

Creating Heatmaps

QGIS Tutorials and Tips



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Thiết lập bản đồ sơ đồ thang màu biến đổi liên tục

Bản đồ sơ đồ thang màu biến đổi liên tục (heatmap) là một trong những công cụ trực quan hóa tốt nhất đối với dữ liệu điểm dày đặc. Các bản đồ này được sử dụng nhằm tìm ra và đánh dấu các cụm có mật độ tập trung hoạt động cao. Chúng cũng hữu ích trong **cluster analysis** phân tích cluster hay **hotspot analysis** phân tích các điểm nóng.

Tổng quan về nhiệm vụ

Chúng ta sẽ làm việc với một tập dữ liệu về vị trí xảy ra tội phạm ở Surrey, vương quốc Anh trong năm 2011 và tìm các điểm nóng về tội phạm trong nước.

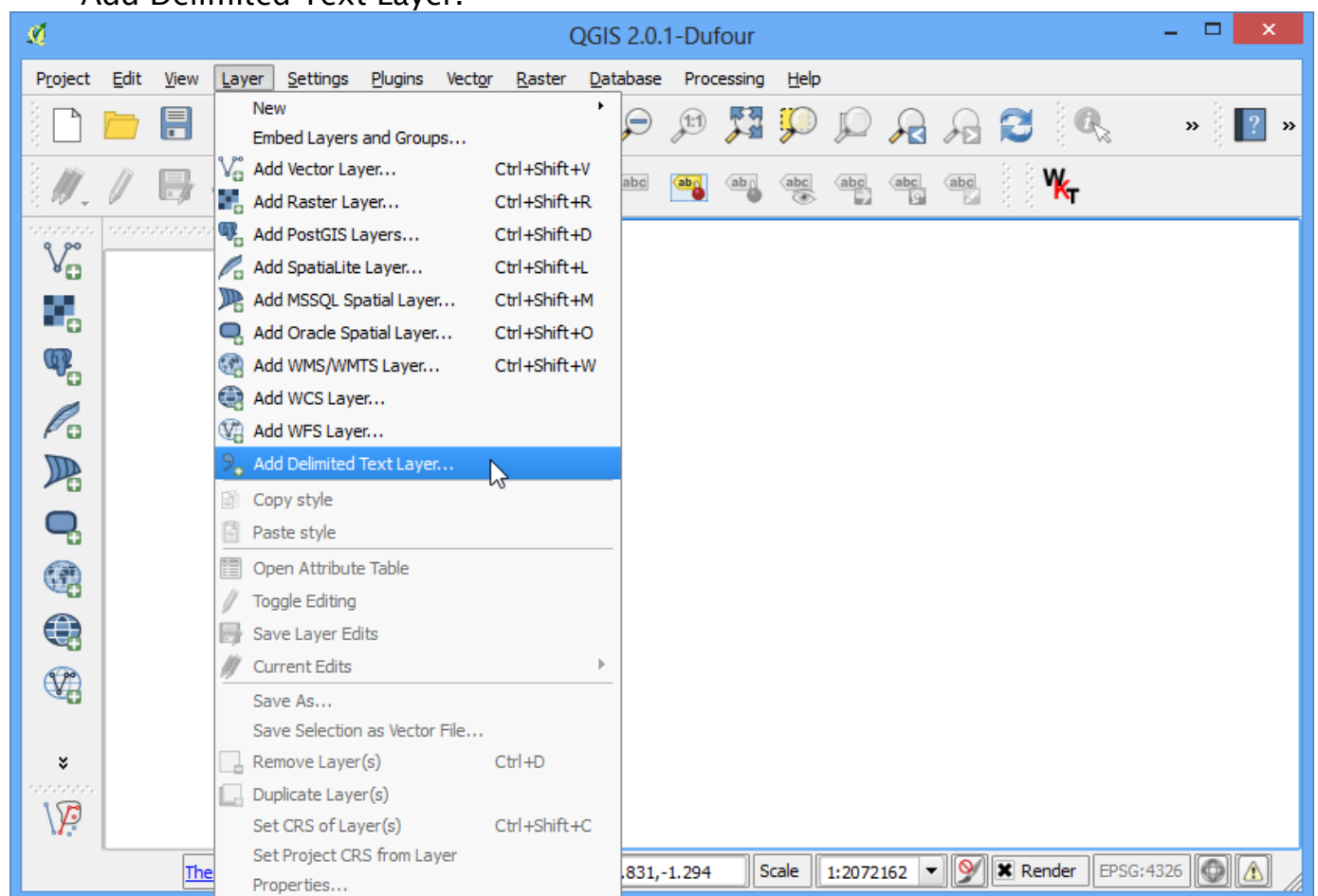
Nguồn dữ liệu

Kho dữ liệu Luân Đôn cung cấp các dữ liệu sơ cấp từ website bản đồ tội phạm của Police.uk <<http://data.london.gov.uk/datastore/package/policeuk-crime-data>> `.`.

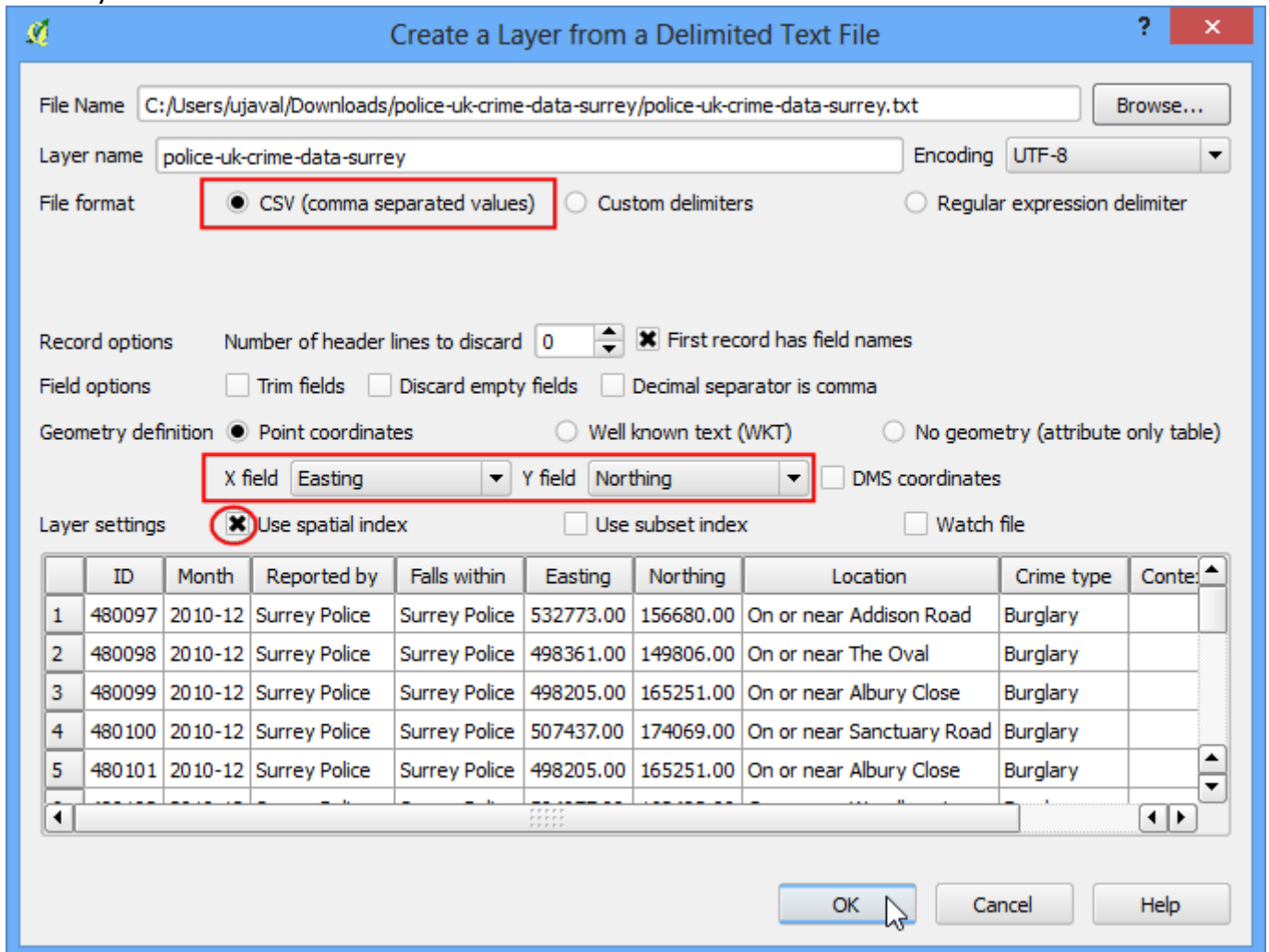
Tại dữ liệu Surrey.

