Smartphones Prices

Excel Portfolio

Clean data

1. Create a backup of your data
   Copy new worksheet

2. Remove duplicates
   Data -> Data Tools -> Remove duplicates

Clean data

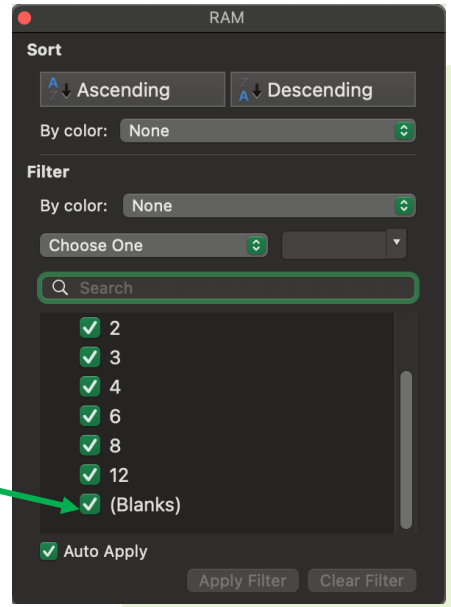
Model	RAM	Storage
C55	8	256
Galaxy M23	4	128
Moto G13	4	128
Redmi Note 11S	6	128
Phone (2)	12	512
Moto E32s	4	64
Phone (2)	12	256
9 Pro	8	128
Galaxy M23	4	128
Redmi Note 12	8	256
M4	6	128
C31	4	64
C55	8	256
Redmi Note 12	8	256
Redmi Note 12	8	256
Redmi Note 12	4	128
iPhone 14		128
Redmi Note 12	8	256
Galaxy M13	4	64
Redmi 10C	4	64
Narzo 50i	3	32
11 Pro	8	256
X5 Pro	8	256
Redmi Note 11	4	128
C53	6	128
iPhone 14		256
Moto E20	2	32
10 AMOLED	8	128
Galaxy M53	8	128
10 AMOLED	8	128
C53	6	128
iPhone 14		128
11 Pro	12	512

3. Handle missing data

Use filters to identify missing values in each column.

Of the pictures revealed missing values in the RAM column, with a pattern occur for iPhone and Samsung brands.

replace missing values with actual data by filtering for each brand separately.



