# MODULE 2 PBI: TEXT-BASED VISUALIZATIONS



#### THEME DESCRIPTION

Students have the ability to fully understand the scope of the problem as the key to developing effective solutions.

# **COURSE SUB-LEARNING OUTCOMES (SUB-CLO)**

CLO-2-Sub-CLO-2:

Students can detail all important aspects of business intelligence and text-based visualization in current scenarios to expand their existing business intelligence knowledge using PBI. – C5

- 1. Loading the Source Data
- 2. A matrix showing the top level of data
- 3. A two-level matrix
- 4. A three-level matrix
- 5. Adding or Removing Subtotals in a Matrix
- 6. Column Matrix
- 7. Displaying Multiple Values as Columns and as Rows
- 8. Placing Subtotals
- 9. Custom Subtotal Settings per Level of Matrix
- 10. Sorting Data in Matrices

# **PRACTICUM SUPPORT**

- 1. Windows Operating System
- 2. Java Standard Edition JRE and JDK version 1.8 or above (installed)
- 3. Microsoft Power BI version (min.) 2.86.727.0 64-bit (installed)

## **PRACTICUM STEPS**

- When creating a matrix, it is important to have the Visualizations pane reflect the hierarchy.
- Put another way, you must ensure that the order of the fields that you select for the matrix and that you place in the field well follows the display hierarchy that you want.
- Consequently, to create a matrix like the one just described, you need to do the following steps:

## 1) Loading the Source Data

Once you have launched Power BI Desktop, you are faced with the startup screen given that you are working with an application that lives and breathes data.

- a. Assuming that you have downloaded the sample data **2. Data IS-529 Lab Wo2 PBI TEXT-BASED VISUALIZATIONS.xlsx** from UMN-elearning IS-529 Lab Week#2).
- b. Click Get Data in the startup screen. The Get Data dialog will appear in the list of all the possible data sources on the right of this dialog, click Excel, and then click Connect.



# 2) A matrix showing the top level of data

- a. Click the Matrix icon in the Visualizations pane. This is shown in Figure 2-1. An empty matrix will appear on the report canvas.
- b. Drag the fields CountryName (from the Countries table), Make (from the Stock table), and Color (from the Colors table) in this order to the Rows well in the Visualizations pane.
- c. Then add the fields SalePrice and Cost Plus Spares Margin (from the InvoiceLines table) and Mileage (from the Stock table).
- d. The matrix should look something like Figure 2.2





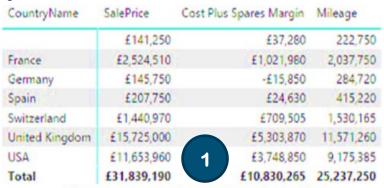


Figure 2-2 A matrix showing the top level of data

- e. You can see that some of the fields have a sigma ( $\Sigma$ ) icon to their left. This indicates that the data in the field is numeric.
- f. As you progress through this book, you will see that there are other icons that Power BI Desktop uses to flag different types of fields.
- g. Save your report on page named "2.2 Top Level of Data".

#### 3) A two-level matrix

- a. Click the "Expand all down one level in the hierarchy" icon at the top of the matrix.
- b. This is the third icon from the left that looks like a small pitchfork
- c. The matrix should look something like Figure 2-3 (note that it is perfectly normal that there is no country name for the first set of rows).
- d. Save your report on page named "2.3 Two-Level Matrix".

#### 4) A three-level matrix

- a. Click the "Expand all down one level in the hierarchy" icon again. The matrix
- b. should look something like Figure 2-4. As you can see, a matrix display not only makes data easier to digest, but it automatically groups records by each element in the hierarchy and adds totals for each level as well.
- c. What is more, each level in the hierarchy is sorted in ascending order. You can expand all the levels that are available in the data that you added to the matrix definition. This final level will display all available detail at that level.
- d. Save your report on page named "2.4 Three-Level Matrix".







By default, a new matrix will include the subtotals for every level of the data. Should you prefer to remove the subtotals from a matrix:

- a. Select the matrix visual that you used in the previous section.
- b. In the Visualizations pane, click the Format icon. Expand the Subtotals section.
- c. Click the Row Subtotals button to turn the row subtotals off. This will remove all the totals from the matrix, as you can see in Figure 2.5.
- d. Save your report on page named "2.5. Matrix without Subtotal".

# 6) Column Matrix

Power BI Desktop does not limit you to adding row-level hierarchies; you can also create column-level hierarchies, or mix the two. Suppose that we want to get a clear idea of sales and gross margin by country, make, and vehicle type, and how they impact one another. To achieve this, I suggest extending the matrix that you created previously by adding a VehicleType level as a column hierarchy.

Here is how you can do this:

- a. Click inside the matrix that you created previously to select it. The Visualizations pane will display the fields that are used for this table in the Rows and Values boxes.
- b. Drag the VehicleType field from the Stock table down into the Columns well in the Visualizations pane. This will add a hierarchy to the columns in the table. The table will look like Figure 2.6.
- c. As you can see, you now have the sales and gross margin by country name, color, make, and vehicle type, but it is in a cross-matrix, where the data is broken down by both rows and columns.
- d. Save your report on page named "2.6. Row & Column Matrix".

