



Data Visualisation with Google Fusion Tables

Workshop Exercises

Dr Luc Small | 25 June 2013 | 1.4

1 Introduction

Google Fusion Tables is shaping up to be a powerful and accessible data visualisation tool. While still in "beta", this cloud-based application has a useful feature set that is destined to grow with time.

In this exercise we use Google Fusion Tables to create a "heat map" of NSW highlighting crime hotspots. In order to accomplish this we will draw in and combine data from two sources.

The first is a comma-separated-values (CSV) file containing crime statistics for all Local Government Areas (LGAs) in NSW. The 152 LGAs in NSW are variously referred to as shires, councils, cities, etc. You can read all about them here:

- http://en.wikipedia.org/wiki/Local_government_areas_of_New_South_Wales

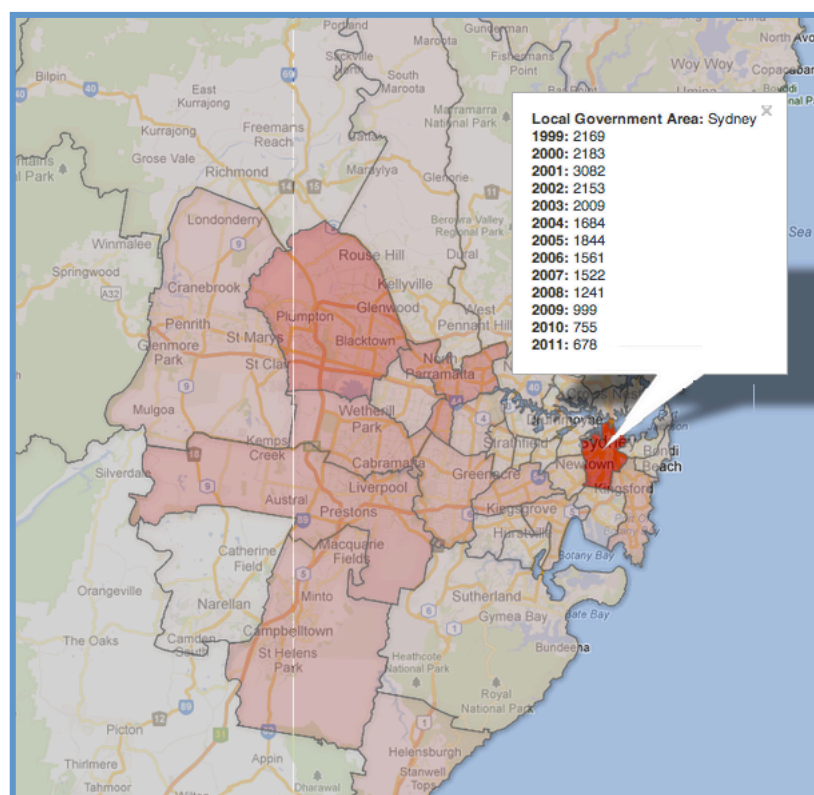
The crime statistics, meanwhile, can be obtained here:

- http://www.bocsar.nsw.gov.au/lawlink/bocsar/ll_bocsar.nsf/pages/bocsar_crime_stats

The second data source is a keyhole mark-up language (KML) file that describes the boundaries of all the LGAs in NSW using geospatial coordinates. This dataset is available here:

- <http://www.tallyroom.com.au/maps>

Once combined in Fusion Tables, we'll be able to generate visualisations like this:



2 Download your datasets

The first step is to download a copy of the datasets you'll need for the exercise.

First grab the LGA boundaries KML file by following this link:

- <http://bit.ly/Ntvncs>

Save the downloaded file to a convenient location, such as your Desktop.

The file is zipped to speed up the download, so double-click on the file to extract it.

You should now have a file at your chosen location (say the Desktop) called:

- AUS-NSW-LGA-2012.kml

Next, visit the "Specific Crime Information Tool" provided by the NSW Government by following this link:

- <http://bit.ly/J47gkw>

Select the "Region by Year" radio-box and click "Go to Step 2 >":

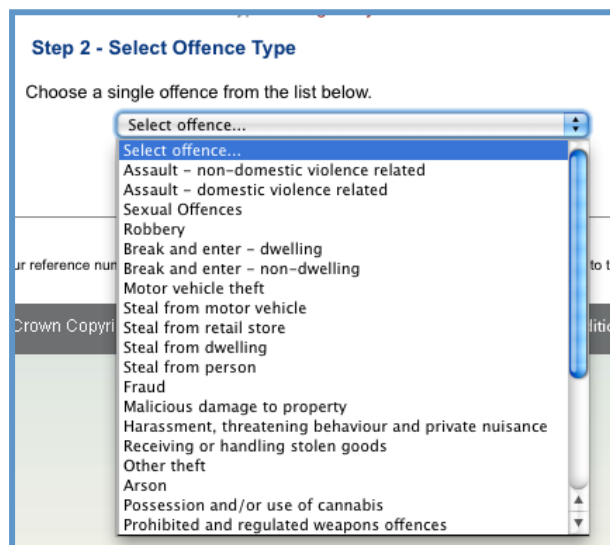


B) ☒ **Region by Year**
[View Example](#)

D) ☐ **Region By Offence**
[View Example](#)

[Go to Step 2 >](#)

Next, select an "Offence Type" that you're interested in seeing on the "heat map" and click "Go to Step 3>":



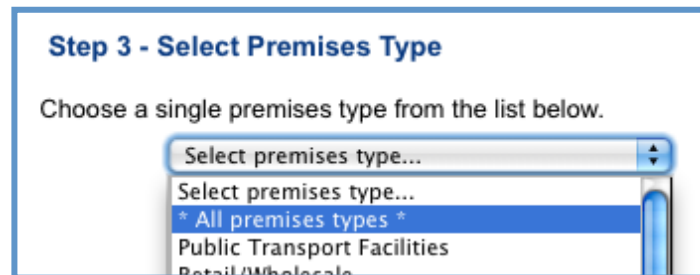
Step 2 - Select Offence Type

Choose a single offence from the list below.

Select offence...

- Select offence...
- Assault – non-domestic violence related
- Assault – domestic violence related
- Sexual Offences
- Robbery
- Break and enter – dwelling
- Break and enter – non-dwelling
- Motor vehicle theft
- Steal from motor vehicle
- Steal from retail store
- Steal from dwelling
- Steal from person
- Fraud
- Malicious damage to property
- Harassment, threatening behaviour and private nuisance
- Receiving or handling stolen goods
- Other theft
- Arson
- Possession and/or use of cannabis
- Prohibited and regulated weapons offences

Finally, select "* All premises types *" from the "Premises Type" dropdown list and click "Show Results":



Crime statistics will be displayed for all LGAs for the selected offence type:

Specific Crime Information Tool

Download this report as a file: [CSV](#) or [PDF](#)

Table 1. Recorded criminal incidents of **Robbery** occurring in premises of type **All Premises Types** by Local Government Area and year.

Local Government Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Albury	15	15	20	19	13	24	18	18	25	37	19	27	19
Armidale Dumaresq	20	15	15	11	22	19	13	9	10	4	9	6	3
Ashfield	179	155	177	159	155	111	78	71	82	56	41	60	36
Auburn	212	271	282	213	223	182	180	193	217	206	166	187	109
Ballina	11	14	13	4	11	9	10	13	26	9	14	12	10
Balranald	0	0	0	0	1	0	0	0	0	0	0	0	0
Bankstown	713	644	618	435	375	274	314	335	306	222	213	186	171

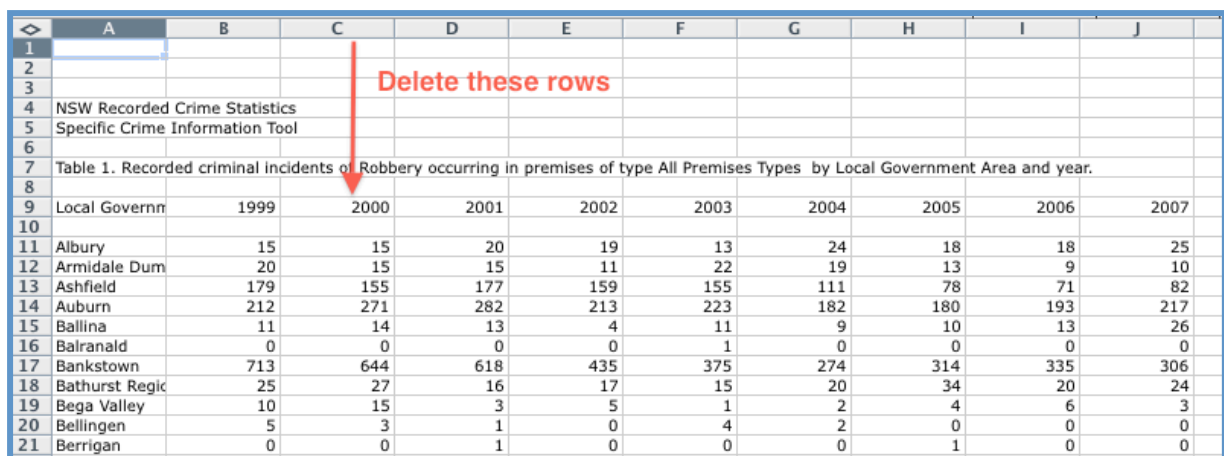
Click on the "Download this report as a file: [CSV](#)" link and save the file to a convenient location, such as the desktop. Note down the name of the file for future reference. You now have the two datasets you need to complete the exercise.

3 Clean up your data with Excel

The downloaded crime statistics CSV file contains some extraneous information that we need to remove.

