Type of data and analysis

Fondamenti di Business Analytics

Lesson 1 - Gambaro

Roadmap

- Types of data
- For each type of data, the appropriate analysis tools
- Example of a dataset (Boomerang Dataset)
 - Vlookup function to complete the dataset
 - Calculus of frequencies for categorical data (Functions Unique and Countif)
 - Bar Chart for categorical data

Types of data



Types of data

Data	Description	Properties	Examples
Nominal or categorical data	Data that can be placed into mutually exclusive categories	Quantitative relationships among and between data are meaningless and descriptive statistics are meaningless	Country in which you were born, a geographic region, your gender— These are either/or categories
Ordinal data	Data are ordered or ranked according to some characteristic	Categories can be compared to one another, but the difference in categories is generally meaningless and calculating averages is suspect	Ranking breakfast cereals—Preferring cereal X <i>more</i> than Y implies nothing about <i>how much more</i> you like one versus the other
Interval data	Data characterized and ordered by a specific distance between each observation, but having no natural zero	Ratios are meaningless, thus 15° C is not half as warm as 30° C	The Fahrenheit (or Celsius) temperature scale or consumer survey scales that are <i>specified</i> to be interval scales
Ratio data	Data that have a natural zero	These data have both ratios and differences that are meaningful	Sales revenue, time to perform a task, length, or weight

Interval data and ratio data??

Example of interval data: today in Milan there are 20 C (Celsius degrees) and in Berlin 10 C

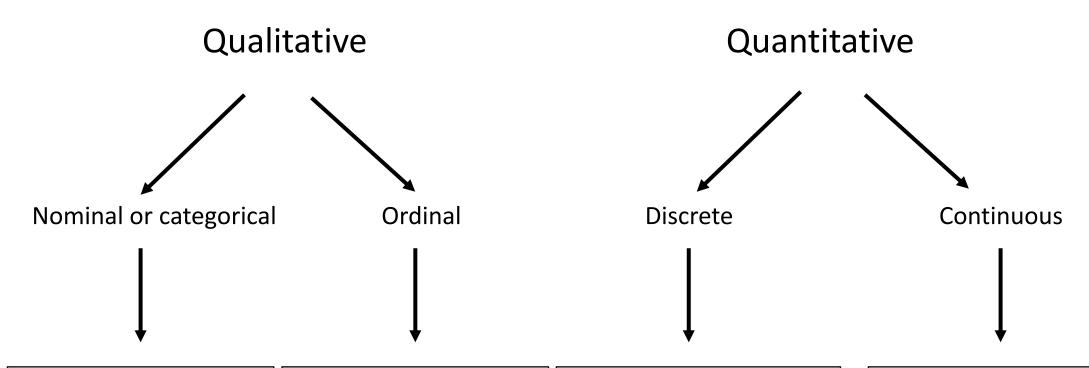
- ✓ It is true that there are 10 C's of difference between the two cities
- × It is wrong to say that Milan has double the temperature of Berlin. In fact, converting the previous data into degrees Fahrenheit you get 50 F in Milan and 68 F in Berlin: it is evident that in the new one scale, the temperature in Milan is not double that in Berlin.

Interval data and ratio data??

Example of ratio data: person A earns 30,000 euros a year, person B 60,000 euro a year

- ✓ It is true that there are 30,000 euro of difference between A and B salary
- ✓ It is true that the annual salary of B is double than salary of A. This is true even if you express the two salary in any other currency.

For each type of data, the appropriate analysis tools



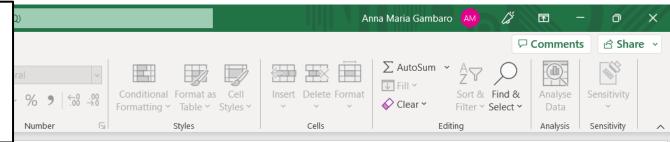
- Frequencies (absolute and relative)
- Mode (values with highest frequency)
- Frequencies (absolute and relative)
- Mode (values with highest frequency)
- Mean (with caution)

- Frequencies (absolute, relative and cumulated)
- Mode, Median, Mean
- Range and Standard
 Deviation
- Quantiles