# 7) Displaying Multiple Values as Columns and as Rows

A feature that has been added to Power BI Desktop fairly recently is the possibility of creating complex matrices where the columns of data can now be displayed as rows.

That is, instead of seeing possibly multiple data values side by side for a complex column hierarchy, you can see all the numeric data displayed as rows.

This is possibly best appreciated with the help of an example:

- a. Create a matrix using the following elements:
  - Rows: CountryName from the Countries table and Make from the Stock table (in this order).
  - Column: VehicleType (from the Stock table).
  - Values: Mileage and LaborCost (in this order). Both are from the Stock table.
- b. Expand all down one level. The matrix will look like the one shown in Figure 2.7. A standard matrix with values as columns.
- c. Save your report on page named "2.7. Multiple Values As Columns".
- d. Next, in the Visualizations pane, click the Format icon and expand the Values section.
- e. Set Show on Rows to On. The matrix will now look like the one shown in Figure 2.8, where the multiple columns of **data have become rows** of data.
- f. Save your report on page named "2.8. Multiple Values As Rows".

# 8) Placing Subtotals

You can also decide whether the subtotals are placed above a group of elements, alongside the elements, header, or under a group, on a separate row. Simply do the following to place subtotals:

- a. Re-create the matrix that you used in Figure 2.7 (following only steps 1 and 2).
- b. In the Visualizations pane, click the Format icon and expand the Subtotals section.
- c. In the popup for Row Subtotal Position, select Bottom.
- d. The matrix should now look like the one in Figure 2.9.
- e. Save your report on page named "2.9. Subtotals below groups".

# 9) Custom Subtotal Settings per Level of Matrix

Power BI Desktop now lets you define whether subtotals are displayed for each level of the matrix hierarchy for both rows and columns. To see this in action:

- a. Re-create the matrix that you used in Figure 2.7 (following only steps 1 and 2).
- b. In the Visualizations pane, click the Format icon and expand the Subtotals section.
- c. Set Per Row Level to On. This will add the list of all the row data elements to the Visualizations pane.
- d. Set Per Column Level to On. This will add the list of all the column data elements to the Visualizations pane.
- e. Set the button to Off for both Make and VehicleType. As you can see in Figure 2.10, the subtotals have been removed for these elements.
- f. Save your report on page named "2.10. Selective subtotals".

# 10) Sorting Data in Matrices

When you sort data in a matrix table, the sort order will respect the matrix hierarchy.

- This means that if you sort on the second element in a hierarchy (Make, in the example table we just created), then the primary element in the hierarchy (CountryName, the leftmost column) will switch back to the initial (alphabetical) sort order, as will any lower levels in the hierarchy of row elements.
- If you sort by any value in a matrix, then the total for the highest level of the hierarchy is used to reorder the whole table. You can see this in Figure 2.11, where the matrix from the previous figure has been sorted on the total gross margin in descending order.
- ▶ This has made the country with the most sales move to the top of the table.
- As well, if you have a column matrix (as in this example), then you will end up sorting on the grand total of the columns (the two rightmost columns in this example) to make the matrix sort by numeric values, albeit in ascending order.
- ▶ Save your report on page named "2.11. Sorting a matrix on values".
- Finally, save all pages on 2. IA IS-529 Lab Wo2 PBI TEXT-BASED VISUALIZATIONS yourname-NIM.pbix and submit to e-Learning IS-529 Lab Week#2

# **RESULTS / OUTCOMES**



SalePrice	Cost Plus Spares Margin	Mileage
£141,250	£37,280	222,750
£46,750	£13,480	65,250
£50,500	£22,700	105,000
£44,000	£1,100	52,500
£2,524,510	£1,021,980	2,037,750
£1,487,210	£689,670	1,086,500
£394,250	£103,210	315,000
£212,000	£51,300	238,750
£373,300	£180,100	292,500
£28,000	2 £5,850	52,500
£29,750	-£8,150	52,500
£145,750	-£15,850	284,720
£74,750	-£11,050	179,720
£71,000	-£4,800	105,000
£207,750	£24,630	415,220
£46,750	£13,480	65,250
£69,250	-£6,550	179,720
£47,750	£16,600	117,750
£44,000 £31,839,190	£1,100 £10,830,265	52,500 25,237,250
	£46,750 £50,500 £44,000 £2,524,510 £1,487,210 £394,250 £212,000 £373,300 £28,000 £29,750 £145,750 £74,750 £71,000 £207,750 £46,750 £46,750 £47,750 £47,750 £44,000	£141,250 £37,280 £46,750 £13,480 £50,500 £22,700 £44,000 £1,100 £2,524,510 £1,021,980 £1,487,210 £689,670 £394,250 £103,210 £212,000 £51,300 £28,000 £51,300 £28,000 £28,000 £28,000 £145,750 £145,750 £11,050 £71,000 £44,800 £207,750 £24,630 £46,750 £13,480 £69,250 £6,550 £47,750 £16,600 £44,000 £1,100