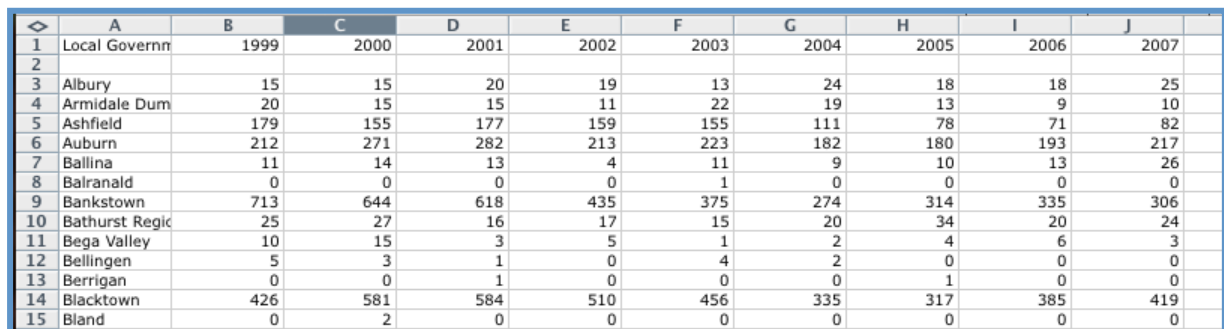
Launch Excel and open the crime statistics CSV file.

There is some textual information in the CSV file, before the table of data begins. These lines need to be deleted. Start by locating the line that begins with "Local Government Area", in this case it is line 9. Delete all the lines above it:



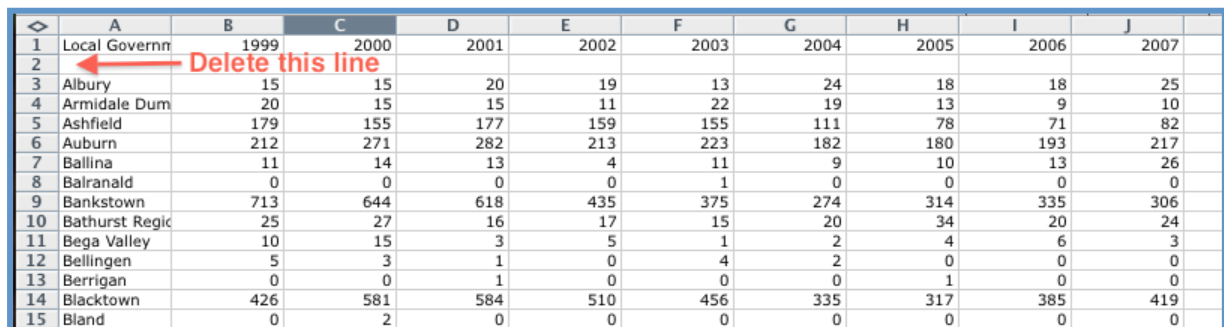
	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4	NSW Recorded Crime Statistics									
5	Specific Crime Information Tool									
6										
7	Table 1. Recorded criminal incidents of Robbery occurring in premises of type All Premises Types by Local Government Area and year.									
8										
9	Local Governm	1999	2000	2001	2002	2003	2004	2005	2006	2007
10										
11	Albury	15	15	20	19	13	24	18	18	25
12	Armidale Dum	20	15	15	11	22	19	13	9	10
13	Ashfield	179	155	177	159	155	111	78	71	82
14	Auburn	212	271	282	213	223	182	180	193	217
15	Ballina	11	14	13	4	11	9	10	13	26
16	Balranald	0	0	0	0	1	0	0	0	0
17	Bankstown	713	644	618	435	375	274	314	335	306
18	Bathurst Regic	25	27	16	17	15	20	34	20	24
19	Bega Valley	10	15	3	5	1	2	4	6	3
20	Bellingen	5	3	1	0	4	2	0	0	0
21	Berrigan	0	0	1	0	0	0	1	0	0

The spreadsheet will now look like this:



	A	B	C	D	E	F	G	H	I	J
1	Local Governm	1999	2000	2001	2002	2003	2004	2005	2006	2007
2										
3	Albury	15	15	20	19	13	24	18	18	25
4	Armidale Dum	20	15	15	11	22	19	13	9	10
5	Ashfield	179	155	177	159	155	111	78	71	82
6	Auburn	212	271	282	213	223	182	180	193	217
7	Ballina	11	14	13	4	11	9	10	13	26
8	Balranald	0	0	0	0	1	0	0	0	0
9	Bankstown	713	644	618	435	375	274	314	335	306
10	Bathurst Regic	25	27	16	17	15	20	34	20	24
11	Bega Valley	10	15	3	5	1	2	4	6	3
12	Bellingen	5	3	1	0	4	2	0	0	0
13	Berrigan	0	0	1	0	0	0	1	0	0
14	Blacktown	426	581	584	510	456	335	317	385	419
15	Bland	0	2	0	0	0	0	0	0	0

The next step is to delete the blank line between the first row (the "header row") and the third:



	A	B	C	D	E	F	G	H	I	J
1	Local Governm	1999	2000	2001	2002	2003	2004	2005	2006	2007
2										
3	Albury	15	15	20	19	13	24	18	18	25
4	Armidale Dum	20	15	15	11	22	19	13	9	10
5	Ashfield	179	155	177	159	155	111	78	71	82
6	Auburn	212	271	282	213	223	182	180	193	217
7	Ballina	11	14	13	4	11	9	10	13	26
8	Balranald	0	0	0	0	1	0	0	0	0
9	Bankstown	713	644	618	435	375	274	314	335	306
10	Bathurst Regic	25	27	16	17	15	20	34	20	24
11	Bega Valley	10	15	3	5	1	2	4	6	3
12	Bellingen	5	3	1	0	4	2	0	0	0
13	Berrigan	0	0	1	0	0	0	1	0	0
14	Blacktown	426	581	584	510	456	335	317	385	419
15	Bland	0	2	0	0	0	0	0	0	0

The spreadsheet will now look like this:

	A	B	C	D	E	F	G	H	I	J
1	Local Governm	1999	2000	2001	2002	2003	2004	2005	2006	2007
2	Albury	15	15	20	19	13	24	18	18	25
3	Armidale Dum	20	15	15	11	22	19	13	9	10
4	Ashfield	179	155	177	159	155	111	78	71	82
5	Auburn	212	271	282	213	223	182	180	193	217
6	Ballina	11	14	13	4	11	9	10	13	26
7	Bairanald	0	0	0	0	1	0	0	0	0
8	Bankstown	713	644	618	435	375	274	314	335	306
9	Bathurst Regic	25	27	16	17	15	20	34	20	24
10	Bega Valley	10	15	3	5	1	2	4	6	3
11	Bellingen	5	3	1	0	4	2	0	0	0
12	Berrigan	0	0	1	0	0	0	1	0	0

Now scroll to the bottom of the spreadsheet and delete all the lines from the line beginning "Total" to the end of the file:

	A	B	C	D	E	F	G	H	I	J
150	Wollondilly	11	5	12	8	6	4	11	9	4
151	Wollongong	186	257	278	257	163	168	184	175	157
152	Woollahra	95	104	113	67	88	70	61	75	71
153	Wyong	117	110	98	72	72	63	86	56	54
154	Yass Valley	0	2	2	1	1	2	0	1	1
155	Young	0	5	3	3	4	1	1	1	2
156	Total	11323	12078	13913	10610	9710	7900	7946	7658	7453
157										
158	* See Help for further details on what types of premises fall under each premises category.									
159										
160	Source: NSW Bureau of Crime Statistics and Research									
161										
162	Your reference number is: 2012-423250-3. Important: Please quote this number when referring to this data query.									

The spreadsheet will now look like this:

	A	B	C	D	E	F	G	H	I	J
150	Wollondilly	11	5	12	8	6	4	11	9	4
151	Wollongong	186	257	278	257	163	168	184	175	157
152	Woollahra	95	104	113	67	88	70	61	75	71
153	Wyong	117	110	98	72	72	63	86	56	54
154	Yass Valley	0	2	2	1	1	2	0	1	1
155	Young	0	5	3	3	4	1	1	1	2
156										

Save the updated CSV file and quit Excel.

4 Sign into Google Drive

You need a Google Account in order to use Fusion Tables. If you don't already have one, you can create one here:

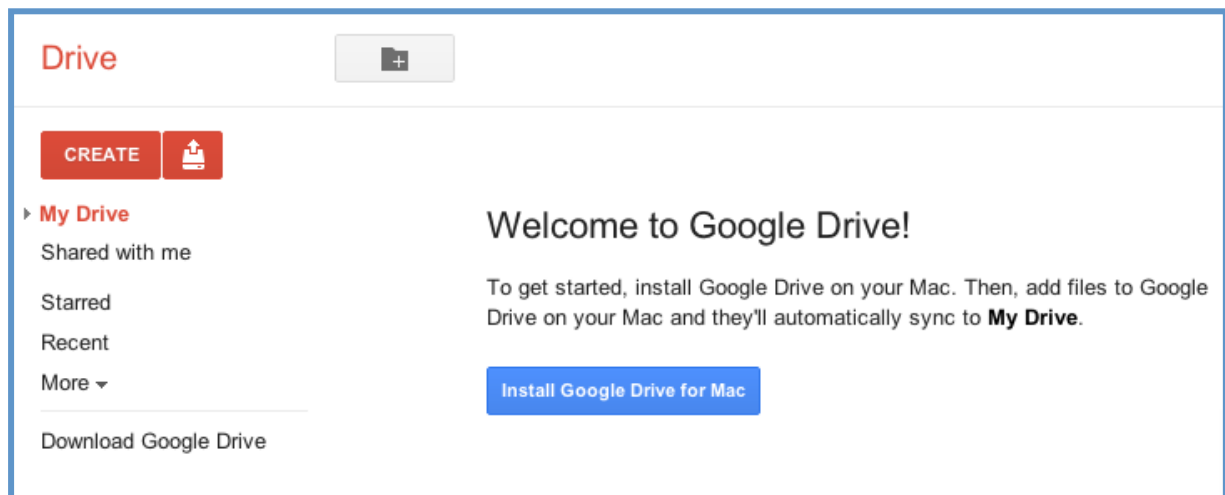
- <https://accounts.google.com/NewAccount>

The next step is to sign into Google Drive by browsing to:

- <https://drive.google.com/>

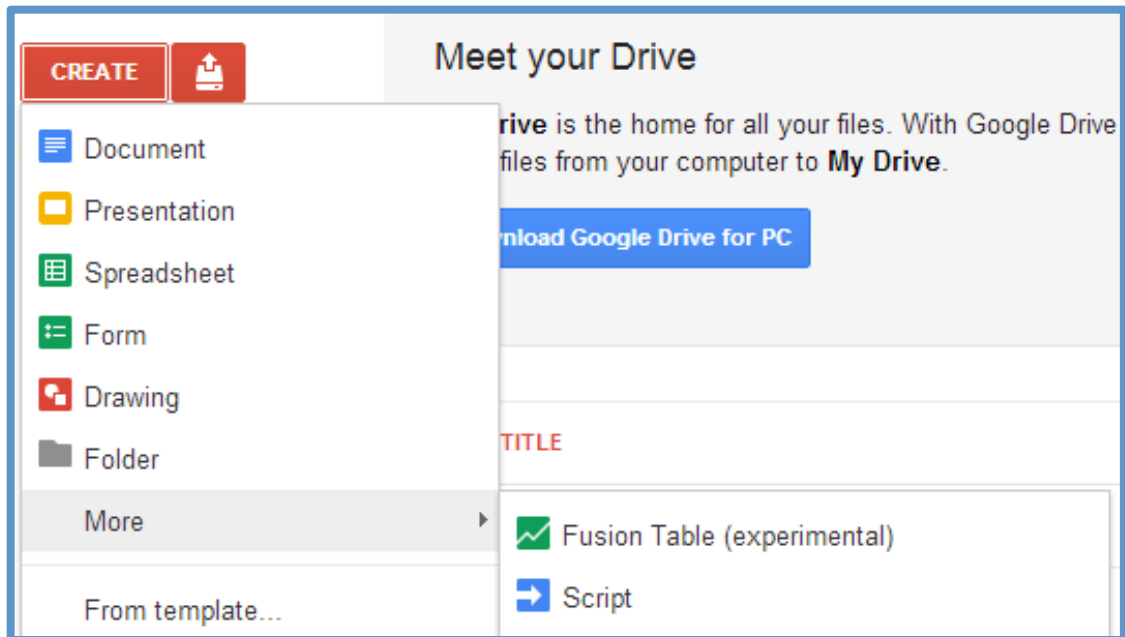
And logging into your Google Account.

Once you're logged into Google Drive, the interface should look similar to this:

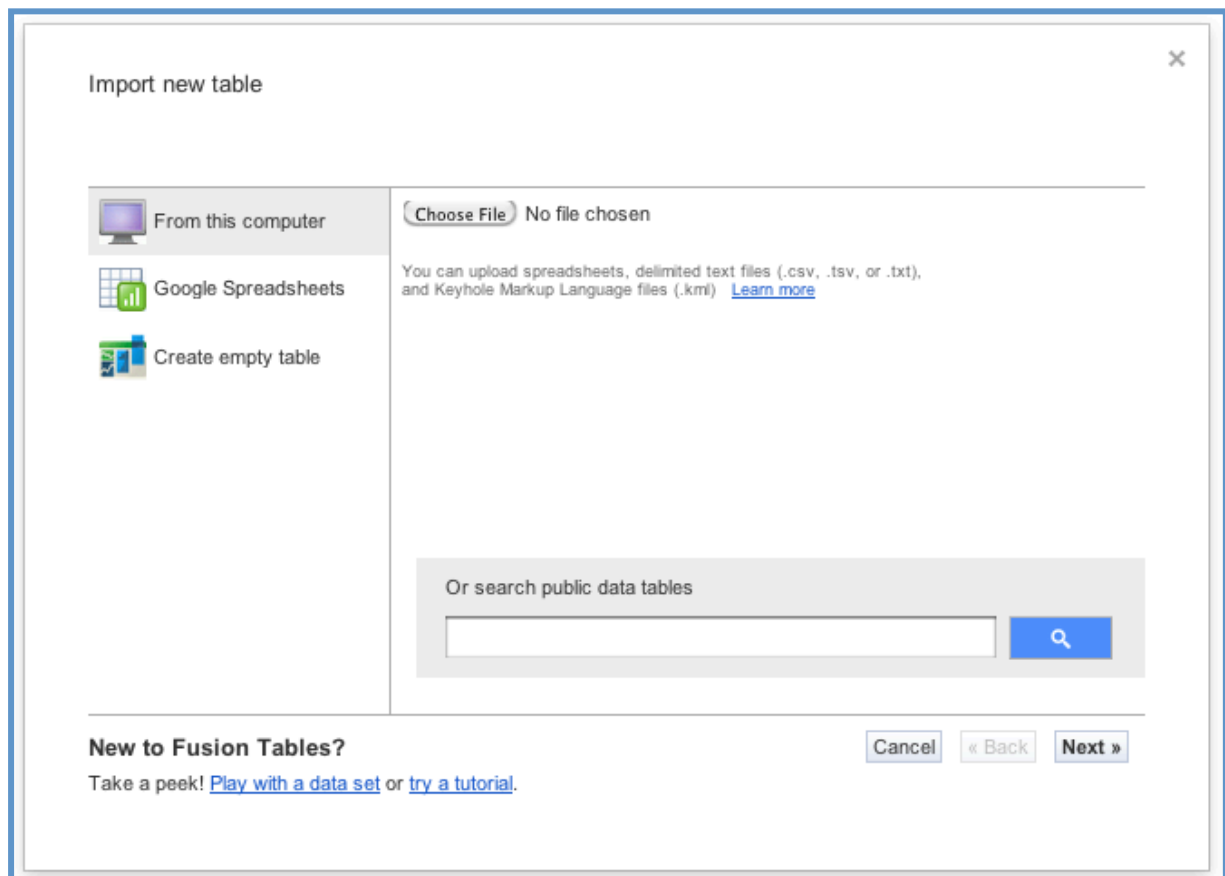


5 Importing the LGA boundaries

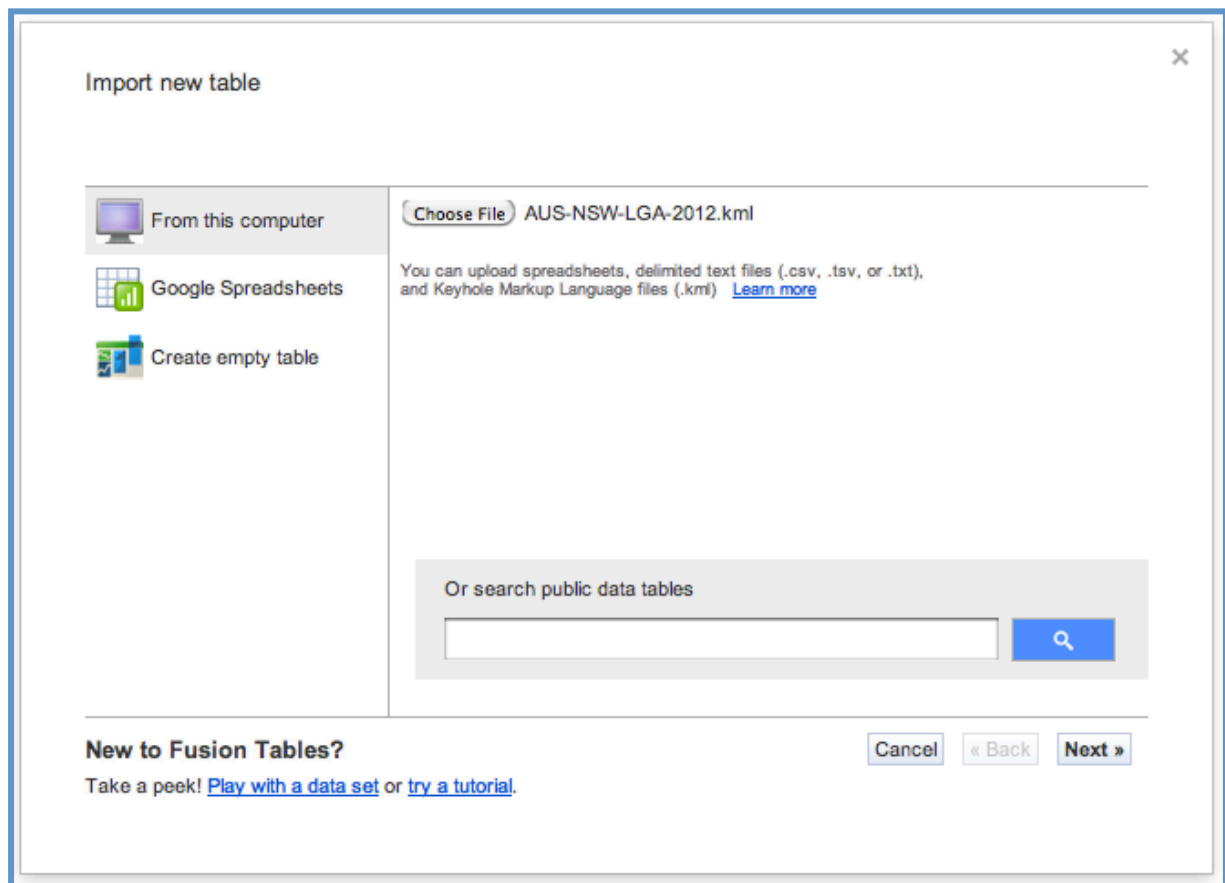
Start by clicking on the "Create" button, then mouse over "More" and select the "Fusion Table" option:



The first screen will ask you to Import a table:



Ensure "From this computer" is selected and then click the "Choose File" button. In the dialog box that appears, browse to the folder containing the "AUS-NSW-LGA-2012.kml" (e.g. the Desktop) and select the file, and close off the dialog box. The screen should now look like this:



Click the "Next >>" button.

The next screen will look like this:

Import new table

Column names are in row

1

1	description	name	geometry
2	<div class="googft-info-window" style="font-family...	Botany Bay	<Polygon> <outerBoundaryIs> <LinearRing> <coordinates...
3	<div class="googft-info-window" style="font-family...	Randwick	<Polygon> <outerBoundaryIs> <LinearRing> <coordinates...
4	<div class="googft-info-window" style="font-family...	Sydney	<Polygon> <outerBoundaryIs> <LinearRing> <coordinates...
5	<div class="googft-info-window" style="font-family...	Waverley	<Polygon> <outerBoundaryIs> <LinearRing> <coordinates...
	<div class="googft-info...		<Polygon>

Rows before the header row will be ignored.