Pivot Table and Visualization

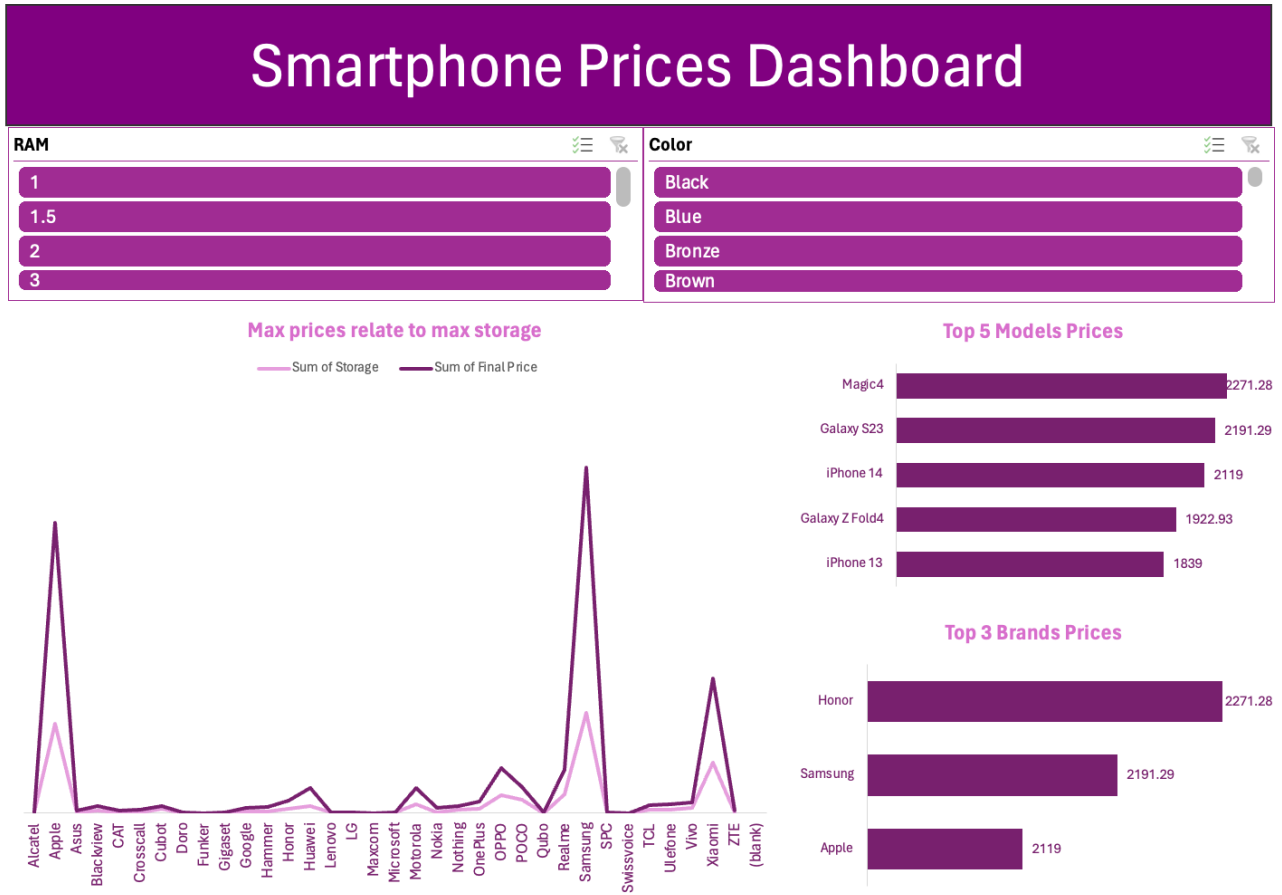
1. Identifying What We Want to Know
   - Question 1: Top 3 Brands by Price.
   - Question 2: Top 5 Models by Price.
   - Question 3: Relationship Between Storage and Price for Each Brand.

2. Pivot table
   - Summarize data and created chart.

Pivot Table and Visualization

3. Create Interactive Dashboard

   One page summary



Correlation and Linear Regression

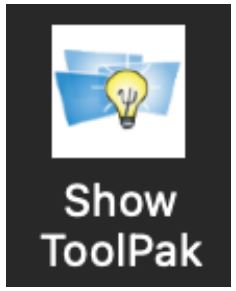
1. XLOOKUP Function

   Select columns to new sheet -> RAM, Storage -> Final Price

Smartphone	RAM	Storage	Final Price		
Realme C55	8	256	231.6		
Samsung Ga	4	128	279		
Motorola Mo	=XLOOKUP(A4,Data_vis!A3:A1778,Data_vis!D3:D1778,,0)				
Xiaomi Redm	6	128	279.99		
Nothing Phor	12	512	799		