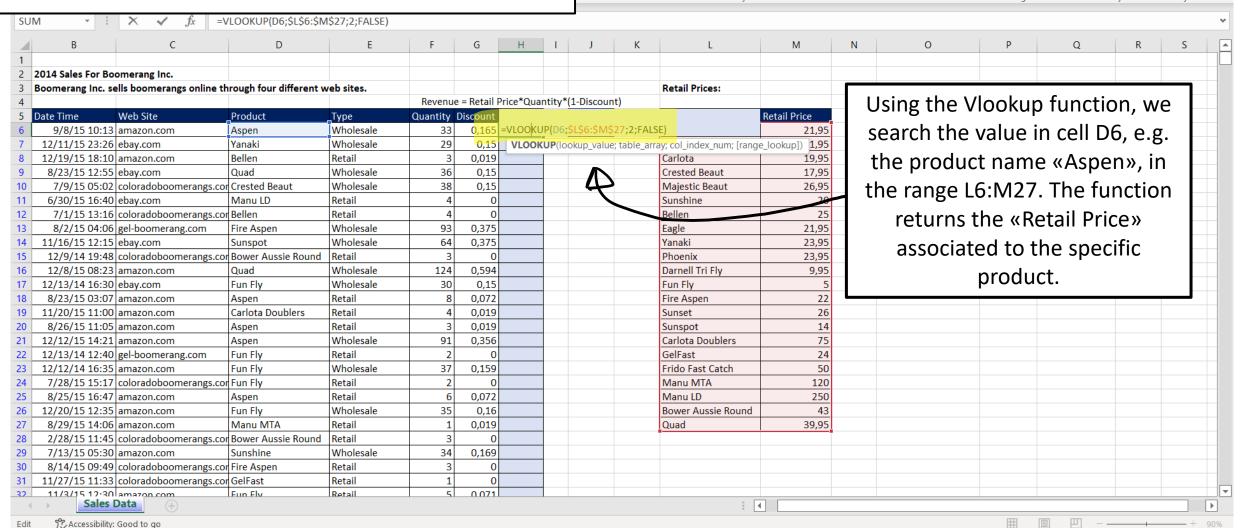
- Frequency density
- Cumulated frequency
- Mean, Median
- Range and Standard Deviation
- Quantiles

Example of a dataset: Vlookup function to complete the dataset

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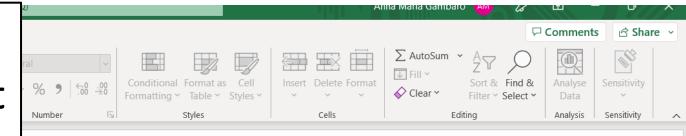


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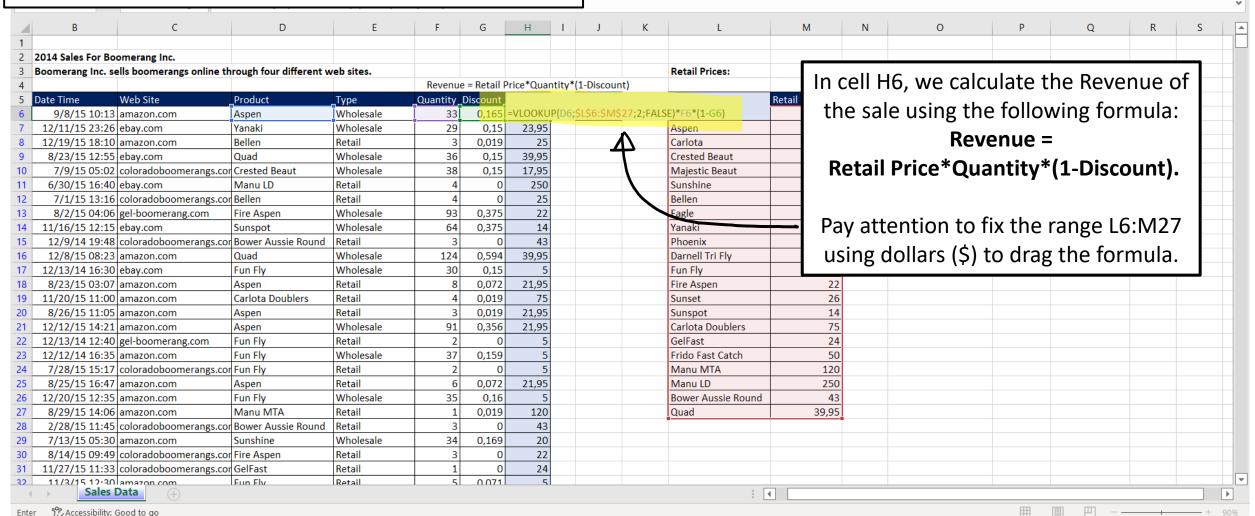