Top Level (Country) Second Level (Make)

Third Level

CountryName	SalePrice	Cost Plus Spares Margin	Mileage	r)
USA				
Aston Martin	£3,722,160	£1,255,995	2,109,890	
Bentley	£1,879,750	£565,780	1,275,735	
Jaguar	£2,751,000	£648,490	3,112,320	
MGB	£348,000	£210,250	655,500	
Rolls Royce	£2,471,550	£1,048,010	1,169,190	
Triumph	£269,000	£55,225	537,750	
TVR	£212,500	-£34,900	315,000	
<b>United Kingdom</b>				
Aston Martin	£4,933,500	£1,703,450	2,109,780	
Bentley	£2,407,750	£798,100	1,701,940	
Jaguar	£2,761,750	£369,440	3,303,910	
MGB	£663,000	£447,500	1,311,000	
Rolls Royce	£4,319,750	£1,844,680	1,871,880	
Triumph	£530,250	£160,400	1,115,250	
TVR	£109,000	-£19,700	157,500	
Switzerland				
Aston Martin	£543,170	£242,675	814,000	
Bentley	£222,750	£161,830	71,195	
Jaguar	£450,250	£196,910	418,470	
Rolls Royce	£192,300	£118,490	174,000	
TVR	£32,500	-£10,400	52,500	
Spain				
Bentley	£46,750	£13,480	65,250	
Jaguar	£69,250	-£6,550	179,720	
Triumph	£47,750	£16,600	117,750	
TVR	£44,000	£1,100	52,500	
Germany				
Jaguar	£74,750	-£11,050	179,720	
TVR	£71,000	-£4,800	105,000	
France				
Aston Martin	£1,487,210	£689,670	1,086,500	

France	£2,524,510	£1,021,980	2.037,750
Aston Martin	£1,487,210	(689,670	1.086.500
Blue	£141.250	£99.750	66.00
British Racing Green	£181,250	650,650	8,000
Canary Yellow	£284.440	699.295	193,000
Green	£108.990	630,325	246,000
Night Blue	£165,600	£19.850	156.500
Red	£450,300	£309.460	261.000
Sher	6155 380	680,340	156.000
Bentley	£394,250	£103,210	315,000
Blue	644,000	£11,350	52.50
British Racing Green	€39,500	-£25,070	52,500
Canary Yellow	£110,000	£45,050	52.50
Dark Purple	£44,000	-625,570	52,500
Red	£110,000	£82,350	52.500
Silver	£46.750	£14,100	52,500
Jaquar	£212,000	£51,300	238,750
Black	£84,500	£33,100	81.25
Canary Vellow	£88,000	£5,650	105,000
Night Blue	£39,500	£12,550	52,500
Rolls Royce	£373,300	£180,100	292,500
Black	£48,250	+£3,540	66,000
Blue	£72,000	£48,605	52,000
Canary Vellow	£207,250	£107,630	113,500
Night Blue	£45,800	€27,405	61,000
Triumph	£28,000	£5,850	52,500
Silver	€28,000	£5,850	52,500
TVR	£29,750	-£8,150	52,500
Silver	£29,750	-£8,150	52,500
Germany	£145,750	-£15,850	284,720
Jaguar	£74,750	-£11,050	179,720
Green	£42,250	-£650	52,500
Red	£32,500	-£10,400	127,220
TVR	£71,000	-£4,800	105,000
Blue	£41,250	£3,350	52,500
Che	£29.750	.£8.150	52 5/1
Total 3	£31,839,190	£10,830,265	25,237,250

CountryName	Convertible	Coupe	Saloon	Total		
Mileage	65,250	157,500		222,750		
LaborCost	£486	£975		£1,461		
Bentley						
Mileage	65,250			65,250		
LaborCost	£486			£486		
Triumph						
Mileage		105,000		105,000		
LaborCost		£650		£650		
TVR						
Mileage		52,500		52,500		
LaborCost		£325		£325		
France						
Mileage	260,000	1,126,250	651,500	2,037,750		
LaborCost	£5,650	£19,767	£11,054	£36,471		
Aston Martin						
Mileage	260,000	826,500		1,086,500		
LaborCost	£5,650	£16,020		£21,670		
Bentley						
Mileage		52,500	262,500	315,000		
LaborCost		£486	£4,223	£4,709		
Jaguar						
Mileage		81,250	157,500	238,750		
LaborCost	-	£1,236	£1,561	£2,797		
Rolls Royce	7					
Mileage		61,000	231,500	292,500		
LaborCost		£1,250	£5,270	£6,520		
Triumph	1					
Mileage	2,109,500	13,306,950	9,820,800	25,237,250		
LaborCost	£28,624	£152,160	£131,175	£311,959		