New to Fusion Tables?

Take a peek! [Play with a data set](#) or [try a tutorial](#).

Cancel

« Back

Next »

There's no need to change any of the default settings, so just click the "Next >>" button again. On the next screen, complete some basic metadata about your table, as follows:

Table name	New South Wales LGA Boundaries
Allow export	<i>Un-tick this check box</i>
Attribute data to	Tally Room
Attribution page link	http://www.tallyroom.com.au/maps
Description	Boundary definitions of NSW LGAs, based on a source KML file provided by the Tally Room website under a Creative Commons Attribution Non-Commercial licence.

The screen should look something like this:

Import new table

Table name

New South Wales LGA Boundaries

Allow export

☐ ?

Attribute data to

Tally Room ?

Attribution page link

<http://www.tallyroom.com/>

Description

Boundary definitions of NSW LGAs, based on a source KML file provided by the Tally Room website under a Creative Commons Attribution Non-Commercial licence.

For example, what would you like to remember about this table in a year?

New to Fusion Tables?

Cancel

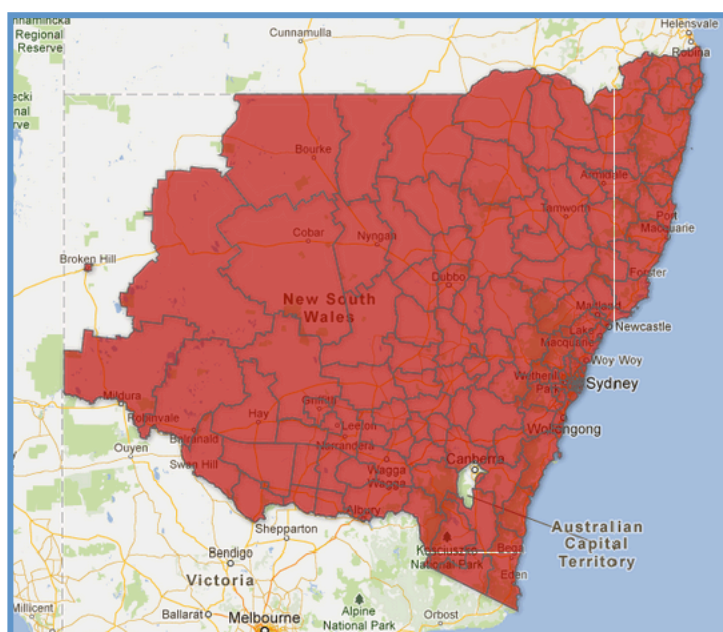
« Back

Finish

Take a peek! [Play with a data set](#) or [try a tutorial](#).

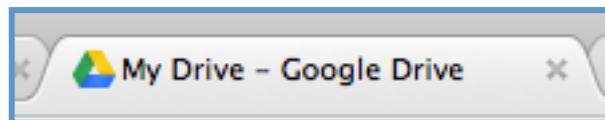
Click the "Finish" button. The main Fusion Tables interface should open, with a default tabular view.

Verify your work by selecting the "Map" option from the visualise menu. The map drawn should look like this:

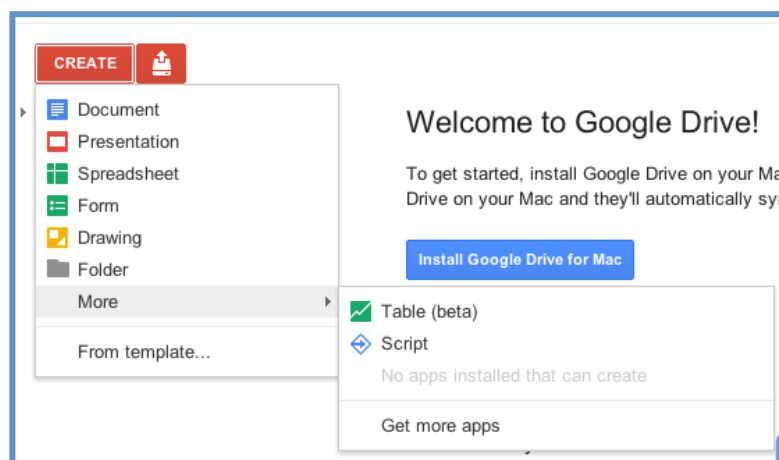


6 Importing the Crime Statistics

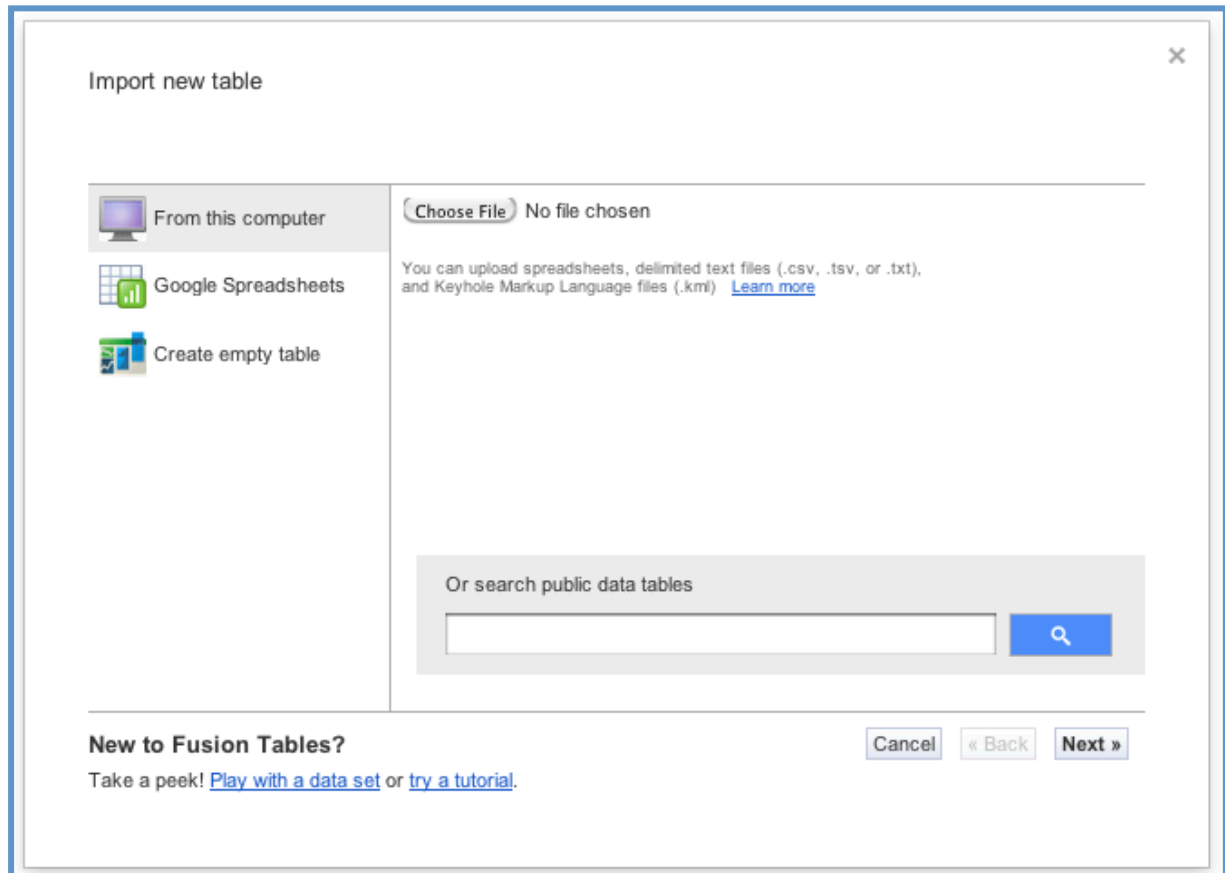
Return to the Google Drive tab in your browser:



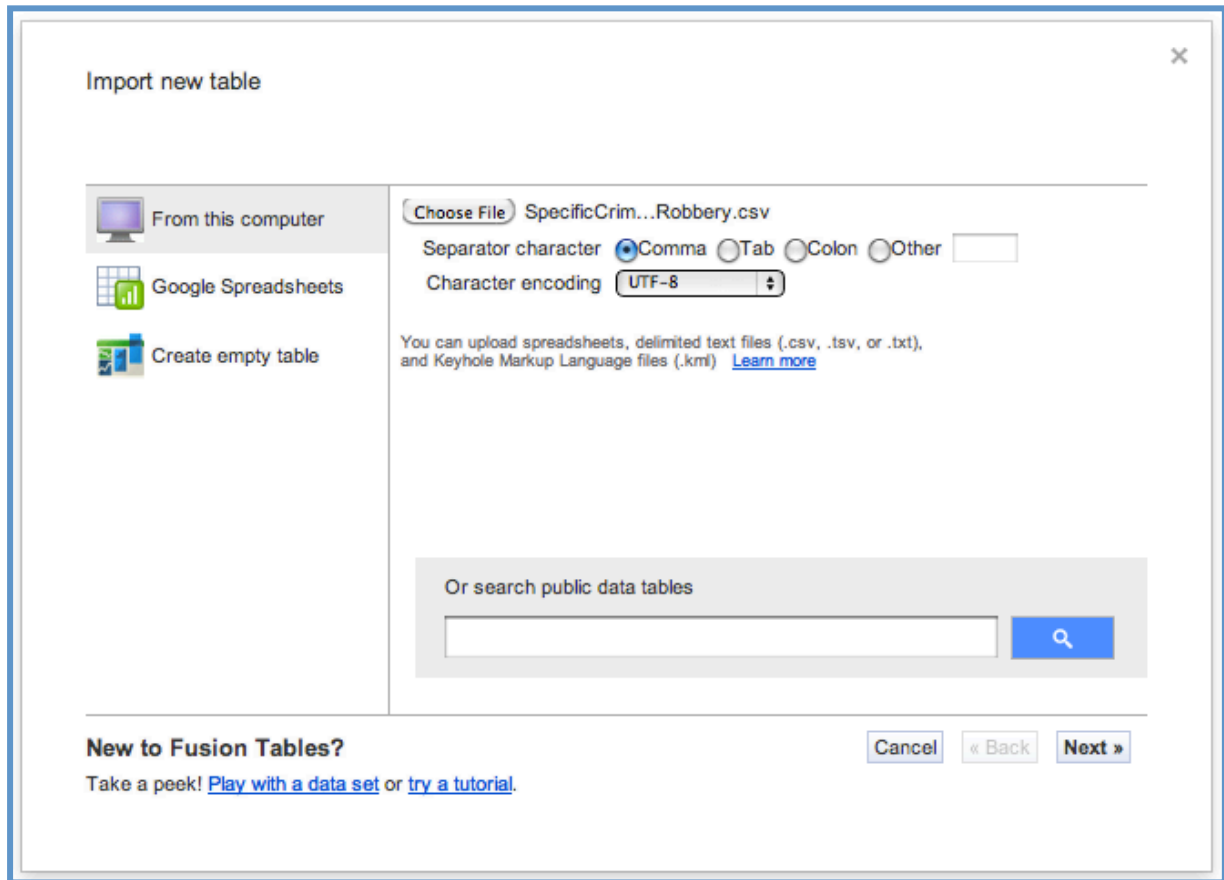
Repeat the process of creating a Google Fusion Table by clicking on the "Create" button, then mouse over "More" and select the "Table (beta)" option:



The first screen will ask you to Import a table:



Ensure "From this computer" is selected and then click the "Choose File" button. In the dialog box that appears, browse to the folder containing your downloaded crime statistics file (e.g. the Desktop) and select the file, and close off the dialog box. The screen should now look approximately like this:



Import new table

From this computer

Google Spreadsheets

Create empty table

Choose File SpecificCrim...Robbery.csv

Separator character ☒ Comma ☐ Tab ☐ Colon ☐ Other

Character encoding UTF-8

You can upload spreadsheets, delimited text files (.csv, .tsv, or .txt), and Keyhole Markup Language files (.kml) [Learn more](#)

Or search public data tables

Cancel « Back Next »

New to Fusion Tables?

Take a peek! [Play with a data set](#) or [try a tutorial](#).

Leave all the settings as their defaults and click the "Next >>" button.

A new screen will appear. In the "Column names are in row" drop down box, leave the default of "1". In the preview area, verify that the bold row contains columns for "Local Government Area" and the years from 1999. Click "Next >>".

Import new table

Column names are in row 1

1	Local Governme Area	1999	2000	2001	2002	2003	2004	2005
2	Albury	15	15	20	19	13	24	18
3	Armidale Dumaresq	20	15	15	11	22	19	13
4	Ashfield	179	155	177	159	155	111	78
5	Auburn	212	271	282	213	223	182	180
6	Ballina	11	14	13	4	11	9	10
7	Balranald	0	0	0	0	1	0	0
8	Bankstown	713	644	618	435	375	274	314
9	Bathurst Regional	25	27	16	17	15	20	34
10	Bega Valley	10	15	3	5	1	2	4

Rows before the header row will be ignored.

New to Fusion Tables?

Cancel

« Back

Next »

Take a peek! [Play with a data set](#) or [try a tutorial](#).

On the next screen, complete some basic metadata about your table, as follows:

Table name	Crime Statistics - <Your chosen type of crime>
Allow export	<i>Un-tick this check box</i>
Attribute data to	NSW Bureau of Crime Statistics and Research
Attribution page link	http://www.bocsar.nsw.gov.au/
Description	Data sourced from the NSW Bureau of Crime Statistics and Research Online Data tools.

The screen should look something like this:

Import new table

Table name

Crime Statistics - Robbery

Allow export

☐ ?

Attribute data to

NSW Bureau of Crime Sta ?

Attribution page link

http://www.bocsar.nsw.go

Description

Data sourced from the NSW Bureau of Crime Statistics and Research Online Data tools.

For example, what would you like to remember about this table in a year?

New to Fusion Tables?

Take a peek! [Play with a data set](#) or [try a tutorial](#).

Cancel

« Back

Finish

Click the "Finish" button. The main Google Fusion Tables interface will open:

Crime Statistics - Robbery
Data sourced from the NSW Bureau of Crime Statistics and Research Online Data tools.
NSW Bureau of Crime Statistics and Research - Edited at 5:04 PM

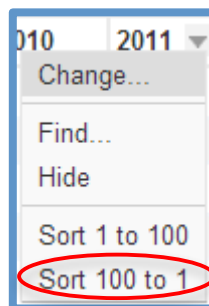
File Edit Tools Help Rows 1 Cards 1 Map of Local...

Filter No filters applied. Sorted by 'Local Government Area'

1-100 of 154

Local Government Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Albury	15	15	20	19	13	24	18	18	25	37	19	27	19
Armidale Dumaresq	20	15	15	11	22	19	13	9	10	4	9	6	3
Ashfield	178	155	175	159	155	111	78	71	82	58	42	60	35
Auburn	212	271	282	213	223	182	180	193	217	206	166	187	109
Ballina	11	14	13	4	11	9	10	13	26	9	14	12	10
Balranald	0	0	0	0	1	0	0	0	0	0	0	0	0
Bankstown	714	643	616	437	376	274	319	337	308	222	214	186	169
Bathurst Regional	25	27	16	17	15	20	34	20	24	13	13	12	23
Bega Valley	10	15	3	5	1	2	4	6	3	2	1	4	1
Bellingen	5	3	1	0	4	2	0	0	0	2	4	3	2
Berrigan	0	0	1	0	0	0	1	0	0	0	0	1	0
Blacktown	424	581	583	510	455	336	316	385	421	406	378	390	335
Bland	0	2	0	0	0	0	0	0	0	1	1	1	1
Blayney	0	0	2	0	0	0	0	0	0	0	0	0	0
Blue Mountains	41	60	42	28	25	33	28	45	31	37	33	30	21

Click the "2011" column and select "Sort 100-1":



The first row of the table will now contain the LGA in which the chosen type of crime occurred most frequently in 2011. Note down the figure in the 2011 column for this row since we'll need it later. In the case of robberies, this figure is 674:

Local Government Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney	2169	2183	3081	2153	2007	1675	1834	1554	1518	1240	997	750	674

7 Merging the Tables

Next we need to merge our tables, so that the crime statistics and geographic information are together in the same table.

While still in your Crime Statistics table, from "File", click the "Merge". The following dialog box will appear:

Merge: Select a table

<input type="checkbox"/>	<input checked="" type="checkbox"/>	New South Wales LGA Boundaries	5:23 PM
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Crime Statistics - Robbery	5:04 PM

Or paste a web address here:

Select "New South Wales LGA Boundaries":

Merge: Select a table

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	New South Wales LGA Boundaries
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Crime Statistics - Robbery

Or paste a web address here:

Click "Next" button. The next screen will look like this:

×

Merge: Confirm source of match

This table

Local Government Area ▾

Albury
Armidale Dumaresq
Ashfield
Auburn
Ballina
Balranald
Bankstown
Bathurst Regional
Bega Valley
Bellingen

New South Wales LGA Boun...

description ▾

<div class="googft-info-window">
<div class="googft-info-window">
<div class="googft-info-window">
<div class="googft-info-window">
<div class="googft-info-window">
<div class="googft-info-window">
<div class="googft-info-window">
<div class="googft-info-window">
<div class="googft-info-window">

Matching values in these two columns will create the merged table. [Learn more](#)

Cancel

Previous

Next

You have to click “description” and select “name”. The screen will look like this:

×

Merge: Confirm source of match

This table

Local Government Area ▾

Albury
Armidale Dumaresq
Ashfield
Auburn
Ballina
Balranald
Bankstown
Bathurst Regional
Bega Valley
Bellingen

New South Wales LGA Boun...

name ▾

Botany Bay
Randwick
Sydney
Waverley
Woollahra
Ashfield
Burwood
Canada Bay
Canterbury
Leichhardt

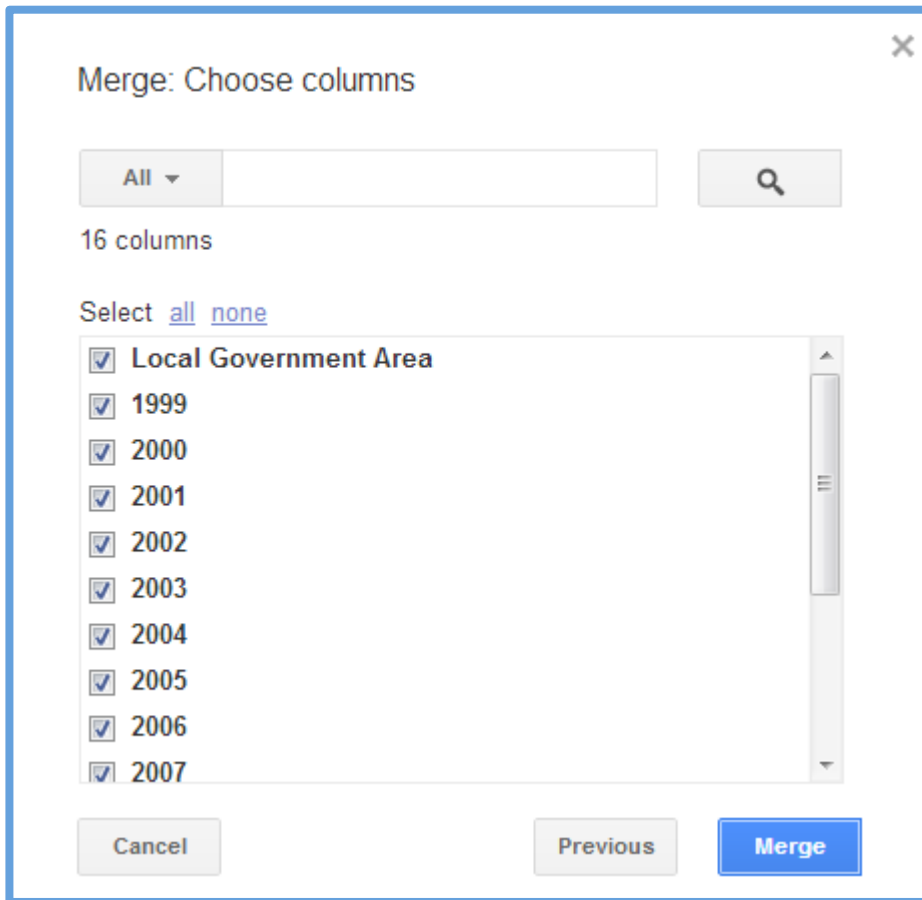
Matching values in these two columns will create the merged table. [Learn more](#)