Example of a dataset: Vlookup function to complete the dataset

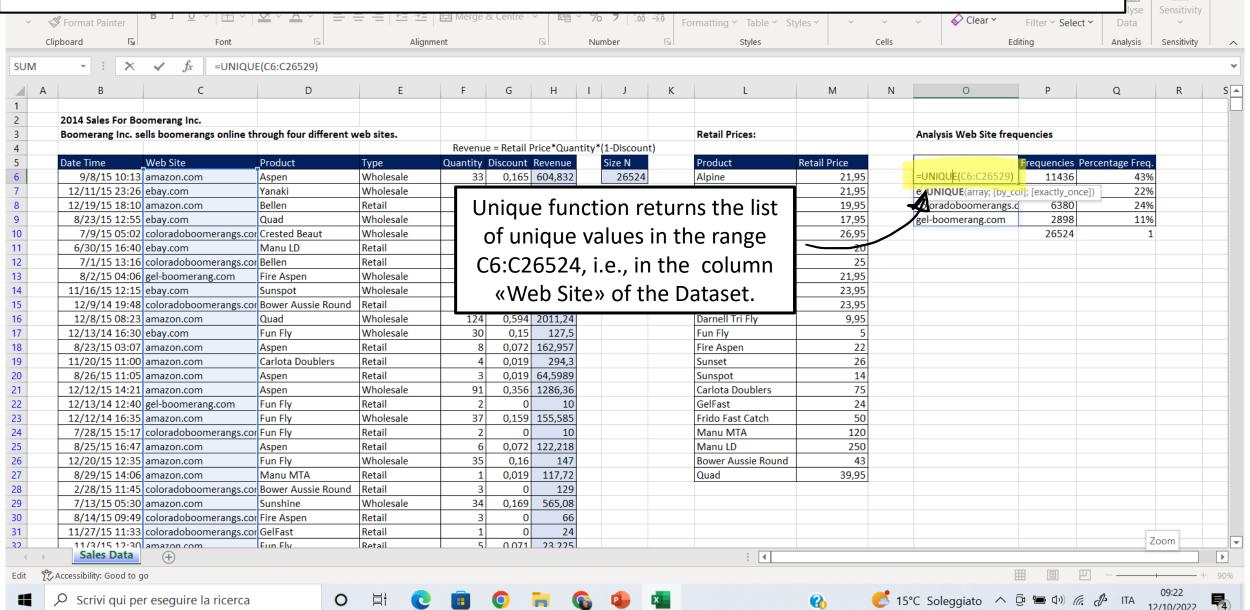
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Calculus of frequencies for categorical data: Unique function