Correlation and Linear Regression

2. Correlation

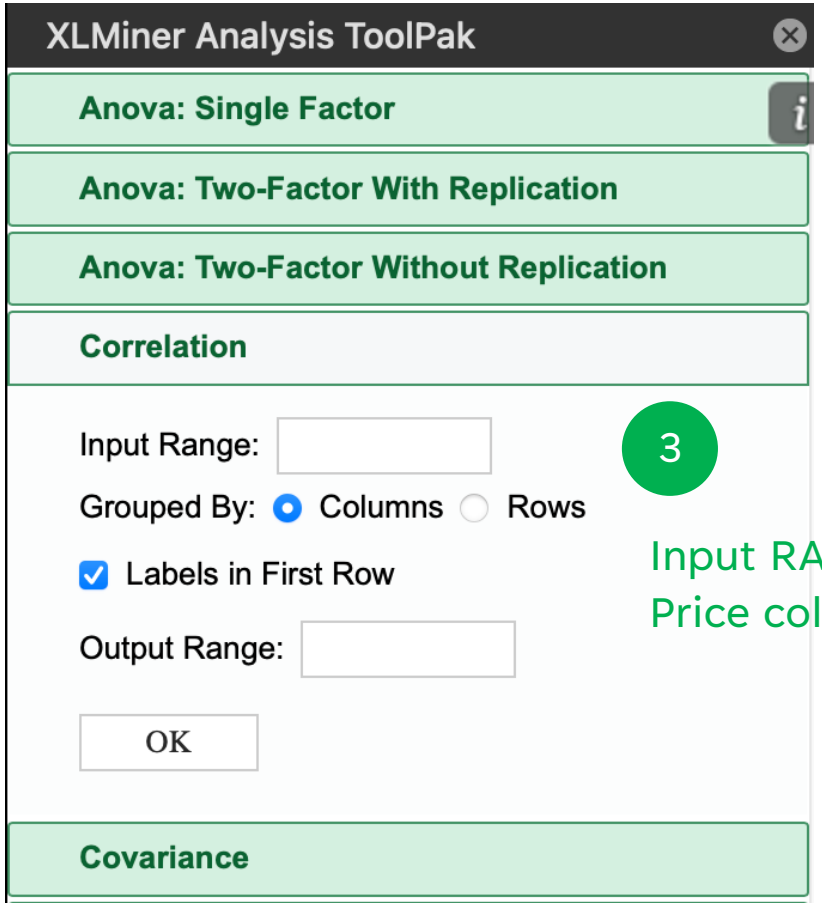


1

Use Show ToolPak on Mac

2

Choose Correlation



3

Input RAM, Storage, Final Price columns

Correlation and Linear Regression

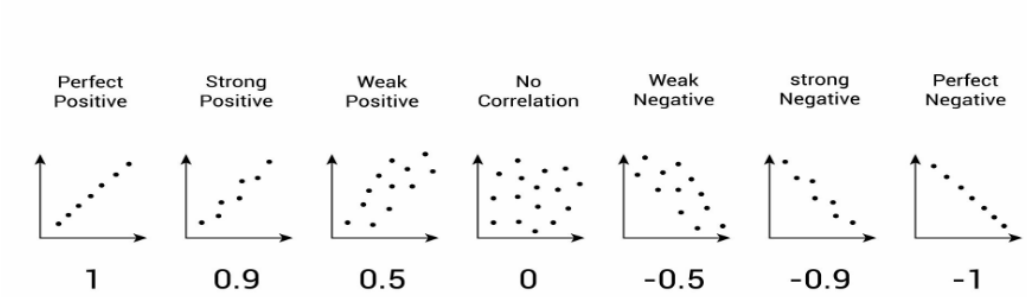
2. Correlation

4

Storage have strong positive with Final Prices

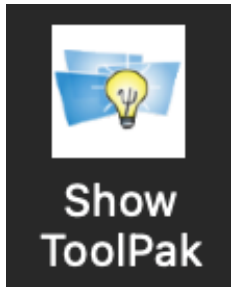
Corrretion

	RAM	Storage	Final Price
RAM	1		
Storage	0.3915721	1	
Final Price	0.4413888	0.6976025	1