Cancel

Previous

Next

Click "Next":



Merge: Choose columns

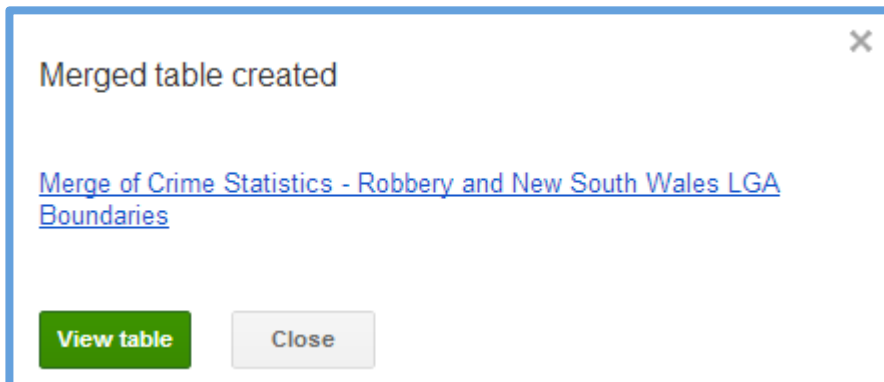
All

16 columns

Select [all](#) [none](#)

<input checked="" type="checkbox"/>	Local Government Area
<input checked="" type="checkbox"/>	1999
<input checked="" type="checkbox"/>	2000
<input checked="" type="checkbox"/>	2001
<input checked="" type="checkbox"/>	2002
<input checked="" type="checkbox"/>	2003
<input checked="" type="checkbox"/>	2004
<input checked="" type="checkbox"/>	2005
<input checked="" type="checkbox"/>	2006
<input checked="" type="checkbox"/>	2007

Keep all years selected and click "Merge" button. You will receive the following message:



Merged table created

[Merge of Crime Statistics - Robbery and New South Wales LGA Boundaries](#)

Click the "View table" button. You will see the merged table:

Merge of Crime Statistics - Robbery and New South Wales LGA Boundaries

NSW Bureau of Crime Statistics and Research, Tally Room - Edited at 1:38 PM


File Edit Tools Help Rows 1 Cards 1 Map of geometry

Filter No filters applied

1-100 of 154

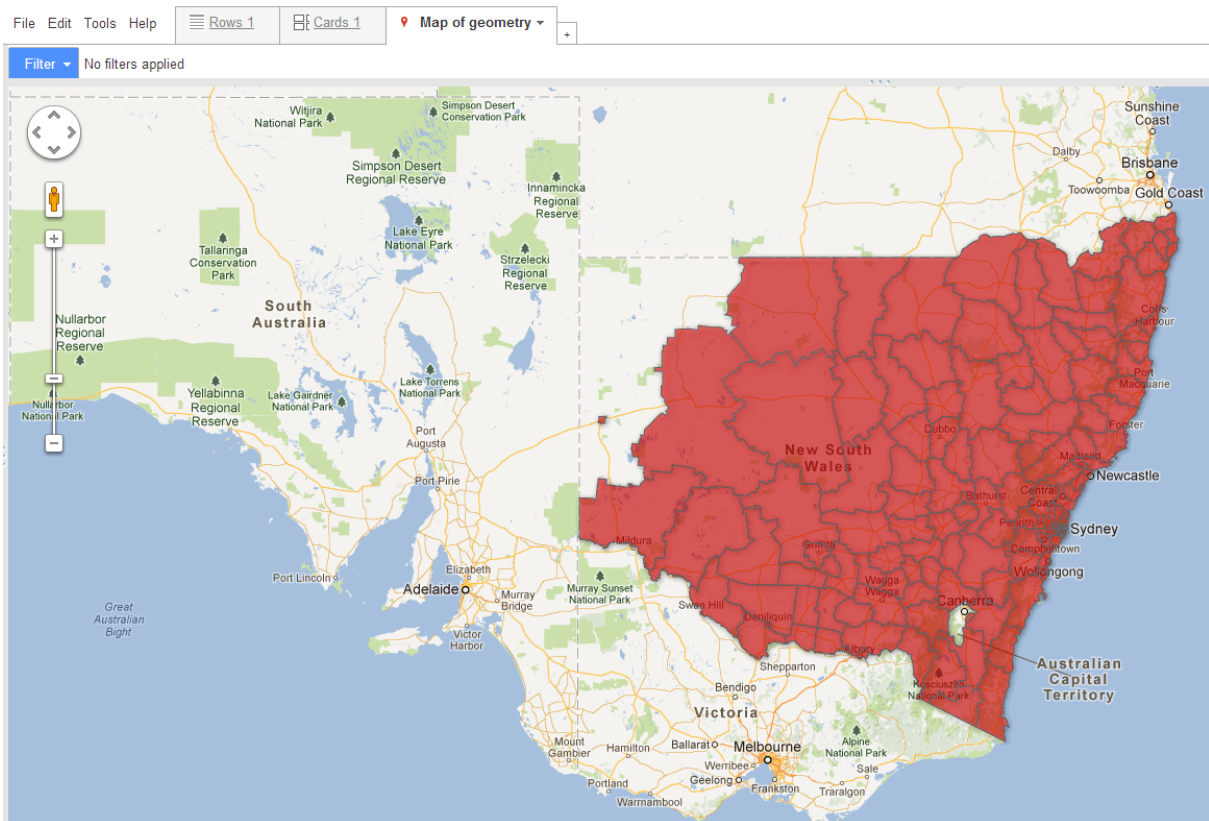
Local Government Area	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	description	geometry
Albury	15	15	20	19	13	24	18	18	25	37	19	27	19	<div class="googt-info-window" style="font-family..."	KML...
Armidale Dumaresq	20	15	15	11	22	19	13	9	10	4	9	6	3	<div class="googt-info-window" style="font-family..."	KML...
Ashfield	178	155	175	159	155	111	78	71	82	58	42	60	35	<div class="googt-info-window" style="font-family..."	KML...
Auburn	212	271	282	213	223	182	180	193	217	206	166	187	109	<div class="googt-info-window" style="font-family..."	KML...

8 Creating the "Heat Map"

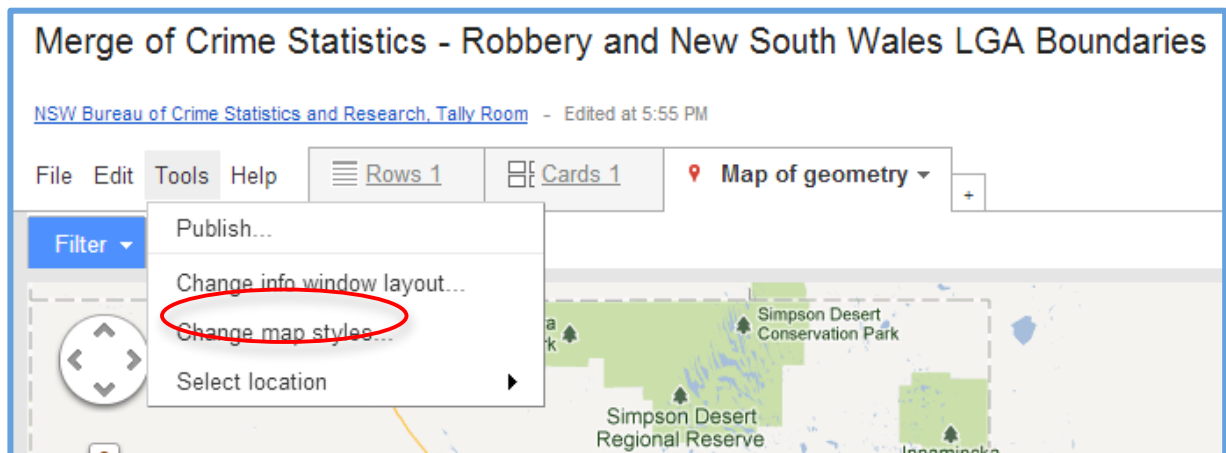
On the merged table, click "  [Map of geometry](#) ". A map will appear like this:

Merge of Crime Statistics - Robbery and New South Wales LGA Boundaries

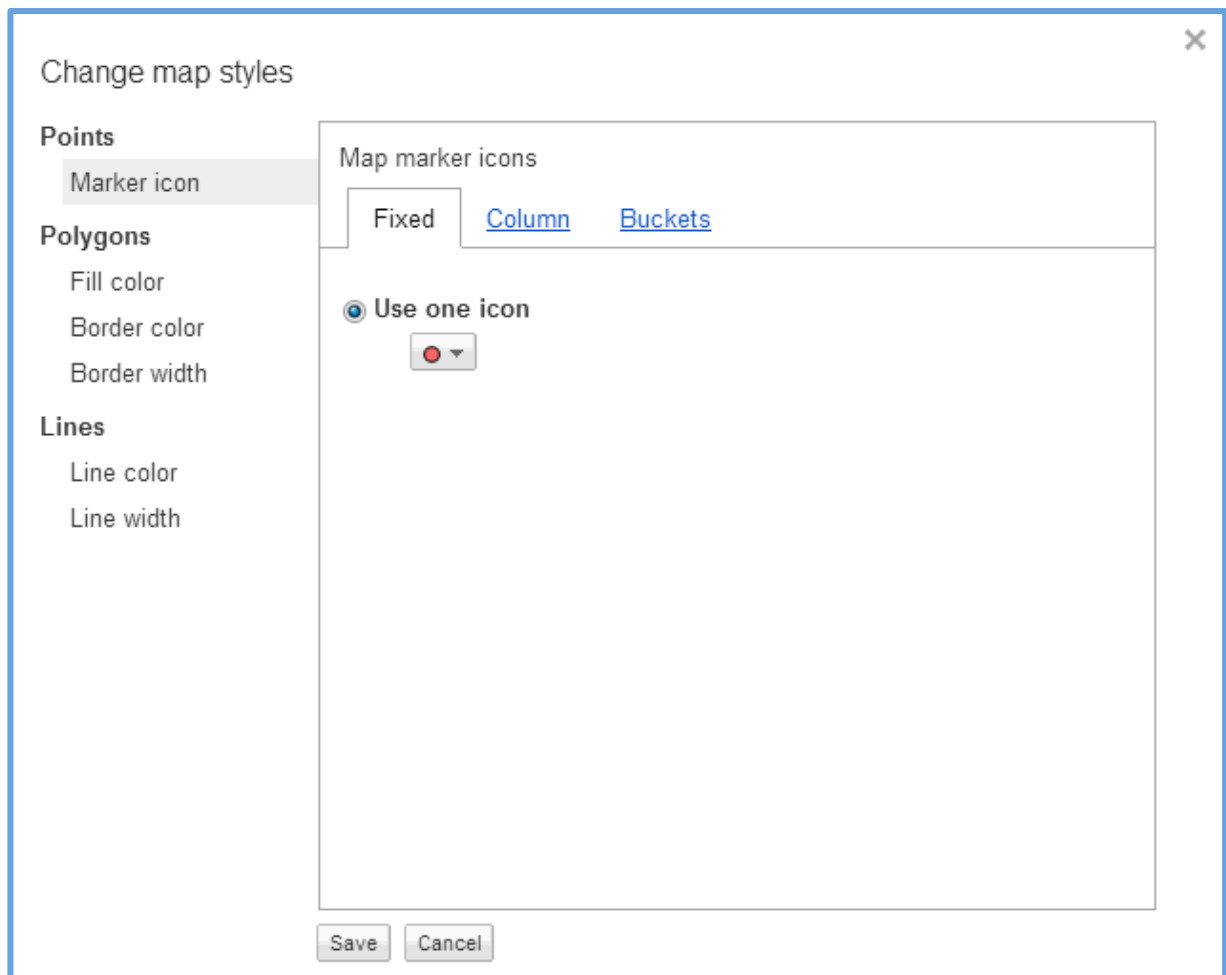
[NSW Bureau of Crime Statistics and Research, Tally Room](#) - Edited at 1:38 PM



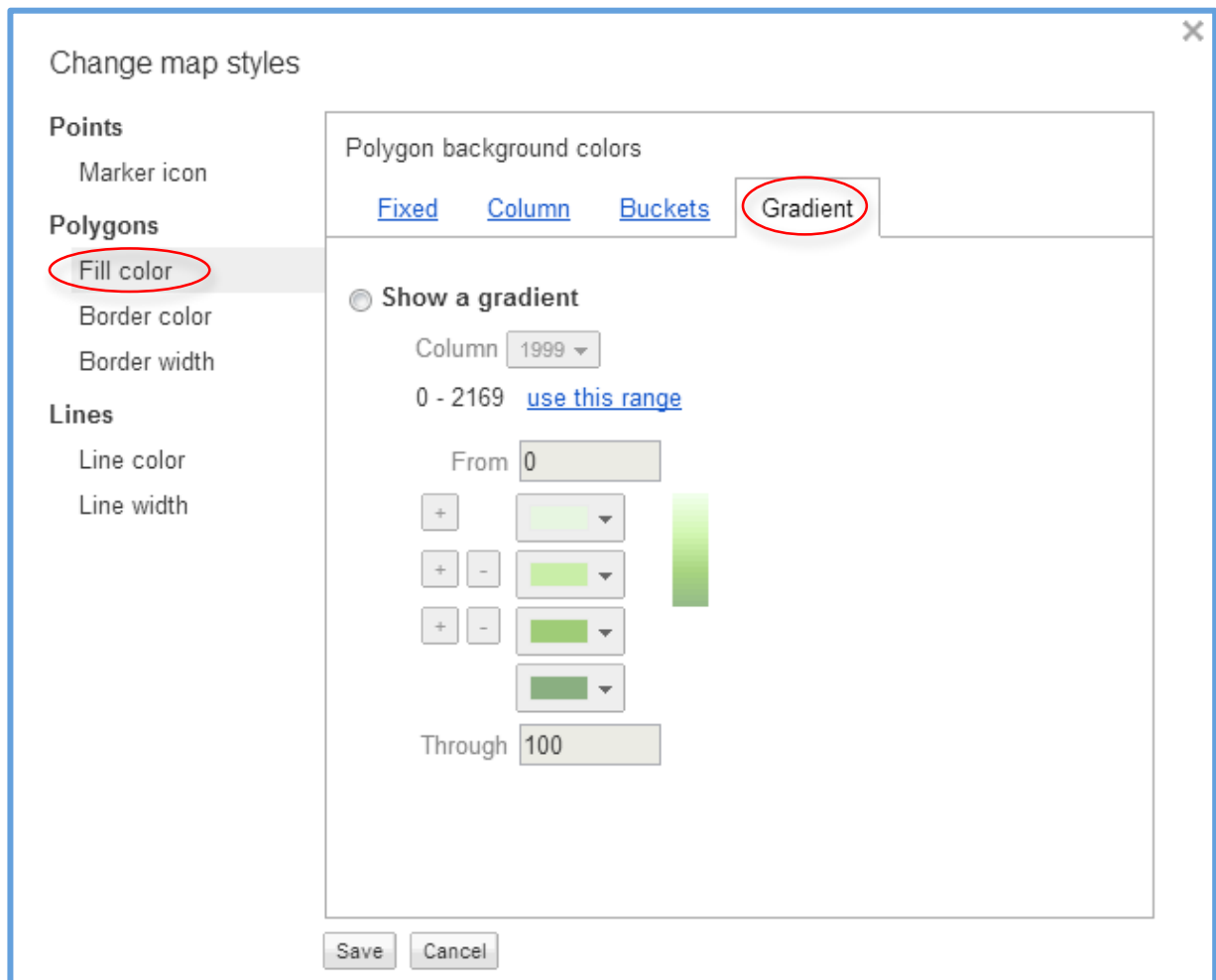
From "Tools", select "Change map styles...":



You will see a dialogue box looking like this:



Select "Fill color" under "Polygons". Then select the "Gradient" tab. The following dialogue box will be displayed:



Once that's done:

1. Click "Show a gradient" and choose "2011" from the drop down list of columns.
2. Click the two minus signs, so that you only have two gradient color boxes shown.
3. Leave "From" as 0 and change "Through" to reflect the highest value for the "2011" column as determined above. *In the case of robberies, this figure was 674, but I've rounded up the value to 700.*

The dialog box should now look similar to below:

Change map styles

Points

Marker icon

Polygons

Fill color

Border color

Border width

Lines

Line color

Line width

Polygon background colors

[Fixed](#)
[Column](#)
[Buckets](#)

Gradient

Show a gradient

Column 2011

0 - 674 [use this range](#)