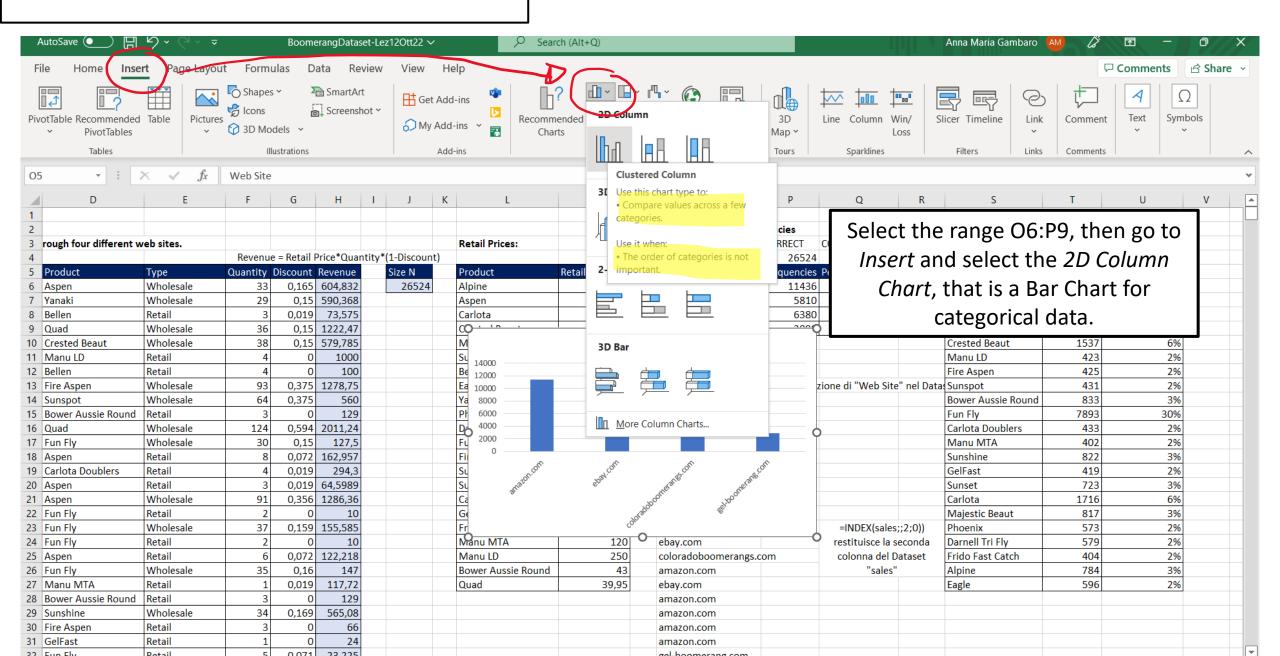


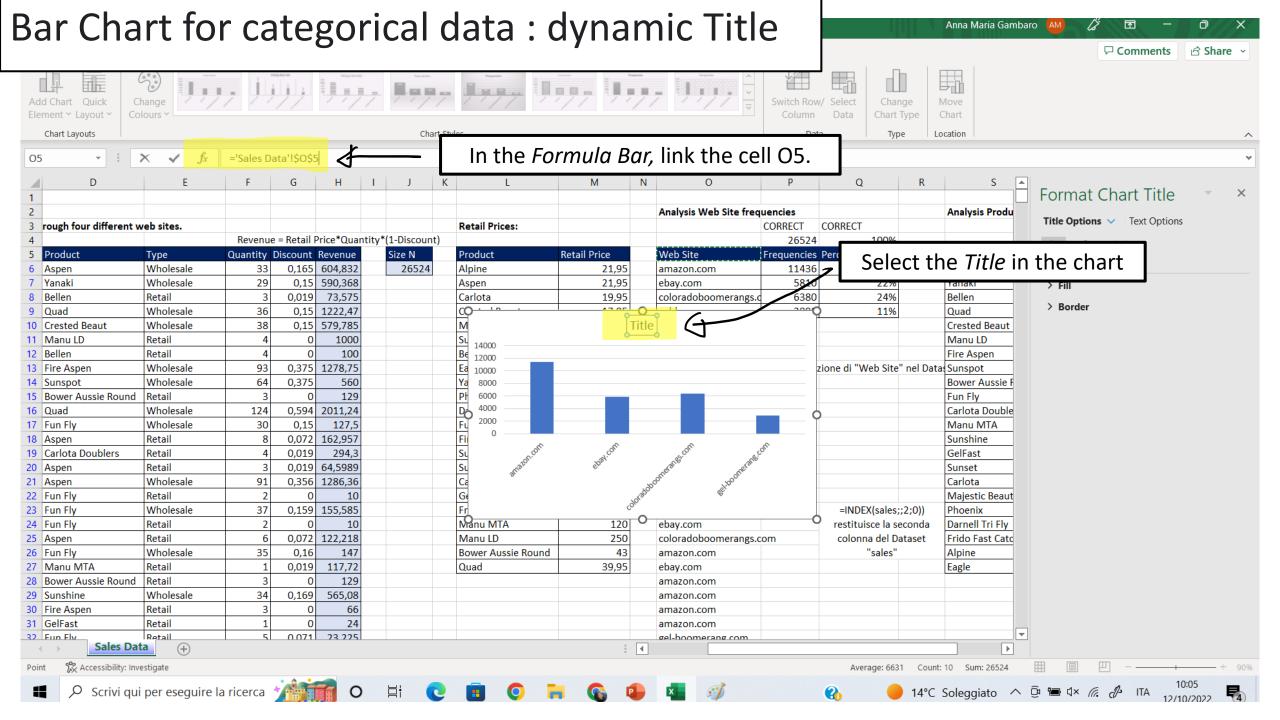
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Calculus of frequencies for categorical data: Countif function ☆ Share Filter Y Select Y Clipboard Number Styles Cells Editing Analysis Sensitivity =COUNTIF(\$C\$6:\$C\$26529;O6) 2014 Sales For Boomerang Inc. Boomerang Inc. sells boomerangs online through four different web sites. Retail Prices: **Analysis Web Site frequencies** Revenue = Retail Price*Quantity*(1-Discount) Date Time Web Site Product Type Quantity Discount Revenue Size N Product Retail Price Web Site 0,165 604,832 9/8/15 10:13 amazon.com Aspen Wholesale 33 26524 Alpine 21,95 amazon.com =COUNTIF(\$C\$6:\$C\$26529:06 29 0.15 590.368 12/11/15 23:26 ebay.com Yanaki Wholesale 21,95 Aspen ebay.com **COUNTIF**(range; criteria) % 12/19/15 18:10 amazon.com Bellen Retail 0.019 73,575 Carlota 19,95 coloradoboomerangs.o 24% 8/23/15 12:55 ebay.com Quad Wholesale 36 0.15 1222.47 17.95 11% Crested Beaut gel-boomerang.com 2898 38 0,15 579,785 7/9/15 05:02 coloradoboomerangs.cor Crested Beaut Wholesale Majestic Beaut 26.95 26524 6/30/15 16:40 ebay.com Manu LD Retail ol 1000 Countif function counts the ol 100 7/1/15 13:16 coloradoboomerangs.cor Bellen Retail 8/2/15 04:06 gel-boomerang.com Fire Aspen Wholesale 93 0.375 1278.75 64 Wholesale 0.375 