Correlation and Linear Regression

3. Linear Regression

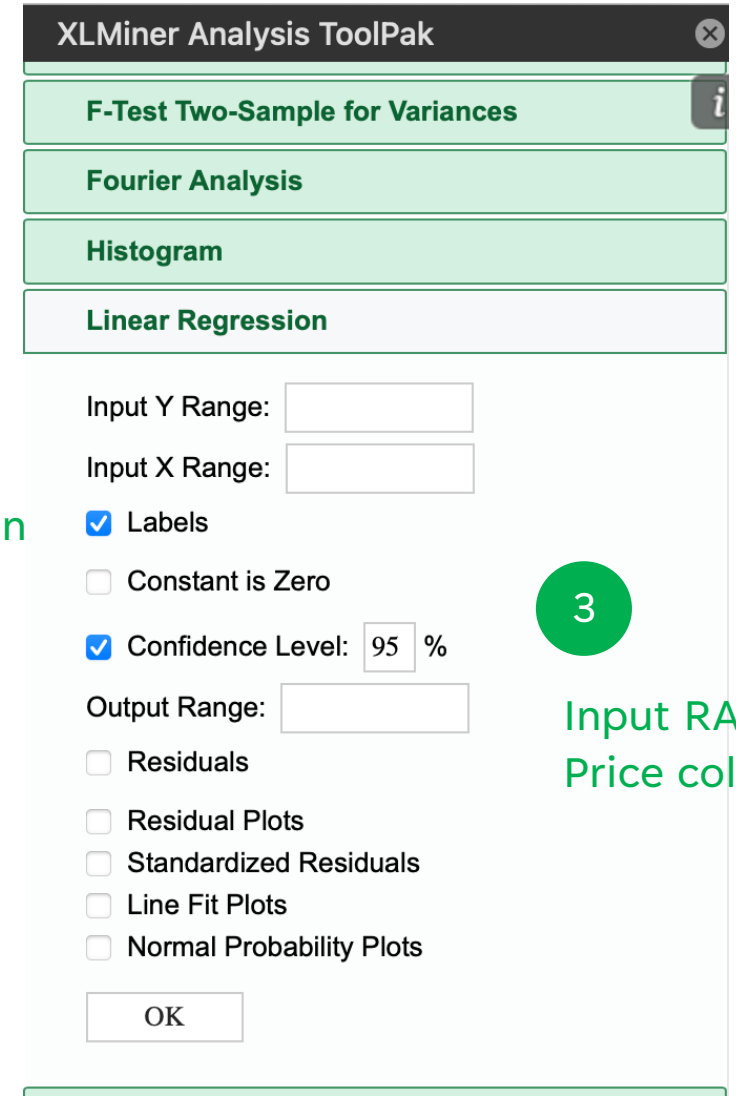


1

Use Show ToolPak on Mac

2

Choose Linear Regression



3

Input RAM, Storage, Final Price columns

Correlation and Regression

3. Linear Regression

4 Analyze Result

Multiple Linear Regression

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.721162
R Square	0.5200747
Adjusted R S	0.519533
Standard Err	277.84331
Observation	1775

1 ค่า Correlation Coefficient

2 R-aquare < 0.80 mean RAM and Storage explain Prices only 52%

ANOVA

3 < 0.05 that mean have a features effect with prices

	df	SS	MS	F	Significance F
Regression	2	148236668	74118334	960.120544	0.0000000000
Residual	1772	136792915	77196.904		
Total	1774	285029582			

3 <0.05 effect to prices

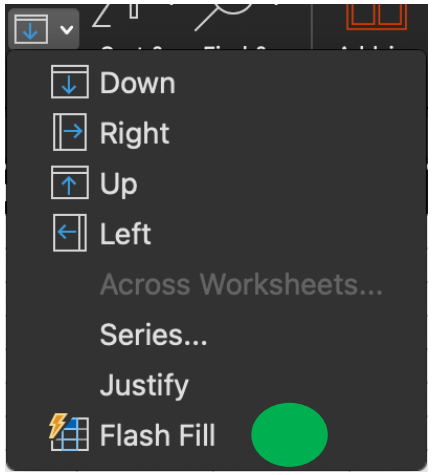
	Coefficients	Standard Err	t Stat	P-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	27.851013	16.103328	1.7295191	0.083890	-3.732502131	59.434528	-3.7325021	59.434528
RAM	29.963794	2.6971999	11.109223	0.000000	24.6737658	35.253821	24.673766	35.253821
Storage	1.7864482	0.0515509	34.654057	0.000000	1.685341212	1.8875552	1.6853412	1.8875552

3 Y = 27.85 + 29.96X1 + 1.786X2

Time Series Analysis

1. Forecasting techniques
   Immediate Term -> Moving Average

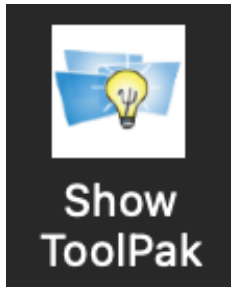
2. Copying data from the ‘Model' column using Flash Fill.