Các bước thực hiện

1. To start, unzip the data to a folder. The data is in a CSV format. We will import this data into QGIS. (see [Nhập file dạng bảng hay CSV](#) for more details). Click Layer > Add Delimited Text Layer.



2. Browse to the **police-uk-crime-data-surrey.txt** file on your computer and open it. Select CSV (comma separated values) as the file format. You will see the Easting and Northing columns automatically selected as X and Y fields. Make sure you check the Use spatial index option as that will speed up your operations on this layer. Click OK.



File Name: C:/Users/ujaval/Downloads/police-uk-crime-data-surrey/police-uk-crime-data-surrey.txt

Layer name: police-uk-crime-data-surrey

Encoding: UTF-8

File format: ☒ CSV (comma separated values) ☐ Custom delimiters ☐ Regular expression delimiter

Record options: Number of header lines to discard: 0 ☒ First record has field names

Field options: ☐ Trim fields ☐ Discard empty fields ☐ Decimal separator is comma

Geometry definition: ☒ Point coordinates ☐ Well known text (WKT) ☐ No geometry (attribute only table)

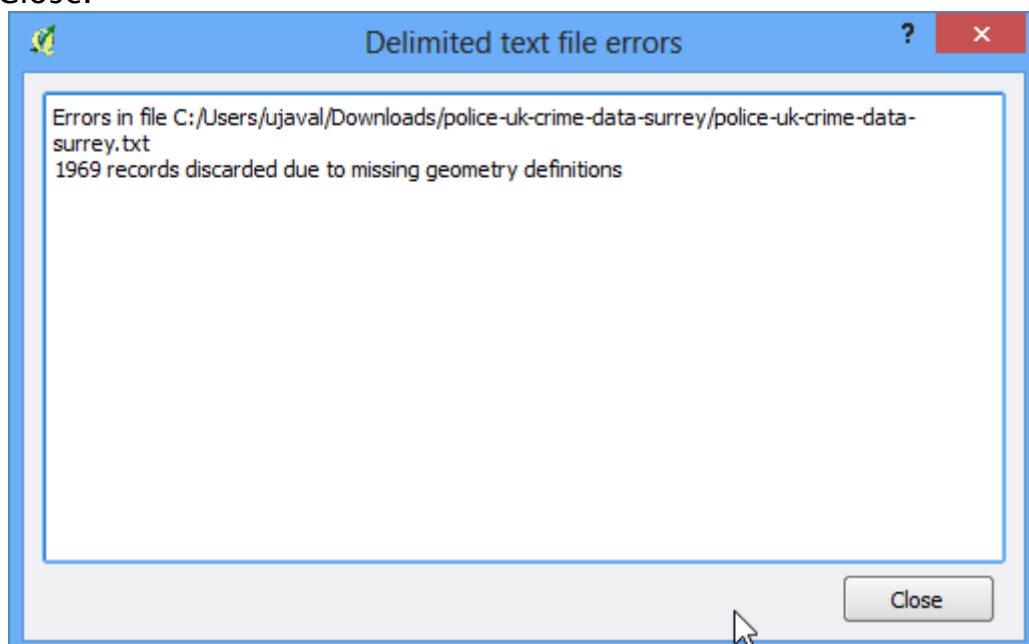
X field: Easting Y field: Northing ☐ DMS coordinates