560 number of times, that the text 11/16/15 12:15 ebay.com Sunspot 12/9/14 19:48 coloradoboomerangs.cor Bower Aussie Round Retail ol 129 0,594 2011,24 12/8/15 08:23 amazon.com Quad Wholesale 124 «amazon.com» apperas in the 12/13/14 16:30 ebay.com Fun Fly Wholesale 0,15 127,5 8/23/15 03:07 amazon.com Aspen Retail 0.072 162.957 range C6:C26529. Pay attention 11/20/15 11:00 amazon.com Carlota Doublers Retail 0.019 294.3 8/26/15 11:05 amazon.com Retail 0,019 64,5989 to fix the range C6:C26529 with Aspen 12/12/15 14:21 amazon.com Aspen Wholesale 0,356 1286,36 Fun Fly Retail dollars (\$) to drag the formula. 12/13/14 12:40 gel-boomerang.com 12/12/14 16:35 amazon.com Fun Fly Wholesale 37 0.159 155,585 7/28/15 15:17 coloradoboomerangs.cor Fun Fly Retail 0,072 122,218 8/25/15 16:47 amazon.com Aspen Retail Manu LD 250 12/20/15 12:35 amazon.com 35 0.16 147 43 Fun Flv Wholesale Bower Aussie Round 0,019 117,72 39,95 8/29/15 14:06 amazon.com Manu MTA Retail Quad 2/28/15 11:45 coloradoboomerangs.cor Bower Aussie Round Retail 129 7/13/15 05:30 amazon.com Wholesale 34 0.169 565.08 Sunshine 8/14/15 09:49 coloradoboomerangs.cor Fire Aspen Retail 24 11/27/15 11:33 coloradoboomerangs.cor GelFast Retail 11/3/15 12:30 amazon com Retail Sales Data 1 4 Accessibility: Good to go Scrivi qui per eseguire la ricerca C 15°C Soleggiato へ @ 🖦 🕬 🦟 🕭 ITA