Figure 2.8 A matrix with values as rows

Figure 2.5 . Matrix without Subtotal

£103,210

£180,100

£51,300

£5,850

-£8,150

315,000

238,750

292,500

52,500

52,500

£394,250

£212,000

£373,300

£28,000

£29,750

Bentley

Jaguar

Triumph

TVR

Rolls Royce



CountryName   SalePrice   Cost Plus Spares Margin   Mileage   SalePrice   Sa	VehicleType	Convertibl	e		Coupe			Saloon			Total		
Aston Martin   \$237,830	CountryName	SalePrice	Cost Plus Spares Margin	Mileage	SalePrice	Cost Plus Spares Margin	Mileage	SalePrice	Cost Plus Spares Margin	Mileage	SalePrice	Cost Plus Spares Margin	Mileage
Bentley   1236/750	USA												
Jaguar   L245.500   £139.700   105.000   £889.250   £69.410   1330.130   £1407.250   £419.380   1,677,190   £2,751,000   £244,680   3,112.320   Rolls Royce   £95.500   £62.250   157,500   £252.500   £140.000   680.000   £2394.300   £1007,780   1,108,190   £2,471,550   £10,480.10   1,169,190   £2,500   £55.500   £134.000   £10,000   £55.250   £149.000   £55.250   £149.000   £55.500   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £55.250   £149.000   £1,717.500   £2,471.550   £169.000   £477.500   £170.19.400   £1,717.500   £2,471.550   £169.400   £1,717.500   £2,471.550   £169.400   £1,717.500   £2,471.550   £169.400   £1,717.500   £2,471.550   £169.400   £1,117.500   £2,471.550   £169.400   £1,117.500   £2,471.550   £169.400   £1,117.500   £2,471.550   £169.400   £1,117.500   £2,471.550   £169.400   £1,117.500   £2,471.550   £169.400   £1,117.500   £2,471.550   £169.400   £1,117.500   £2,471.550   £169.400   £1,117.500   £1,441.600	Aston Martin	£237,630	£102,030	275,000	£3,484,530	£1,153,965	1,834,890				£3,722,160	£1,255,995	2,109,890
MGB         E95,500         £62,250         157,500         £22,500         £148,000         488,000         £1348,000         £2143,555         £168,010         £1,618,000         £1,007,780         £1,007,780         £1,007,780         £1,007,780         £269,000         £55,525         \$37,550         £209,000         £55,225         \$37,550         £209,000         £55,225         \$37,550         £209,000         £55,225         \$37,550         £209,000         £55,225         \$37,550         £209,000         £55,225         \$37,550         £209,000         £55,225         \$37,550         £209,000         £55,225         \$37,550         £4,933,500         £1,003,450         £1,003,450         £1,000,00         £1,003,450         £1,000,00         £1,000,00         £1,000,00         £1,000,00         £1,000,00         £2,000,00         £4,933,500         £4,933,500         £4,935,500         £530,250         £1,000,40         £1,000,00	Bentley	£236,750	£1,630	222,750	£316,250	£75,510	143,600	£1,326,750	£488,640	909,385	£1,879,750	£565,780	1,275,735
Rolls Royce   E77,250   £40,230   £10,000   £2,394,300   £1,007,780   1,108,190   £2,471,550   £10,48,010   1,169,190     F55,225   537,750   £55,250   537,550   £212,500   £25,200   £35,750     F77   F77	Jaguar	£245,500	£159,700	105,000	£898,250	£69,410	1,330,130	£1,607,250	£419,380	1,677,190	£2,751,000	£648,490	3,112,320
Triumph TVR	MGB	£95,500	£62,250	157,500	£252,500	£148,000	498,000				£348,000	£210,250	655,500
United Kingdom	Rolls Royce				£77,250	£40,230	61,000	£2,394,300	£1,007,780	1,108,190	£2,471,550	£1,048,010	1,169,190
United Kingdom	Triumph				£269,000	£55,225	537,750				£269,000	£55,225	537,750
Aston Martin   E4933,500   £1,703,450   £1,034,50   £1,33,500   £1,703,450   £1,33,500   £1,703,450   £1,33,500   £1,703,450   £1,343,500   £13,240   1,115,90   £2,407,750   £2869,440   3,033,910   MG8   £182,750   £13,1250   315,000   £480,250   £316,250   996,000   £43,19,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £1844,680   1,871,880   £4,319,750   £184,680   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,319,750   £184,080   1,871,880   £4,41,750   £184,080   1,871,880   £4,41,750   £184,080   1,871,880   £4,41,750   £184,080   1,871,880   £4,41,750   £184,080   1,871,880   £4,41,750   £184,470   £4,41,470	TVR				£212,500	-£34,900	315,000				£212,500	-£34,900	315,000
Bentley £390,750 £99,090 353,250 £577,500 £185,590 234,700 £1,439,500 £513,420 1,113,990 £2,407,750 £798,100 1,701,340  Jaguar  MGB £182,750 £131,250 315,000 £480,250 £316,250 996,000 £43,750 £22,761,750 £39,440 3,303,910  Rolls Royce  Roll Royce  R	United Kingdom												
Jaguar	Aston Martin				£4,933,500	£1,703,450	2,109,780				£4,933,500	£1,703,450	2,109,780
