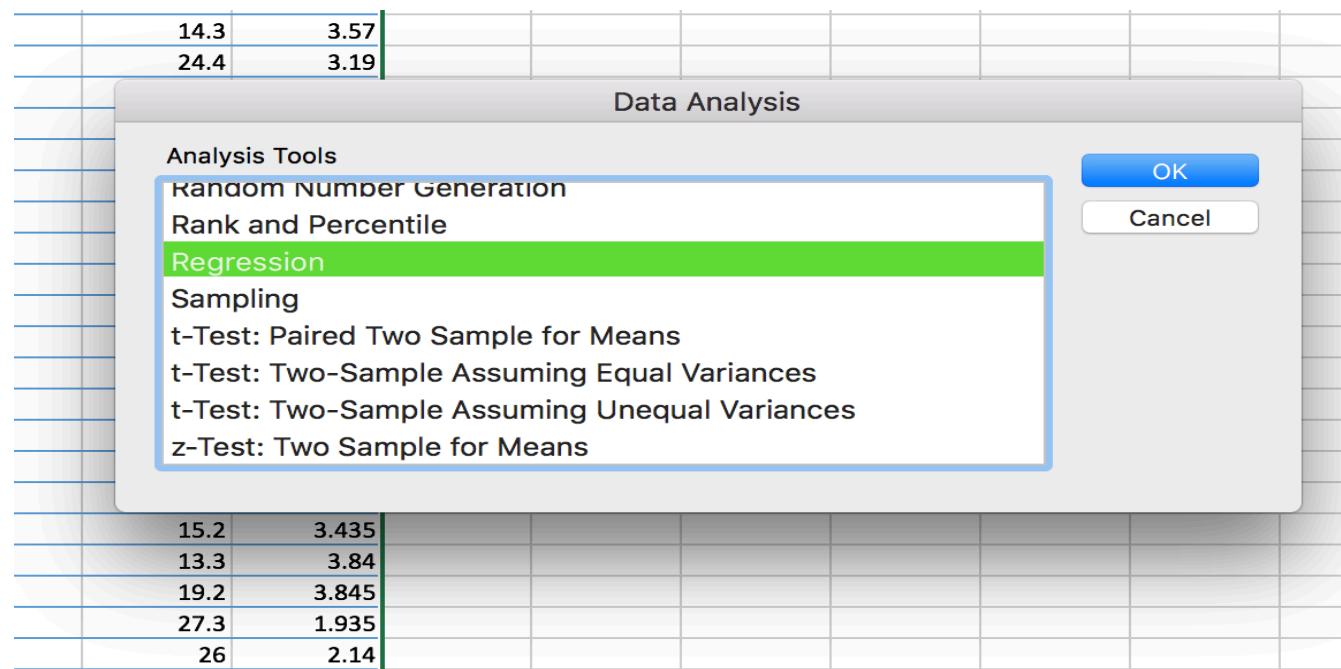
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## *Step 2 : Click Data Analysis in the Data tab*

The screenshot shows the Microsoft Excel ribbon with the 'Data' tab selected. The 'Data' tab has several groups of buttons: 'Connections' (with 'From FileMaker', 'From HTML', 'From Text', 'New Database Query', 'Refresh All', and 'Edit Links'), 'Sort & Filter' (with 'Sort' and 'Advanced' dropdowns), 'Text to Columns', 'Remove Duplicates', 'Data Validation', 'Consolidate', 'What-If Analysis', 'Group', 'Ungroup', 'Subtotal', 'Hide Detail', 'Show Detail', 'Data Analysis' (which is highlighted with a red arrow), and 'Solver'. A red arrow also points from the 'Data Analysis' button to its corresponding section in the ribbon.