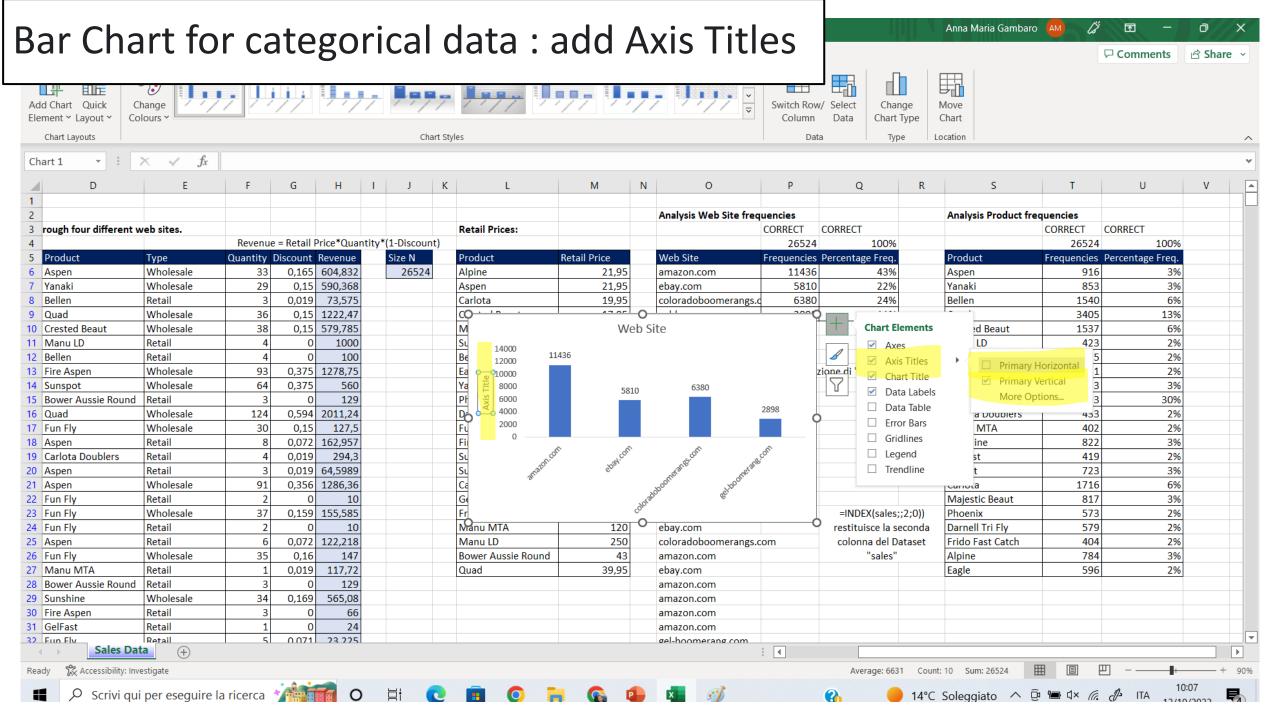
Calculus of frequencies for categorical data: relative frequencies ☆ Share Filter Y Select Y Clipboard Number Styles Cells Editing Analysis Sensitivity =P6/\$J\$6 2014 Sales For Boomerang Inc. Boomerang Inc. sells boomerangs online through four different web sites. Retail Prices: **Analysis Web Site frequencies** Revenue = Retail Price*Quantity*(1-Discount) Date Time Web Site Product Type Quantity Discount Revenue Product Retail Price Web Site Frequencies 9/8/15 10:13 amazon.com Aspen Wholesale 33 0,165 604,832 26524 Alpine 21,95 amazon.com 11436 29 0.15 590.368 12/11/15 23:26 ebay.com Yanaki Wholesale 21,95 ebay.com 5810 22% Aspen 12/19/15 18:10 amazon.com Bellen Retail 0.019 73,575 19,95 coloradoboomerangs.o 6380 24% Carlota 8/23/15 12:55 ebav.com Quad Wholesale 36 0.15 1222.47 17.95 2898 11% Crested Beaut gel-boomerang.com 38 0,15 579,785 Majestic Beaut 7/9/15 05:02 coloradoboomerangs.cor Crested Beaut Wholesale 26,95 26524 6/30/15 16:40 ebay.com Manu LD Retail ol 1000 Sunshine 20 ol 100 25 7/1/15 13:16 coloradoboomerangs.com Bellen Retail Bellen 0.375 1278.75 8/2/15 04:06 gel-boomerang.com Fire Aspen Wholesale 93 Eagle To obtain relative frequencies, we 64 11/16/15 12:15 ebay.com 0.375 560 Sunspot Wholesale Yanaki 12/9/14 19:48 coloradoboomerangs.com Bower Aussie Round Retail ol 129 Phoenix calculate the ratio between 0,594 2011,24 12/8/15 08:23 amazon.com Quad Wholesale 124 Darnell Tri Fly 12/13/14 16:30 ebay.com Fun Fly Wholesale 0,15 127,5 Fun Fly absolute frequencies and the 8/23/15 03:07 amazon.com Aspen Retail 0.072 162.957 Fire Aspen 11/20/15 11:00 amazon.com Carlota Doublers Retail 0.019 294.3 Sunset 0.019 64.5989 sample size of the dataset in cell J6. 8/26/15 11:05 amazon.com Aspen Retail Sunspot Carlota Doublers 12/12/15 14:21 amazon.com Aspen Wholesale 0,356 1286,36 Retail Pay attention to fix with dollars (\$) 12/13/14 12:40 gel-boomerang.com Fun Flv GelFast 12/12/14 16:35 amazon.com Fun Fly Wholesale 37 0.159 155,585 Frido Fast Catch 7/28/15 15:17 coloradoboomerangs.cor Fun Fly Retail Manu MTA the reference to cell J6 to drag the 0,072 122,218 8/25/15 16:47 amazon.com Aspen Retail Manu LD 35 0.16 147 12/20/15 12:35 amazon.com Fun Flv Wholesale Bower Aussie Ro formula. 27 117,72 8/29/15 14:06 amazon.com Manu MTA Retail 0,019 Quad 2/28/15 11:45 coloradoboomerangs.cor Bower Aussie Round Retail 129 29 7/13/15 05:30 amazon.com Wholesale 34 0.169 565.08 Sunshine 8/14/15 09:49 coloradoboomerangs.cor Fire Aspen Retail 66 24 11/27/15 11:33 coloradoboomerangs.cor GelFast Retail 0 11/3/15 12:30 amazon com Retail Sales Data 1 4 Accessibility: Good to go C 15°C Soleggiato へ @ 🖦 🕬 🦟 🕭 ITA Scrivi qui per eseguire la ricerca