MGB         £182,750         £131,250         315,000         £480,250         £316,250         996,000         £4319,750         £1,844,680         1,871,880         £4,319,750         £184,680         1,871,880         £4,319,750         £184,680         1,871,880         £4,319,750         £184,680         1,871,880         £4,319,750         £160,400         1,115,250           TVR         £109,000         -£19,700         157,500         £109,000         -£19,700         157,500           Switzerland           Aston Martin         £153,500         £69,920         238,000         £389,670         £172,755         576,000         £161,830         71,195         £222,750         £161,830         71,195         £222,750         £161,830         71,195         £222,750         £161,830         71,195         £222,570         £114,760         238,750         £50,250         £99,750         £114,760         238,750         £450,250         £118,480         71,400         71,400         71,400         £18,480         71,195         £222,750         £118,480         £174,000         £11,400         £76,010         113,000         £118,480         £174,000         £18,480         £174,000         £118,480         £174,000         £18,580         £2,500	Bentley	£390,750	£99,090	353,250	£577,500	£185,590	234,700	£1,439,500	£513,420	1,113,990	£2,407,750	£798,100	1,701,940
Rolls Royce Triumph	Jaguar				£1,044,250	£41,620	1,343,190	£1,717,500	£327,820	1,960,720	£2,761,750	£369,440	3,303,910
Triumph    F530,250	MGB	£182,750	£131,250	315,000	£480,250	£316,250	996,000				£663,000	£447,500	1,311,000
TVR	Rolls Royce							£4,319,750	£1,844,680	1,871,880	£4,319,750	£1,844,680	1,871,880
Switzerland         Aston Martin         £153,500         £69,920         238,000         £389,670         £172,755         576,000         £543,170         £242,675         814,000           Bentley         £20,000         £82,100         52,500         £39,500         £50         127,220         £290,750         £114,760         238,750         £450,250         £196,910         418,470           Rolls Royce         £74,500         £42,480         61,000         £117,800         £76,010         113,000         £192,300         £118,490         174,000           TVR         £32,500         -£10,400         52,500         £32,500         -£10,400         52,500         £32,500         -£10,400         52,500         £46,750         £13,480         65,250         £46,750         £13,480         65,250         £46,750         £13,480         65,250         £47,750         £16,600         117,750         £47,750         £16,600         117,750         £47,750         £16,600         117,750         £47,750         £16,600         117,750         £44,000         £1,100         52,500         £74,750         £16,000         117,750         £44,000         £1,100         52,500         £74,750         £16,000         117,750         £47,750         £16,000<	Triumph				£530,250	£160,400	1,115,250				£530,250	£160,400	1,115,250
Aston Martin £153,500 £69,920 238,000 £389,670 £172,755 576,000 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £161,830 71,195 £222,750 £196,910 £184,470 Rolls Royce £450,250 £196,910 £184,470 £143,470 £	TVR				£109,000	-£19,700	157,500				£109,000	-£19,700	157,500
Bentley Jaguar £120,000 £82,100 \$2,500 £39,500 £50 127,220 £290,750 £114,760 238,750 £450,250 £196,910 418,470 Rolls Royce TVR £46,750 £13,480 65,250  Bentley £46,750 £13,480 65,250  Triumph TVR £47,750 £16,600 117,750 TVR £44,000 £11,00 \$2,500 £11,100 \$2,500  France  Aston Martin Bentley £267,570 £128,345 260,000 £1,219,640 £561,325 826,500  Bentley £46,000 £13,845 260,000 £1,219,640 £44,000 £27,520 £39,500 £128,780 £23,950 £13,875 £12,000 £31,000 £32,500  France  Aston Martin Bentley £267,570 £18,345 260,000 £1,219,640 £561,325 826,500  Bentley £48,000 £17,750 £25,000 £128,750 £128,345 260,000 £1,219,640 £561,325 826,500  France  Aston Martin £267,570 £18,805 £250 £30,800 £139,870 £113,870 £213,000 £13,000 £13,000 £10,000  France  Aston Martin £267,570 £18,805 £250 £30,800 £1,219,640 £561,325 826,500  Bentley £48,000 £1,219,640 £561,325 826,500 £128,780 £25,900 £373,300 £180,100 238,750  Rolls Royce £77,250 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,850 £25,00 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750  F1VR £27,750 £40,230 £10,850 £25,000 £296,050 £139,870 231,500 £373,300 £180,100 238,750	Switzerland												
Jaguar   £120,000   £82,100   52,500   £39,500   £50   127,220   £290,750   £114,760   238,750   £450,250   £196,910   418,470     Rolls Royce	Aston Martin	£153,500	£69,920	238,000	£389,670	£172,755	576,000				£543,170	£242,675	814,000
Rolls Royce	Bentley							£222,750	£161,830	71,195	£222,750	£161,830	71,195
TVR	Jaguar	£120,000	£82,100	52,500	£39,500	£50	127,220	£290,750	£114,760	238,750	£450,250	£196,910	418,470
Spain   Bentley	Rolls Royce				£74,500	£42,480	61,000	£117,800	£76,010	113,000	£192,300	£118,490	174,000
Bentley £46,750 £13,480 65,250  Jaguar  £29,750 -£8,150 127,220 £39,500 £1,600 52,500 £69,250 -£6,550 179,720  Triumph  TVR  £47,750 £16,600 117,750  £44,000 £1,100 52,500 £44,000 £1,100 52,500  Germany  Jaguar  £32,500 -£10,400 127,220 £42,250 -£650 52,500 £74,750 -£11,050 179,720  TVR  £32,500 -£10,400 127,220 £42,250 -£650 52,500 £74,750 -£11,050 179,720  TVR  £46,750 £16,600 117,750  £44,000 £1,100 52,500  France  Aston Martin  £267,570 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £44,000 -£25,570 52,500 £350,250 £128,780 262,500 £344,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,345 260,000 £1,219,640 £561,325 826,500 £128,780 262,500 £394,250 £103,210 315,000  Jaguar  £46,750 £128,740 £128	TVR				£32,500	-£10,400	52,500				£32,500	-£10,400	52,500