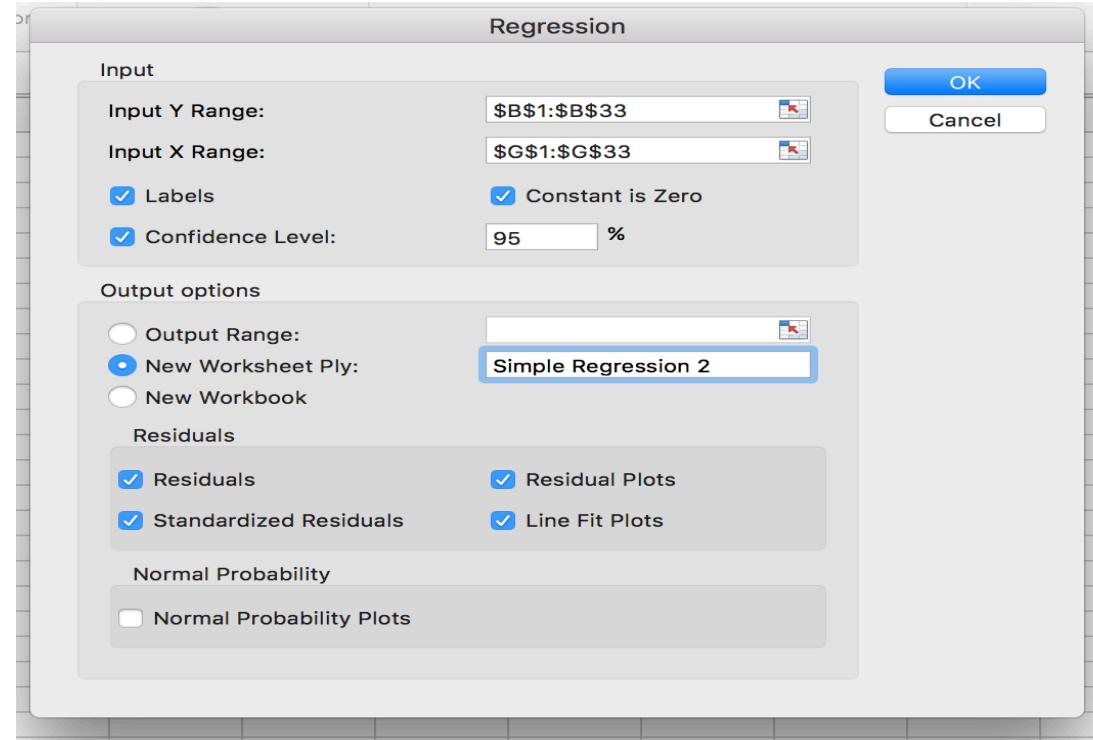
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*Step 3 : Select Regression and Click OK*



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*Step 4 : Configure Inputs and Click OK*



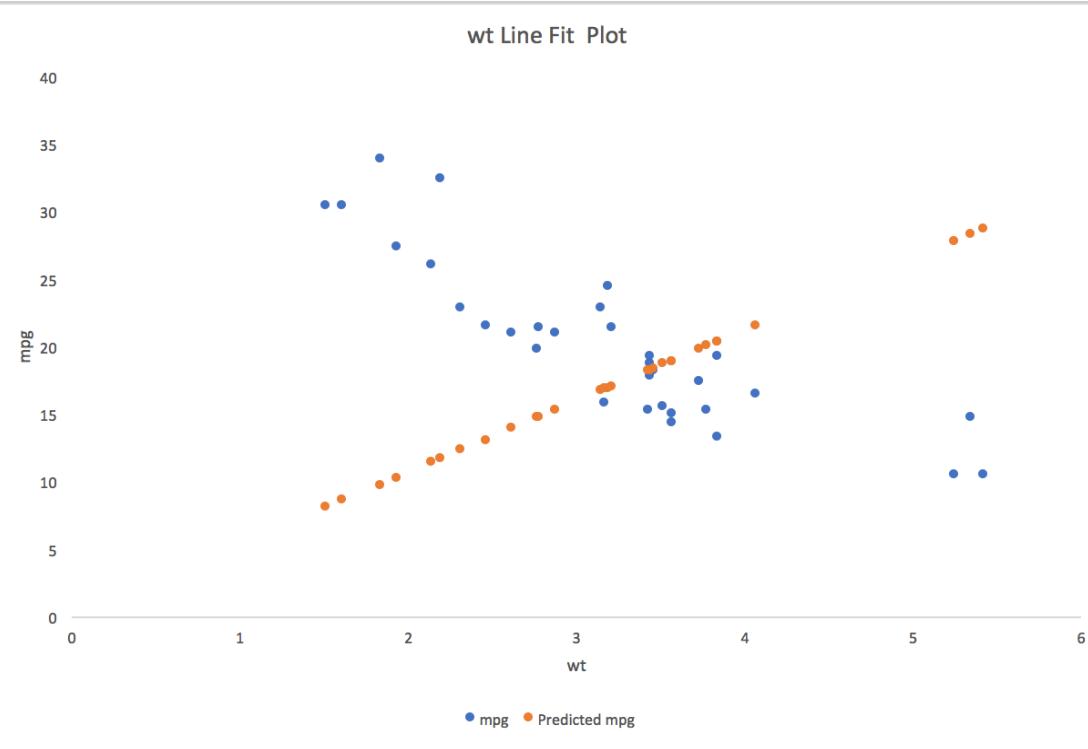
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## *Step 5 : Profit!*