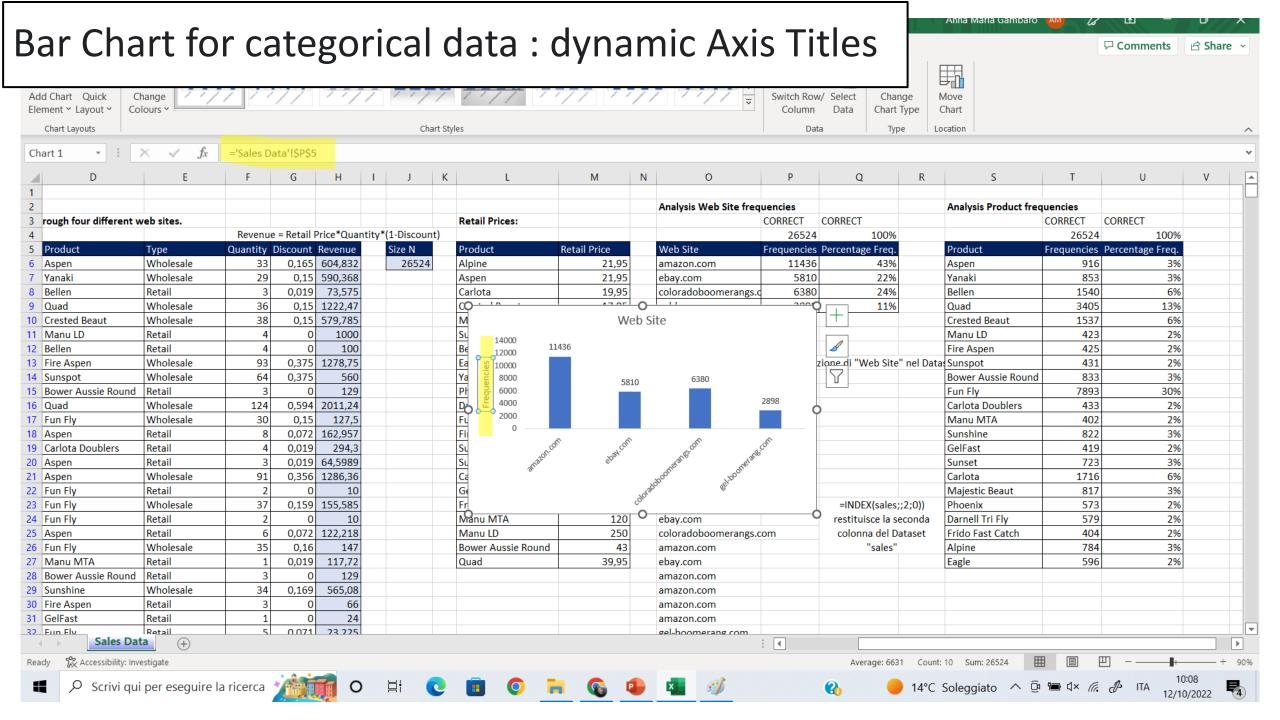
Bar Chart for categorical data

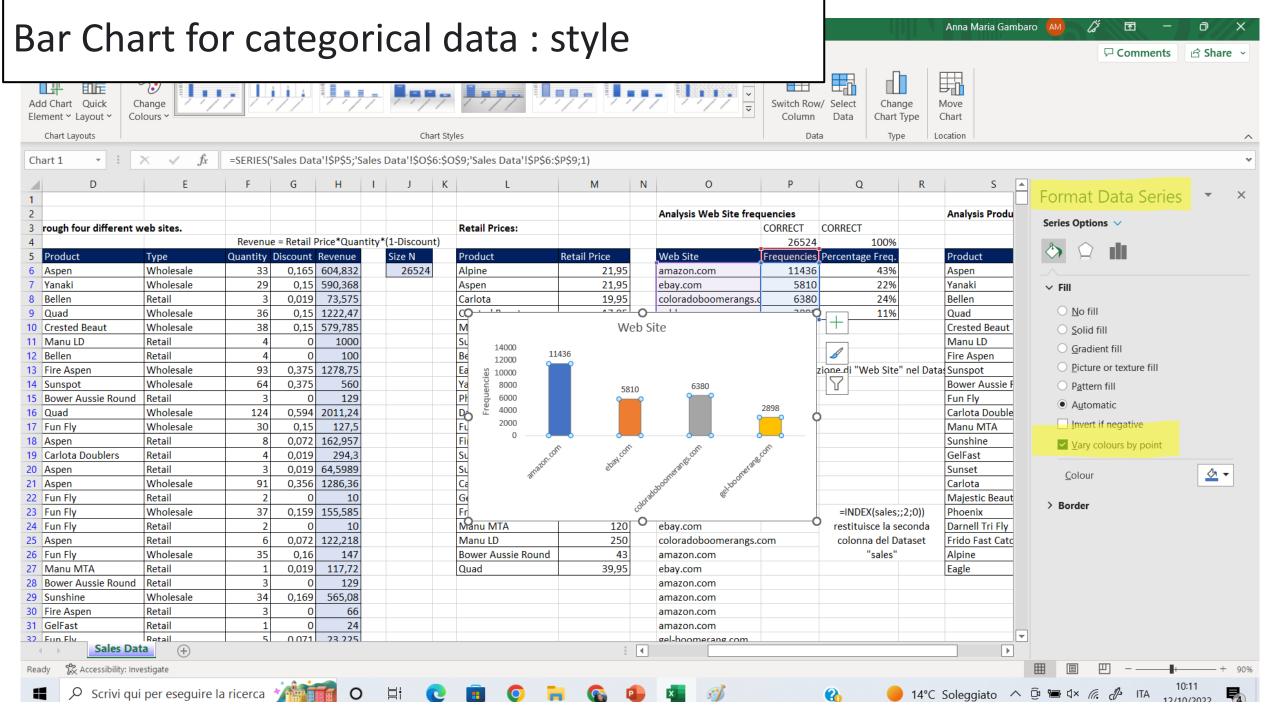




Bar Chart for categorical data: Data Labels Anna Maria Gambaro ☐ Comments Add Chart Quick Change Switch Row/ Select Move Change Element ~ Layout ` Colours Column Chart Type Chart Chart Layouts Chart Styles Data Туре Location Chart 1 ='Sales Data'!\$O\$5 Q Analysis Web Site frequencies Analysis Product frequencies rough four different web sites. **Retail Prices:** CORRECT CORRECT CORRECT CORRECT Revenue = Retail Price*Quantity*(1-Discount) 26524 100% 26524 100% Product Type Quantity Discount Revenue **Product** Retail Price Web Site Frequencies Percentage Freq. **Product** Frequencies Percentage Freq. Wholesale 604,832 26524 Alpine 21,95 43% 916 3% 6 Aspen 0,165 amazon.com 11436 Aspen 29 3% Wholesale 590,368 5810 22% 853 Yanaki 0,15 Aspen 21,95 ebay.com Yanaki Bellen Retail 0.019 73,575 19.95 coloradoboomerangs.c 6380 24% Bellen 1540 6% Carlota 36 1222,47 3405 13% Quad Wholesale 0.15 10 Crested Beaut Wholesale 38 0,15 579,785 М Web Site Chart Elements ed Beaut 1537 6% 423 2% 11 Manu LD Retail 0 1000 LD Axes 14000 Вє 11436 12 Bellen Retail 0 100 425 2% spen 12000 Axis Titles Wholesale 93 0.375 1278,75 Ea 10000 431 2% 13 Fire Aspen zione di Chart Title 64 Ya 3% 14 Sunspot Wholesale 0,375 560 Aussie Round 833 8000 6380 5810 Data Labels Pł 6000 7893 30% 15 Bower Aussie Round Retail 129 Data Table 2898 D_O Fu 4000 16 Quad Wholesale 124 0,594 2011,24 a Doublers 433 2% Error Bars 2000 17 Fun Fly Wholesale 30 0,15 127,5 MTA 402 2% □ Gridlines Fi 162,957 822 3% 18 Aspen Retail 0,072 ine Su Su Ca Ga Fr ☐ Legend 19 Carlota Doublers Retail 0.019 294.3 419 2% ☐ Trendline 723 3% 20 Aspen Retail 0,019 64,5989 6% 21 Aspen Wholesale 0,356 1286,36 1716 curroca Retail 10 817 3% 22 Fun Fly Majestic Beaut 23 Fun Fly Wholesale 37 0.159 155.585 =INDEX(sales;;2;0)) Phoenix 573 2% Manu MTA 120 restituisce la seconda 579 2% 24 Fun Fly Retail 10 ebay.com Darnell Tri Flv 2% 25 Aspen Retail 0,072 122,218 Manu LD 250 coloradoboomerangs.com colonna del Dataset Frido Fast Catch 404 35 784 3% 26 Fun Fly Wholesale 0,16 147 Bower Aussie Round 43 "sales" Alpine amazon.com 27 Manu MTA Retail 0,019 117,72 Quad 39,95 Eagle 596 2% ebay.com Retail 129 28 Bower Aussie Round amazon.com 29 Sunshine Wholesale 34 0.169 565.08 amazon.com 30 Fire Aspen Retail 66 amazon.com 24 31 GelFast Retail amazon.com 32 Fun Fly Retail gel-hoomerang com Sales Data 1 **|** & Accessibility: Investigate Count: 10 Sum: 26524 Ready Scrivi qui per eseguire la ricerca 14°C Soleggiato ∧ ♀ ≒ □× € ₺