Jaguar         £29,750         -£8,150         127,220         £39,500         £1,600         52,500         £69,250         -£6,550         179,720           Triumph         £47,750         £16,600         117,750         £47,750         £16,600         117,750           TVR         £44,000         £1,100         52,500         £44,000         £1,100         52,500           Germany           Jaguar         £32,500         -£10,400         127,220         £42,250         -£650         52,500         £74,750         -£11,050         179,720           TVR         £71,000         -£4,800         105,000         £71,000         £42,250         -£650         52,500         £74,750         -£11,050         179,720           TVR         £71,000         -£4,800         105,000         £71,000         £42,250         -£650         52,500         £74,750         -£1,050         179,720           Aston Martin         £267,570         £128,345         260,000         £1,219,640         £561,325         826,500         £128,780         262,500         £394,250         £103,210         315,000           Jaguar         £86,250         £27,350         81,250         £125,750 <t< td=""><td>Spain</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Spain												
Triumph TVR  £47,750 £44,000 £1,100 £2,500 £42,550 £44,000 £1,100 £52,500 £44,000 £1,100 £52,500 £44,000 £1,100 £52,500 £44,000 £1,100 £52,500 £44,000 £1,100 £52,500 £74,750 £1,050 £71,000 £	Bentley	£46,750	£13,480	65,250							£46,750	£13,480	65,250
TVR	Jaguar				£29,750	-£8,150	127,220	£39,500	£1,600	52,500	£69,250	-£6,550	179,720
Germany   Jaguar   £32,500   -£10,400   127,220   £42,250   -£650   52,500   £74,750   -£11,050   179,720     TVR	Triumph				£47,750	£16,600	117,750				£47,750	£16,600	117,750
Jaguar         £32,500         -£10,400         127,220         £42,250         -£650         52,500         £74,750         -£11,050         179,720           TVR         £71,000         -£4,800         105,000         £71,000         -£4,800         105,000           France         Aston Martin         £267,570         £128,345         260,000         £1,219,640         £561,325         826,500         £128,780         262,500         £394,250         £103,210         315,000           Bentley         £44,000         -£25,570         52,500         £350,250         £128,780         262,500         £394,250         £103,210         315,000           Jaguar         £86,250         £27,350         81,250         £125,750         £23,950         157,500         £212,000         £51,300         238,750           Rolls Royce         £77,250         £40,230         61,000         £296,050         £139,870         231,500         £373,300         £180,100         292,500           Trumph         £28,000         £5,850         52,500         £28,000         £5,850         52,500           £29,750         +£8,150         52,500         £29,750         £29,750         £8,150         52,500	TVR				£44,000	£1,100	52,500				£44,000	£1,100	52,500
TVR	Germany												
France Aston Martin  E267,570  E128,345 260,000  E1,219,640  E44,000  E25,570  E24,000  E1,219,640  E44,000  E25,570  E23,500  E23,350  E23,000  E373,300  E38,000  E	Jaguar				£32,500	-£10,400	127,220	£42,250	-£650	52,500	£74,750	-£11,050	179,720
Aston Martin Bentley	TVR				£71,000	-£4,800	105,000				£71,000	-£4,800	105,000
Bentley £44,000 -£25,570 52,500 £350,250 £128,780 262,500 £394,250 £103,210 315,000  Jaguar £86,250 £27,350 81,250 £125,750 £23,950 157,500 £212,000 £51,300 238,750  Rolls Royce £77,250 £40,230 61,000 £296,050 £139,870 231,500 £373,300 £180,100 292,500  Triumph £28,000 £5,850 52,500 £28,000 £29,750 -£8,150 52,500  TVR	France												
Jaguar         £86,250         £27,350         £125,750         £23,950         157,500         £212,000         £51,300         238,750           Rolls Royce         £77,250         £40,230         61,000         £296,050         £139,870         231,500         £373,300         £180,100         292,500           Trumph         £28,000         £5,850         52,500         £28,000         £5,850         52,500           TVR         £29,750         £81,50         52,500         £29,750         £29,750         £81,50         52,500	Aston Martin	£267,570	£128,345	260,000	£1,219,640	£561,325	826,500				£1,487,210	£689,670	1,086,500
Rolls Royce	Bentley				£44,000	-£25,570	52,500	£350,250	£128,780	262,500	£394,250	£103,210	315,000
Triumph  £28,000 £5,850 52,500 £28,000 £5,850 52,500  TVR  £29,750 -£8,150 52,500 £29,750 -£8,150 52,500	Jaguar				£86,250	£27,350	81,250	£125,750	£23,950	157,500	£212,000	£51,300	238,750
Triumph  £28,000 £5,850 52,500 £28,000 £5,850 52,500  TVR  £29,750 -£8,150 52,500 £29,750 -£8,150 52,500	Rolls Royce		5		£77,250	£40,230	61,000	£296,050	£139,870	231,500	£373,300	£180,100	292,500
TVR £29,750 -£8,150 52,500 Figure 2.6 Pow 8. Column Matrix £29,750 -£8,150 52,500	Triumph				£28,000	£5,850	52,500				•	•	
	TVR				£29,750	-£8,150	52,500	Eim	uro 2.6. Pow & Column M	atriv	£29,750	-£8,150	52,500