Brand	Model	Model_Num	Final Price
Apple	iPhone 6s	6	136
Apple	iPhone 6s	6	136
Apple	iPhone 6s	6	140
Apple	iPhone 6s	6	109
Apple	iPhone 6s	6	140
Apple	iPhone 6s	6	140
Apple	iPhone 7	7	199
Apple	iPhone 7	7	180
Apple	iPhone 7	7	130
Apple	iPhone 7	7	130
Apple	iPhone 7	7	110

Time Series Analysis

3. Moving Average

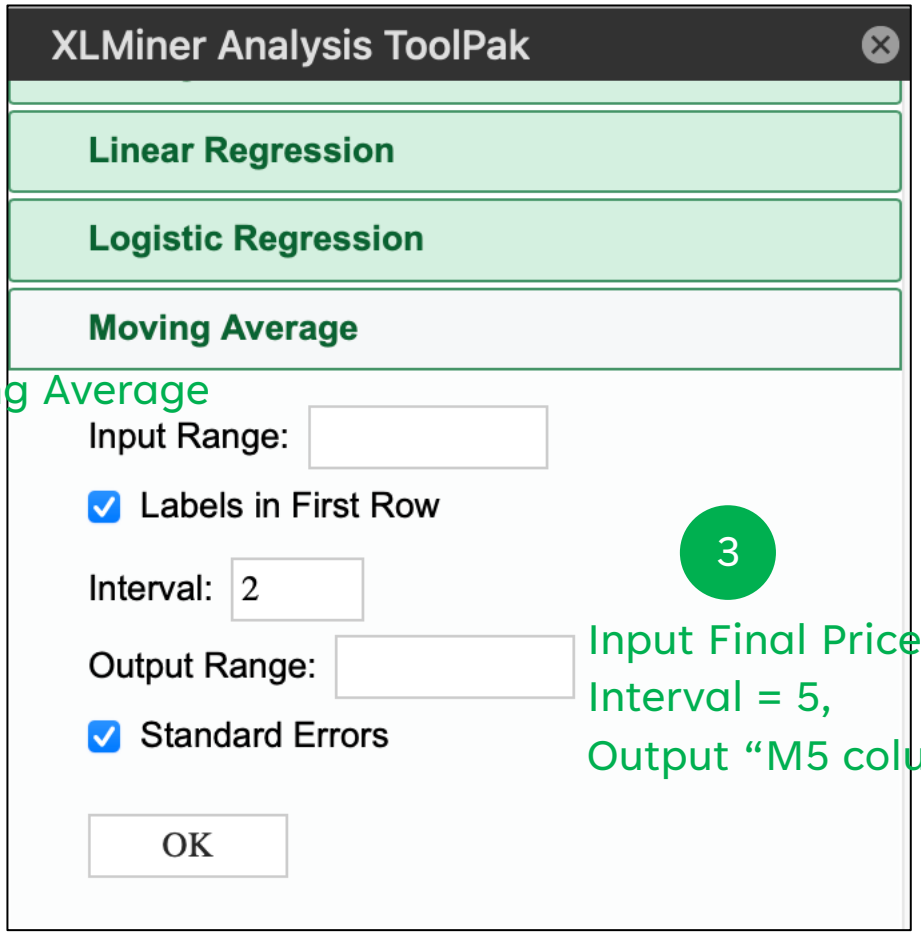


1

Use Show ToolPak on Mac

2

ChooseMoving Average



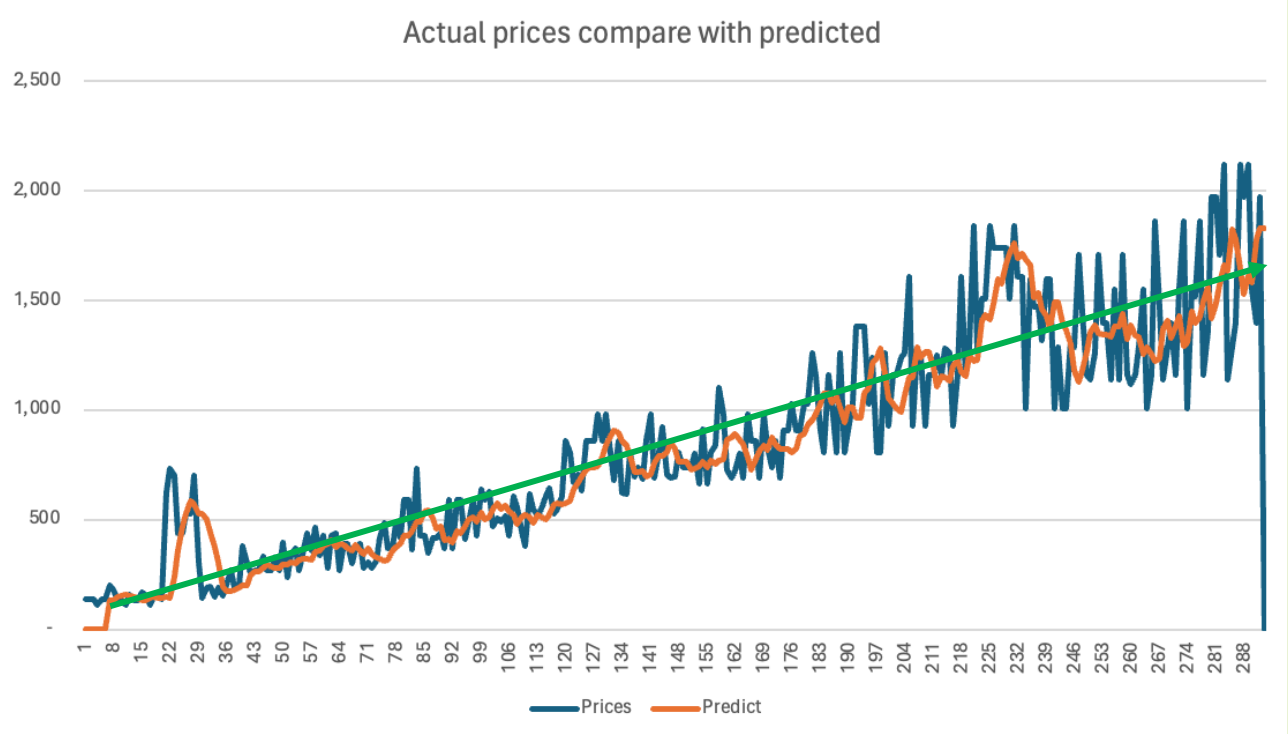
3

Input Final Prices,
Interval = 5,
Output “M5 column”

Time Series Analysis

4. Compare Actual prices and Predict Price of iPhone Series

Prices	M5	Predict
136	Forecast	
136	#N/A	
140	#N/A	
109	#N/A	
140	#N/A	
140	132	
199	133	132
180	146	133
130	154	146
130	158	154
110	156	158
161	150	156
135	142	150
135	133	142
168	134	133
155	142	134
110	151	142
155	141	151
150	145	141



Actual prices and **predicted prices** are **quite similar**, indicating an **upward trend in iPhone prices**.

Time Series Analysis

5. Accuracy of forecasting
   1. Root Mean Square Error : RMSE
   2. Mean Absolute Error : MAE

Prices	M5	Predict	Y-Y^	(Y-Y^)^2	abs(Y-Y^)	(Y-Y^)/Y
136	Forecast					
136	#N/A					
140	#N/A					
109	#N/A					
140	#N/A					
140	132					
199	133	132	67	4,462.24	66.8	0.33567839
180	146	133	47	2,209.00	47	0.26111111
130	154	146	(16)	243.36	15.6	-0.12
130	158	154	(24)	556.96	23.6	-0.1815385
110	156	158	(48)	2,284.84	47.8	-0.4345455
161	150	156	5	26.52	5.15	0.03199751

RMSE	229.7	=SQRT(SUM(F8:F294)/287)
MAE	151.7	=SUM(G8:G294)/287

$$\text{RMSE} = \sqrt{\frac{\sum_{i=1}^{n}(Y-Y\hat{})^2}{n}}$$

$$\text{MAE} = \frac{\sum_{t=1}^{n}|Y-Y\hat{}|}{n}$$