Layer settings: ☒ Use spatial index ☐ Use subset index ☐ Watch file

	ID	Month	Reported by	Falls within	Easting	Northing	Location	Crime type	Conte
1	480097	2010-12	Surrey Police	Surrey Police	532773.00	156680.00	On or near Addison Road	Burglary	
2	480098	2010-12	Surrey Police	Surrey Police	498361.00	149806.00	On or near The Oval	Burglary	
3	480099	2010-12	Surrey Police	Surrey Police	498205.00	165251.00	On or near Albury Close	Burglary	
4	480100	2010-12	Surrey Police	Surrey Police	507437.00	174069.00	On or near Sanctuary Road	Burglary	
5	480101	2010-12	Surrey Police	Surrey Police	498205.00	165251.00	On or near Albury Close	Burglary	

OK Cancel Help

3. You may see some errors. You can ignore those for the purpose of this tutorials. Click Close.

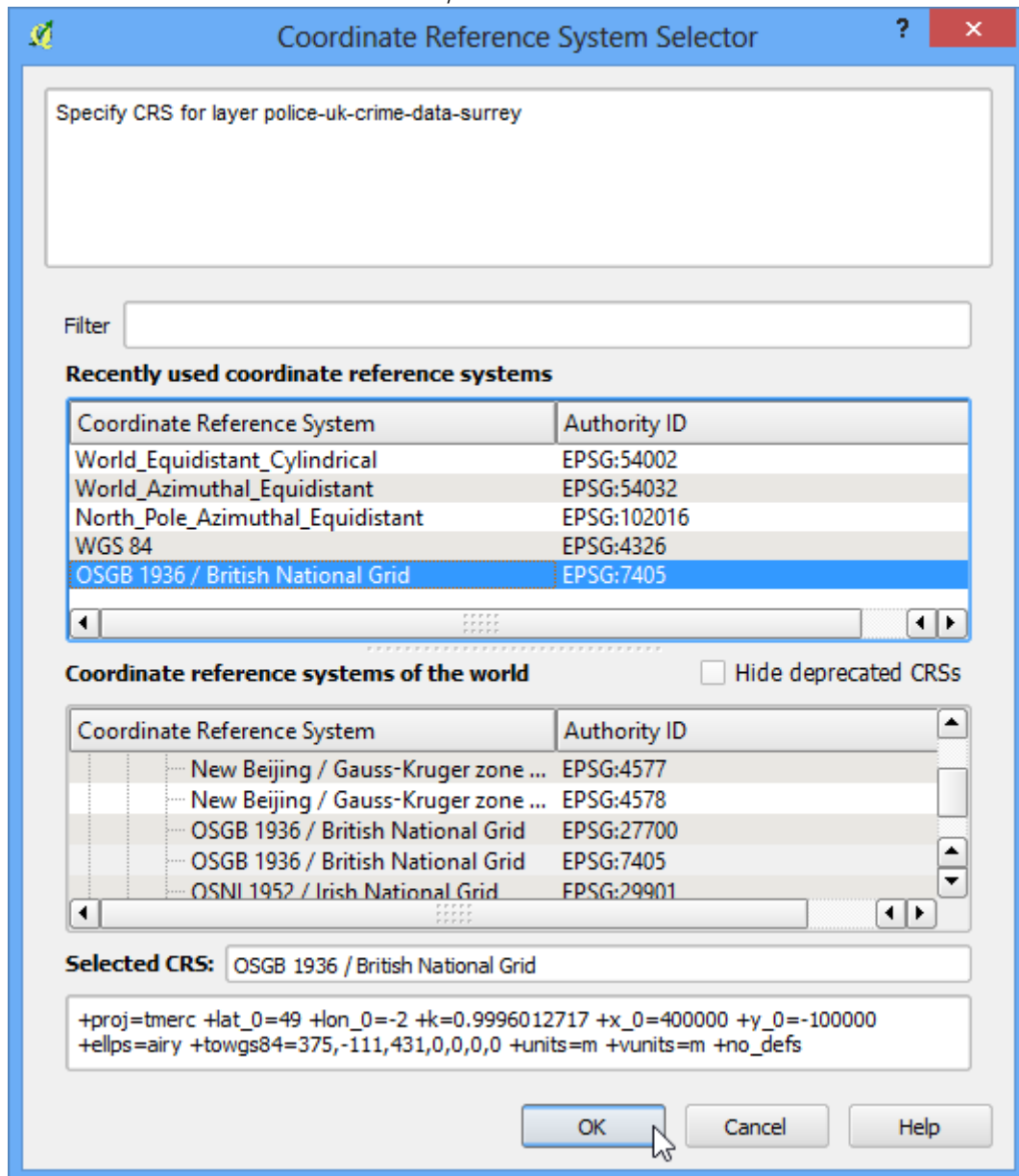


Delimited text file errors

Errors in file C:/Users/ujaval/Downloads/police-uk-crime-data-surrey/police-uk-crime-data-surrey.txt
1969 records discarded due to missing geometry definitions