From 0

+

+

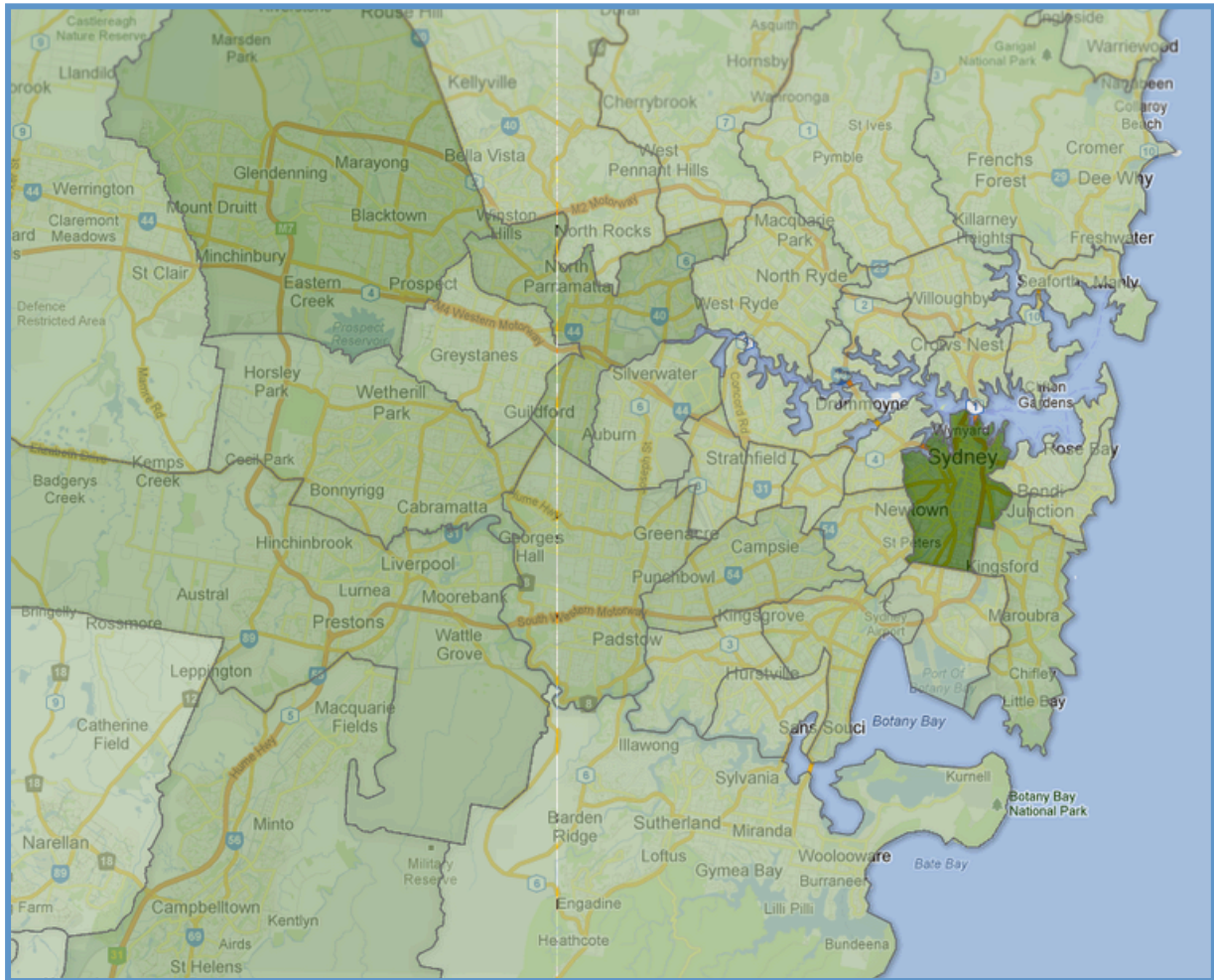
+

Through 700

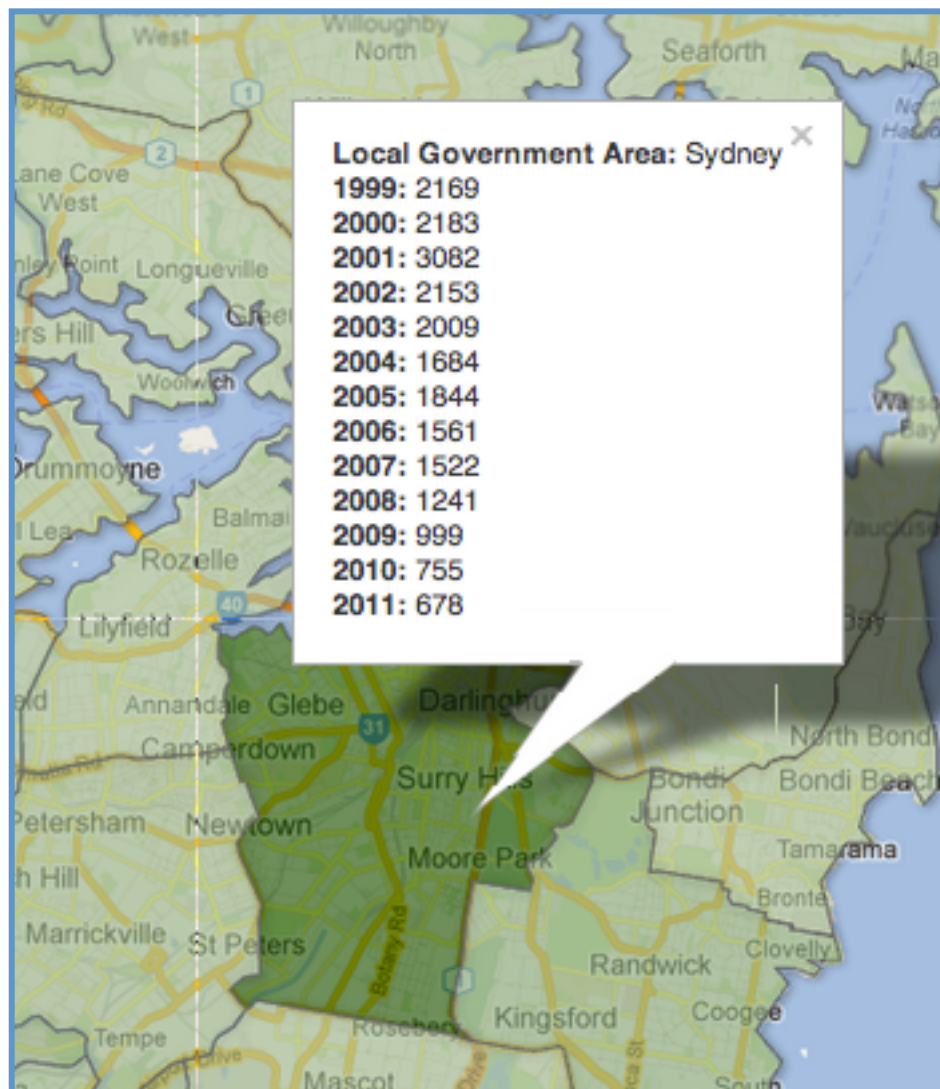
Save

Cancel

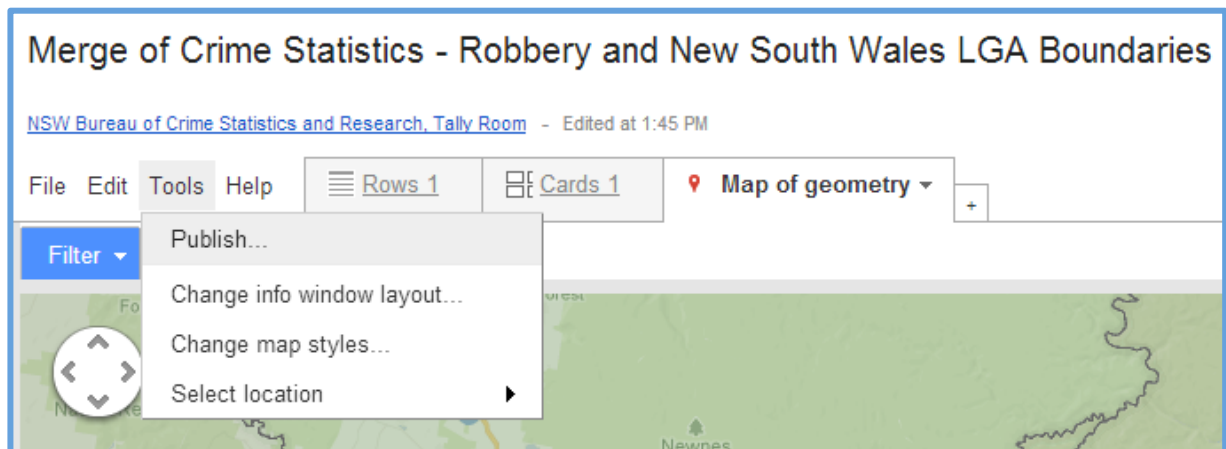
Now click the "Save" button. You should now see a "heat map", showing the absolute occurrence of the selected type of crime. Darker shades indicate higher levels of occurrence:



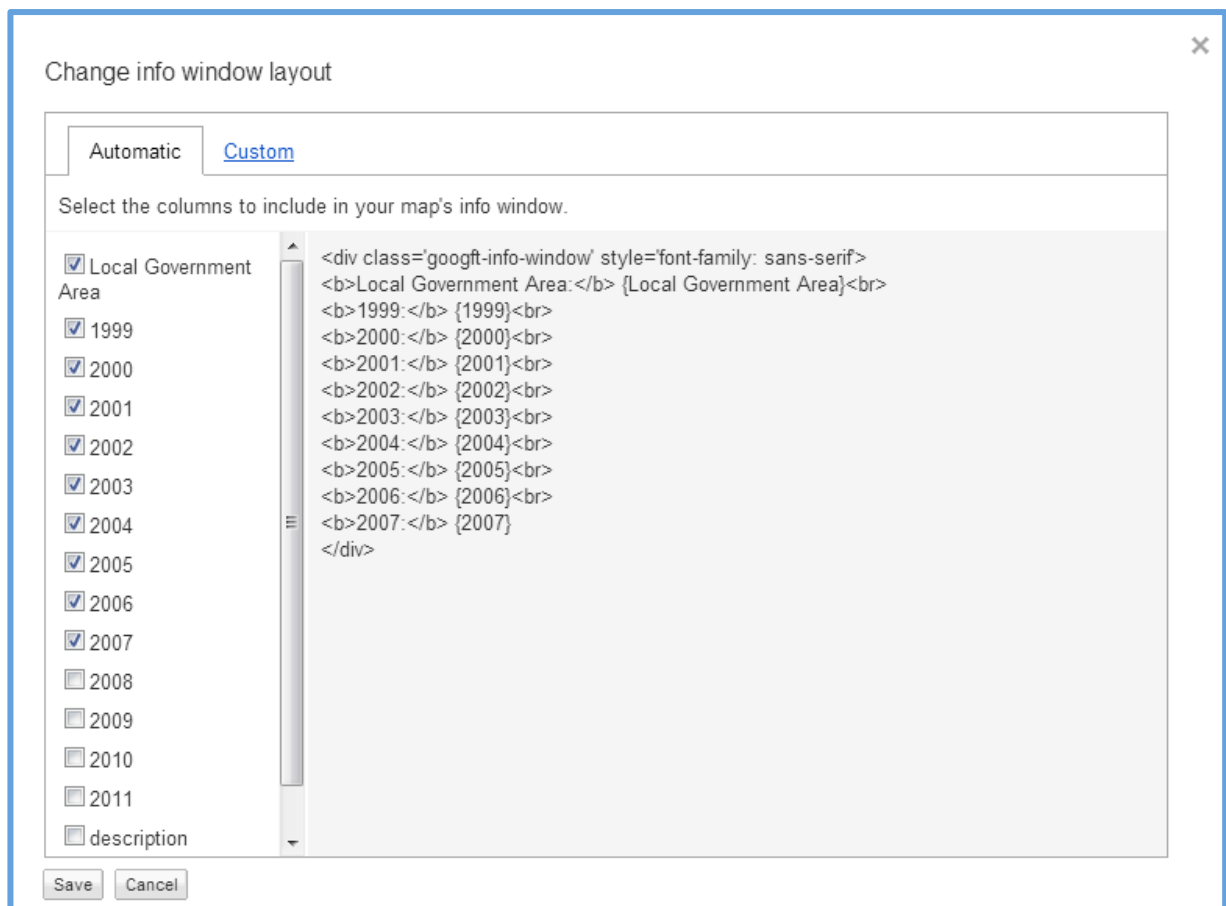
By clicking within any LGA, you can look at the statistics since 1999:



If you want to change the display years, you can simply go to "Tools" and select "Change info window layout..."



Select years, then "Save" it:



Other Things to Try

Here are some suggestions for further experimentation:

- Try changing the heat map to reflect the statistics for a different year.
- Try "Change info window layout" to display only some of the columns.
- Try changing the colour of the gradient on the heat map.

Revision History

Version No.	Revision Date	Summary of Changes	Revised by
1.0	16 July 2012	Initial Document	Dr Luc Small
1.1	19 July 2012	Changed to include Excel section	Dr Luc Small
1.2	23 July 2012	Small adjustments following trial presentation	Dr Luc Small
1.3	07 February 2013	Presentation updated to match changes to new Google drive lay out.	Wei Cai