VehicleType	Convertible		Coupe		Saloon		Total	
CountryName	Mileage	LaborCost	Mileage	LaborCost	Mileage	LaborCost	Mileage	LaborCost
9	65,250	£486	157,500	£975			222,750	£1,461
Bentley	65,250	£486					65,250	£486
Triumph			105,000	£650			105,000	£650
TVR			52,500	£325			52,500	£325
France	260,000	£5,650	1,126,250	£19,767	651,500	£11,054	2,037,750	£36,471
Aston Martin	260,000	£5,650	826,500	£16,020			1,086,500	£21,670
Bentley			52,500	£486	262,500	£4,223	315,000	£4,709
Jaguar			81,250	£1,236	157,500	£1,561	238,750	£2,797
Rolls Royce			61,000	£1,250	231,500	£5,270	292,500	£6,520
Triumph	6		52,500	£450			52,500	£450
TVR			52,500	£325			52,500	£325
Germany			232,220	£1,136	52,500	£325	284,720	£1,461
Jaquar			127,220	£486	52,500	£325	179,720	£811
TVR			105,000	£650	1		105,000	£650
Spain	65,250	£486	297,470	£1,461	52,500	£325	415,220	£2,272
Bentley	65,250	£486					65,250	£486
Jaguar			127,220	£486	52,500	£325	179,720	£811
Triumph			117,750	£650			117,750	£650
TVR			52,500	£325			52,500	£325
Switzerland	290,500	£5,325	816,720	£13,512	422,945	£8,370	1,530,165	£27,207
Aston Martin	238,000	£5,000	576,000	£10,950			814,000	£15,950
Bentley	The state of the last	Onion		- HOLDING	71,195	£2,237	71,195	£2,237
Jaguar	52,500	£325	127,220	£987	238,750	£3,933	418,470	£5,245
Rolls Royce		- CALLO	61,000	£1,250	113,000	£2,200	174,000	£3,450
TVR			52,500	£325			52,500	£325
United Kingdom	668,250	£6,394	5,956,420	£61,453	4,946,590	£62,105	11,571,260	£129,952
Aston Martin	The State of the S		2,109,780	£26,268		The state of the s	2,109,780	£26,268
Bentley	353,250	£4,444	234,700	£5,934	1,113,990	£20,865	1,701,940	£31,243
Jaguar	A STATE OF LINES OF STATE OF S		1,343,190	£15,476	1,960,720	£18,930	3,303,910	£34,406
MGB	315,000	£1,950	996,000	£5,850	MILITARITA	30000	1,311,000	£7,800
Total	2,109,500	£28,624	13,306,950	£152,160	9,820,800	£131,175	25,237,250	£311,959