Close

4. Next, you need to choose a **Coordinate Reference System (CRS)**. If you read the data description, you will notice that the spatial reference for the data is British National Grid. Choose OSGB 1936 / British National Grid as the CRS. Click OK.



5. Bây giờ bạn sẽ thấy dữ liệu được tải trong QGIS.



6. Zoom-in a bit closer to get a better look at the data. You will notice that the data is quite dense and it is hard to get an idea of where there is a high concentration of points. This is where a heatmap will come in handy.



7. To create the heatmap, you need to enable a core plugin named *Heatmap*. See [Using Plugins](#) to know how to enable built-in plugins. Once you have enabled the plugin, go to Raster › Heatmap › Heatmap.

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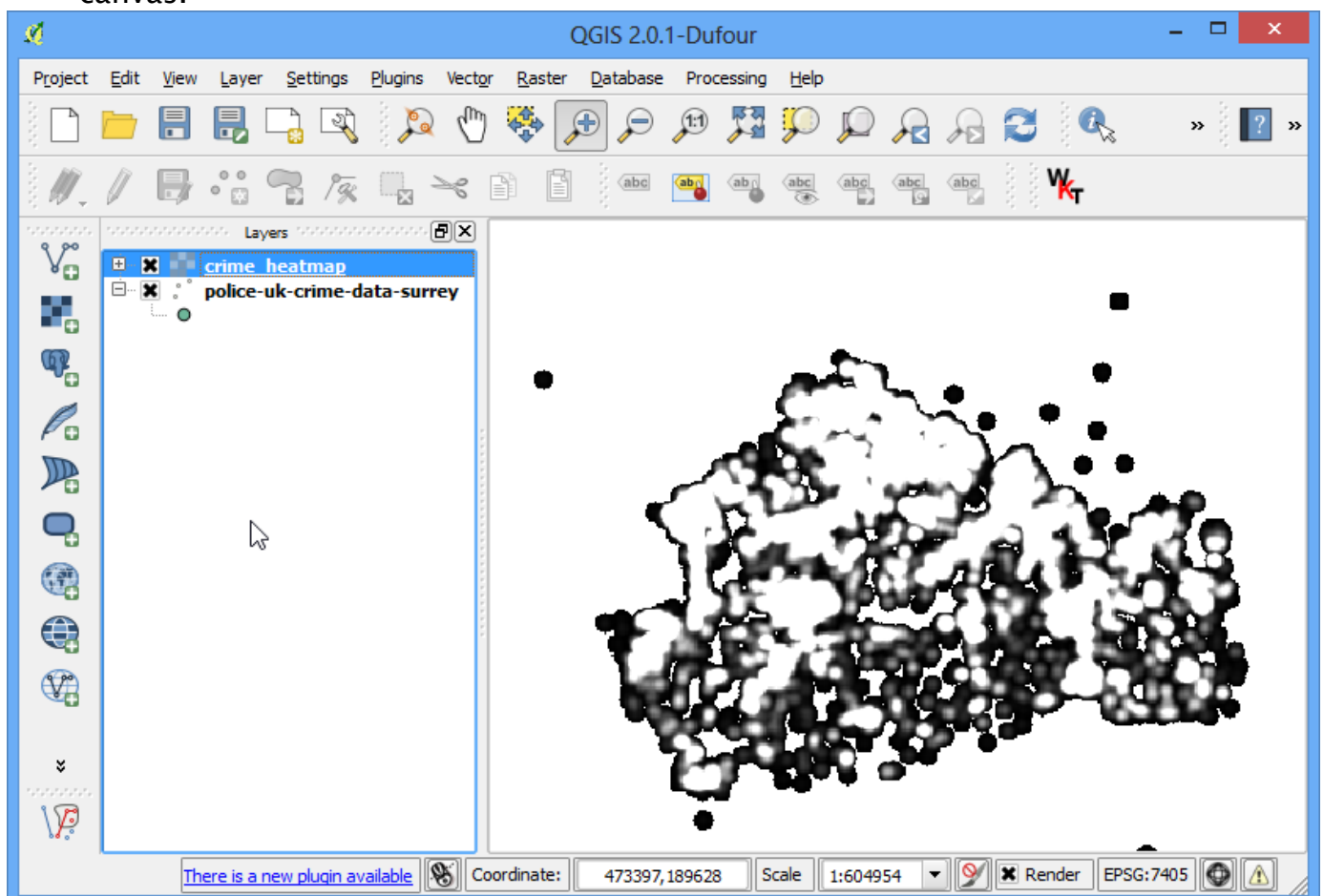
g c□ plugin Heatmap plugin trong QGIS 2.8.1 có l□i. Xem **thông**
<https://gis.stackexchange.com/questions/137770/why-are-heatmaps-on-qgis-2-8-1-produced-in-the-wrong-crs>