Bar Chart for categorical data: style ☐ Comments Add Chart Ouick Change Switch Row/ Select Change Move Element Y Layout Y Colours ` Data Column Chart Type Chart Chart Layouts Chart Styles Data Type Location Chart 1 =SERIES('Sales Data'!\$P\$5;'Sales Data'!\$O\$6:\$O\$9;'Sales Data'!\$P\$6:\$P\$9;1) Q Format Data Series **Analysis Web Site frequencies** Analysis Produ Series Options V 3 rough four different web sites. **Retail Prices:** CORRECT CORRECT Revenue = Retail Price*Quantity*(1-Discount) 26524 100% Product Type Quantity Discount Revenue Size N **Product** Retail Price Web Site Frequencies Percentage Freq. **Product** 6 Aspen Wholesale 0,165 604,832 26524 Alpine 21,95 amazon.com 11436 Aspen 29 0,15 590,368 Yanaki Wholesale Aspen 21,95 5810 22% ebay.com Yanaki ∨ Fill 8 Bellen Retail 0.019 73,575 Carlota 19.95 coloradoboomerangs.c 6380 24% Bellen ○ No fill Wholesale 36 0,15 1222,47 9 Quad 11% Quad 38 0,15 579,785 Web Site 10 Crested Beaut Wholesale Crested Beaut Solid fill M ---- ID 11 Manu LD Retail 1000 Gradient fill 14000 12 Bellen Retail 100 11436 Colour 12000 Picture or texture fill 13 Fire Aspen Wholesale 93 0.375 1278.75 ≌ 10000 zione di 64 0.375 14 Sunspot Wholesale 560 8000 Pattern fill 15 Bower Aussie Round Retail 129 0 6000 Automatic 2898 Wholesale 124 4000 16 Quad 0,594 2011,24 2000 Invert if negative 17 Fun Fly Wholesale 30 0,15 127,5 18 Aspen Retail 0.072 162.957 Vary colours by point 19 Carlota Doublers 0.019 294.3 Retail 20 Aspen Retail 0,019 64,5989 <u>⟨</u>⟩ Colour 21 Aspen Wholesale 0,356 1286,36 Retail 10 22 Fun Fly Border 23 Fun Fly Wholesale 37 0.159 155,585 =INI Manu MTA 24 Fun Fly Retail 10 120 ebay.com restit Manu LD 25 Aspen Retail 0,072 122,218 250 coloradoboomerangs.com colo 35 43 26 Fun Fly Wholesale 0,16 147 Bower Aussie Round amazon.com 27 Manu MTA Retail 0,019 117,72 Quad 39,95 ebay.com 28 Bower Aussie Round Retail 129 amazon.com Style 9 29 Sunshine 34 565.08 Wholesale 0.169 amazon.com 30 Fire Aspen Retail 66 amazon.com 31 GelFast 24 Retail amazon.com 32 Fun Fly Retail 0.071 gel-hoomerang com -Sales Data **∄** [4] & Accessibility: Investigate Ready 14°C Soleggiato ∧ ② 🖮 ▷× € 🐠 Scrivi qui per eseguire la ricerca