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.848327982					
R Square	0.719660365					
Adjusted R Square	0.687402301					
Standard Error	11.26887815					
Observations	32					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	10105.69394	10105.69394	79.58015404	6.09652E-10	
Residual	31	3936.616057	126.9876147			
Total	32	14042.31				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A
wt	5.291624101	0.593180134	8.920770933	4.55314E-10	4.081825241	6.501422961

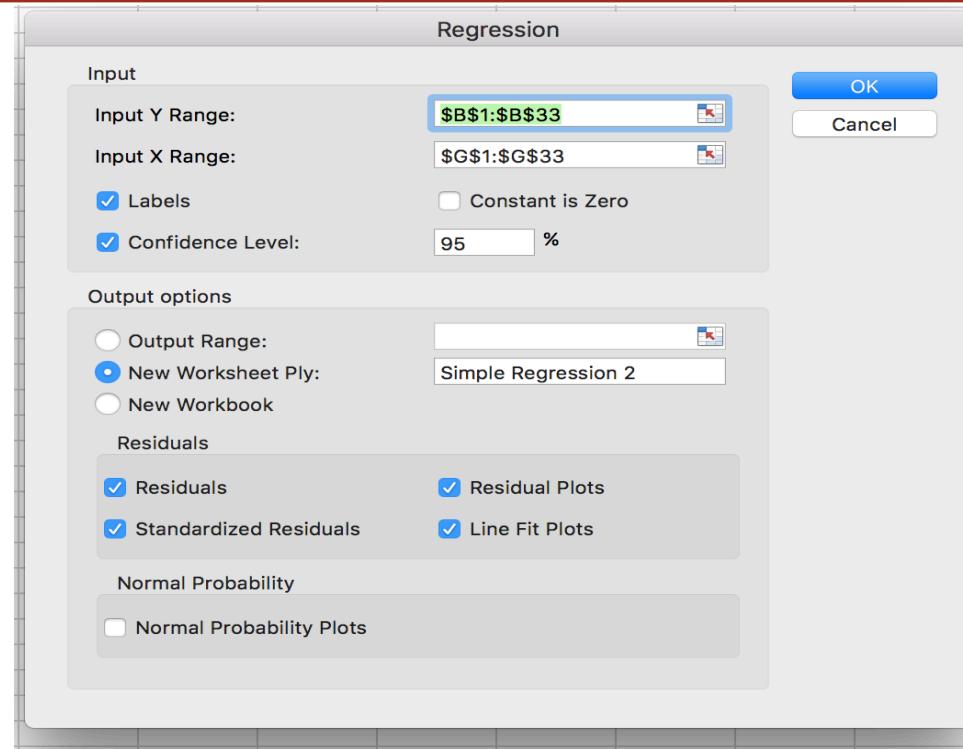
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*Step 6 : Visualize*