8. In the Heatmap Plugin dialog, choose **crime_heatmap** as the name out the Output raster. Enter **1000** map units as the Radius. Radius is the area around each point that will be used to calculate the **heat** a pixel received. Check the Advanced so we can specify the output size of our heatmap. Enter **100** as Cell Size X and Cell Size Y. Click OK.



9. Once the processing is finished, you will see a grayscale heatmap loaded into the canvas.



10. Let's make our heatmap look more like the traditional heatmap you often see. Right-click on the heatmap layer and click Properties.



11. In the Style tab, select Singleband pseudocolor as the Render type. Next, under the section Load min/max values, select the Actual (slower) as the Accuracy and click Load. This will scan the heatmap and find the minimum and maximum pixel values. These values will be used to generate an appropriate color ramp. In the section Generate new color map, select YlOrRd (Yellow-Orange-Red) as the color ramp, and click Classify. Click OK.



12. Now you will see a more appealing heatmap-like rendering of the layer. You can select the Identify tool and click on any pixel of the heatmap. You will see the pixel value in the resulting pop-up. This pixel-value is a measure of how many points from the source layer are contained within the specified radius (in our case - 1000m) around the pixel.



13. Now you have your heatmap. It is useful for visual interpretation, but not very useful if you want to use these results in analysis. Many times, you want to identify the **hotspots** where there is high-concentration of points. We will now try to identify such **hotspots** using this heatmap. Go to Raster › Raster Calculator.



14. You will have to decide on a threshold value first. All pixel values above that threshold will be considered to be in a cluster. Let's use a value of 5 for this data. In Raster calculator dialog, name the output layer as ***crime_hotspots***. Double-click on crime_heatmap@1 under the Raster bands section and it will be added to the Raster calculator expression textarea. Complete the expression as ***"crime_heatmap@1" > 5***. Check the box next to Add result to project and OK.



15. A new layer will be added to QGIS. This layer has pixels with values of either 0 or 1. All pixels in the input layer where the pixel value was larger than 5 now have a value of 1 and all remaining pixels are 0. Click on Raster › Conversion › Polygonize (Raster to Vector).



16. Name the output file as crime_hotspots_vector. Check the box next to Field name as well as Load into canvas when finished. Click OK.



17. Once the conversion finishes, you will have yet another layer added to QGIS. This is the vector representation of the clusters that were created in the previous step. The layers contain clusters with both 0 and 1 values. Let's filter out the 0 values, so we get the clusters of hotspots. Right-click on the layer and select Open Attribute Table.



18. Trong Attribute table, bấm Select feature using an expression.



19. Nhấp "**DN**" = 1 và bấm chuột vào Select. Tiếp theo, bấm chuột vào Close.



20. In the main QGIS window, you will see some features highlighted in yellow. These are the features that matched our query. Right-click on the layer and select Save Selection As....



21. Đặt tên lớp đầu ra **crime_clusters**. Kiểm tra hộp bên cạnh Add saved file to map và bấm OK.



22. There you have it. The final layer contains the **hotspots** extracted from the heatmap. These clusters are the intelligence gathered from the raw data and can provide useful insights as well as serve as an input for further action.