Figure 2.7 A standard matrix with values as columns



VehicleType CountryName	Convertible Mileage	LaborCost	Coupe Mileage	LaborCost	Saloon Mileage	LaborCost	Total Mileage	LaborCost
France				T.				
Aston Martin	260,000	£5,650	826,500	£16,020			1,086,500	£21,670
Bentley			52,500	£486	262,500	£4,223	315,000	£4,709
Jaguar			81,250	£1,236	157,500	£1,561	238,750	£2,797
Rolls Royce		8 🔳	61,000	£1,250	231,500	£5,270	292,500	£6,520
Triumph			52,500	£450			52,500	£450
TVR			52,500	£325			52,500	£325
Total	260,000	£5,650	1,126,250	£19,767	651,500	£11,054	2,037,750	£36,471
Germany	THE RELEASE OF THE PARTY OF THE							
Jaguar			127,220	£486	52,500	£325	179,720	£811
TVR			105,000	£650			105,000	£650
Total			232,220	£1,136	52,500	£325	284,720	£1,461
Spain								
Bentley	65,250	£486					65,250	£486
Jaguar			127,220	£486	52,500	£325	179,720	£811
Triumph			117,750	£650			117,750	£650
TVR			52,500	£325			52,500	£325
Total	65,250	£486	297,470	£1,461	52,500	£325	415,220	£2,272
Switzerland								
Aston Martin	238,000	£5,000	576,000	£10,950			814,000	£15,950
Bentley	of transferred				71,195	£2,237	71,195	£2,237
Jaguar	52,500	£325	127,220	£987	238,750	£3,933	418,470	£5,245
Rolls Royce	i i i i i i i i i i i i i i i i i i i		61,000	£1,250	113,000	£2,200	174,000	£3,450
TVR			52,500	£325			52,500	£325
Total	290,500	£5,325	816,720	£13,512	422,945	£8,370	1,530,165	£27,207

Figure 2.9 Placing subtotals below groups

CountryName	Make	Color	SalePrice	Cost Plus Spares Margin	Mileage							
United Kingdom	Aston Martin	Blue	£858,250	£469,300	289,900	VehicleType	Convertible		Coupe		Saloon	
		Red	£732,500	£215,630	341,940	CountryName	Mileage	LaborCost	Mileage	LaborCost	Mileage	LaborCos
		Silver	£670,250	£250,870	289,720							
		Black	£665,250	£109,780	288,000	Bentley	65,250	£486				
		Dark Purple	£582,500	£305,920	255,000	Triumph	03,230	2100	105,000	£650		
		Night Blue	£446,250	£63,320	284,720	TVR			52,500	£325		
		Canary Yellow	£438,250	£81,170	195,000	France			32,300	1545		
		British Racing Green	£288,500	£86,410	60,500	Aston Martin	260,000	£5,650	826,500	£16,020		
		Green	£251,750	£121,050	105,000	III DAUGGER HER BEREIT	200,000	23,030	NAME OF TAXABLE	THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TRANSPORT	262.500	****
		Total	£4,933,500	£1,703,450	2,109,780	Bentley			52,500	£486	262,500	£4,22
	Rolls Royce	Red	£1,118,750	£547,300	420,000	Jaguar			81,250	£1,236	157,500	£1,56
	Marine Salar	British Racing Green	£830,250	£307,850	267.500	Rolls Royce		9	61,000	£1,250	231,500	£5,27
		Silver	£685,000	£362,200	288,000	Triumph			52,500	£450		
		Black	£521,750	£243,260	335,690	TVR			52,500	£325		
		Green	£401,500	£87,020	210,000	Germany						
		Dark Purple	£359.750	£202,570	15.000	Jaguar			127,220	£486	52,500	£32
		Blue	£310,750	£66,980	283,190	TVR			105,000	£650		
		Canary Yellow	£92,000	£27,500	52,500	Spain						
		Total	£4,319,750	£1,844,680	1,871,880	Bentley	65,250	£486				
	Jaguar	Canary Yellow	£562,250	£28,930	757,220	Jaguar			127,220	£486	52,500	£325
	Juguar	Blue	£428,000	-£45,770	463,250	Triumph			117,750	£650		
		Silver	£408,750	£49,650	430,000	TVR			52,500	£325		
		Red	£390,750	£153,600	315,000	Switzerland			\$110.00 mg			
		British Racing Green	£261,500	£68,680	269,250	Aston Martin	238,000	£5,000	576,000	£10,950		
		Dark Purple	£254,250	£53,310	340,500	Bentley	200,000				71,195	£2,23
		Green	£212.000	£30,060	337,220	Jaquar	52,500	£325	127,220	£987	238,750	£3,93
		Black	£165,250	£53,830	211,750	Rolls Royce	50,500		61,000	£1,250	113,000	
		Night Blue	£79.000	-£22,850	179.720	TVR			52,500	£325	113,000	ze,cu
Bentley		Total	£2,761,750	£369,440	3,303,910	United Kingdom			32,300	1525		
	Pantinu	Canary Yellow	£629,750	£162,650	347,450	Aston Martin			2,109,780	£26,268		
	Bendey	Red Red	£508.000	£219,370	445,940	THE RESERVE AND ADDRESS OF THE PARTY OF THE	252.252	*****	The second secon		1112000	C20.00
		Night Blue	£404,250	£149,510	267,500	Bentley	353,250	£4,444	234,700	£5,934	1,113,990	-
	10	Dark Purple	£404,250 £233,000	£43,560	235,500	Jaguar			1,343,190	£15,476	1,960,720	£18,930
	10	Green	£233,000	£162,450	57,500	MGB	315,000	£1,950	996,000	£5,850	0.000.000	
		Blue	£167,000	£49,540	138,050	Total	2,109,500	£28,624			9,820,800	£131,17
		British Racing Green	£152,250	£49,540 £54,410	105,000			Figure	2.10 Sel	ective su	btotals	

Figure 2.11 Sorting a matrix on values

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