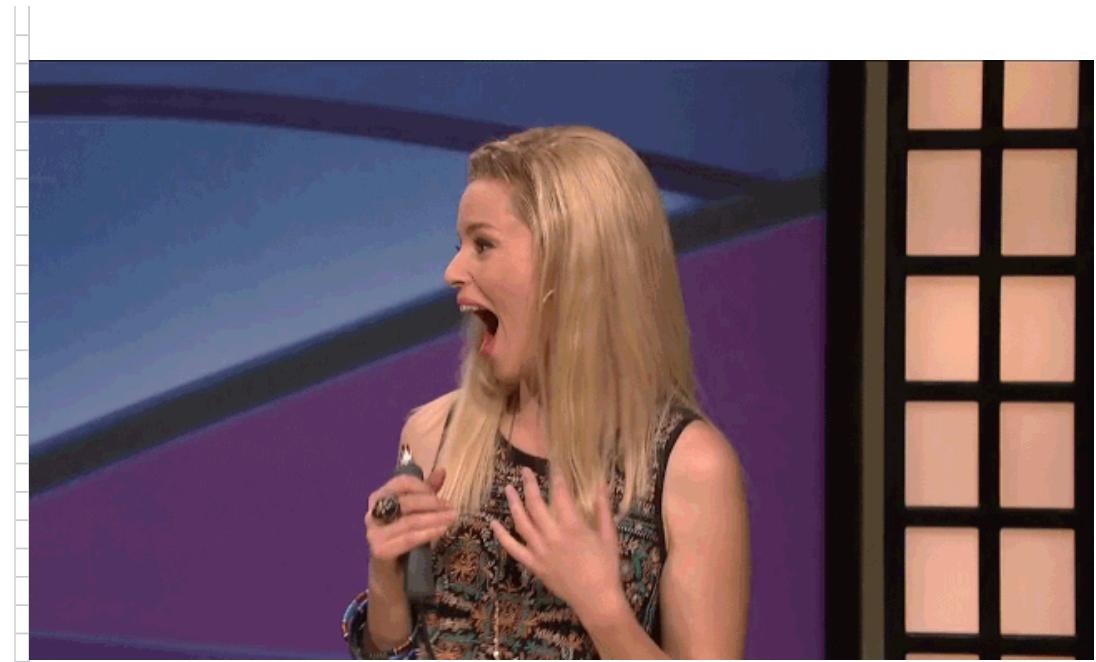
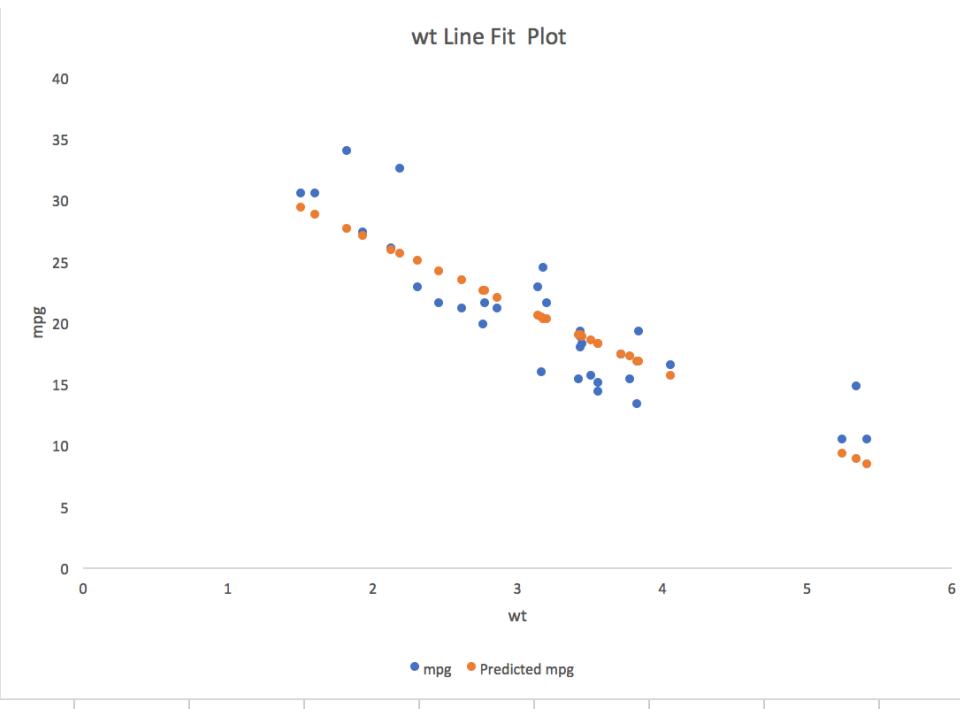
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*Step 7 : Time to make some changes!*



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*Step 8 : Visualize Again !*



# Instructor Case - Motor Trends

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## *Conclusion*

$$\text{Mileage} \approx 37.28 - 5.34 * (\text{Weight})$$

*Gas Mileage of a car is expected to decrease if Weight of the car increases !*

# Instructor Case - Motor Trends

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*Moral*

***“It is through science that we prove, but through intuition that we discover”***

- Henri Poincare  
(French Mathematician)

# Machine Learning

