



Methodological demonstration for [Chapter 7 – “Role of public spaces in promoting social interaction in divided cities. The case of Nicosia, Cyprus” \(pp.103-119\)](#)

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## Disclaimer

This document is an addendum to the chapter mentioned above which is part of the book [GIS in Sustainable Urban Planning and Management: A Global Perspective](#). The purpose of this document is to demonstrate the application of the methods described in that chapter using QGIS 3.x along with the data available [here](#). This document is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](#). Different license terms may apply for the data. If that is the case, a file containing the license terms is included with the data.

## How to use this document

Most of the steps described are illustrated with screenshots. Bear in mind that what the screenshot depicts and what you see in your computer might differ slightly depending on the QGIS version you are using and the way your toolbars and add-ons are arranged. Along the text you will see different icons. The key for these icons is as follows:



Data or external resource to download;



A software action you are supposed to do;



Information specific about QGIS.



Additional or complementary scientific information;



An important concept which you may want keep in mind;

[1] An operation that is referenced in the flowchart of operations.

Additionally, for the sake of readability, the following style conventions are used:

- A reference to dataset or a layer uses *this style*;
- A QGIS command, or any clickable button is noted using **this style**.
- A QGIS menu or section is highlighted using *this style*.

At the end of the document, a diagram depicting the workflow described in these pages can be seen. It is advisable to look at it first and/or refer to it as you proceed.

## Outline

This case analyses the ability of public spaces in the divided city of Nicosia to facilitate social interaction. It uses a mixed method design, building an index of social interaction to quantify the ability of public spaces to promote social interaction, and conducting expert interviews to design and validate the index and its results.

For this demonstration, we provide the geometries of the public spaces and the standardized criteria values used to build the index of social interaction. These come in the form of *shapefiles* (.shp) and *comma separated values* (.csv) containing the standardized criteria values calculated according to the methodology described by the authors of the study.

From here a series of GIS-based visualizations are suggested in order to get a reading of the data and assess the social dimension of the public spaces at hand.

## Getting started

📁 Download the data; the data consists of the following files:

- `Nicosia.qgs` – a QGIS project preloaded with the layers;
- `Streets.shp` – line features representing the building boundaries of Nicosia;
- `Crossing_points.shp` – line features representing two of the crossing points that allow the crossing of the buffer zone that divides the city of Nicosia;
- `Buffer_zone.shp` – polygon features representing the buffer zone that divides the city of Nicosia;
- `Public_spaces.shp` – polygon features representing seven (7) public spaces where social interaction is analysed;
- `index_si` – a table with the social interaction values by criteria;
- `Public_spaces.qml` – a QGIS layer style file which can be used to style the features contained in the `Public_spaces.shp`.

▶ Start QGIS and open `Nicosia.qgs` (Figure 1).

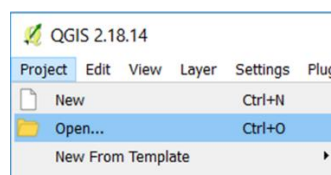


Figure 1 – opening a project

▶ From the *Layers panel*, **right-click** on layer `public_spaces` and access the attribute table to examine it. Repeat the procedure for the layer `index_si` (Figure 2).

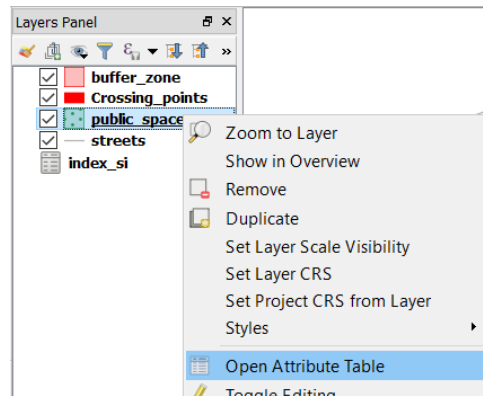


Figure 2 – assessing attribute table

A brief explanation of the attributes contained in the `index_si` table (for further details see<sup>1</sup>):

`Surf_area`: The surface area of the public space

`Dif_activ`: Number of different types of activities carried out in the public space

`Num_activ`: Number of each type of activity carried out in the public space

`Desnsity_w`: Occupant density in the public space, walking

`Desnsity_s`: Occupant density in the public space, static

`Age_groups`: Presence of different age groups in the public space

`Communities`: Presence of the members of both communities in the public space

`Events`: Number of events taking place in the public space

`Index_si`: The global social interactivity index

### Joining attributes [1]

The layer `public_spaces` contains the spatial context (i.e. the geometries) but the social interaction indexes are stored in the non-spatial layer `index_si`. Therefore we should add the information contained in the latter to the `public_spaces` attribute table by means of a join by attributes.



A join consists of adding the attributes of a layer/table to another table based on some condition. In this case, the join condition is that the field “name” in `public_spaces` corresponds to the field “name” in `index_si`. This means that the attribute table of `public_spaces` will have all the attributes of `index_si` whenever the join condition is true.

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<sup>1</sup> Van Maarseveen, Martinez, & Flacke (2018) *GIS in Sustainable Urban Planning and Management: A Global Perspective*. CRC Press. (forthcoming)

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- ▶ From the *Layers panel*, **right-click** on the layer `public_spaces` and access the layer **Properties**. In the *Layer Properties* dialog click on the **Joins** tab and from there click to **add** a join condition (Figure 3).

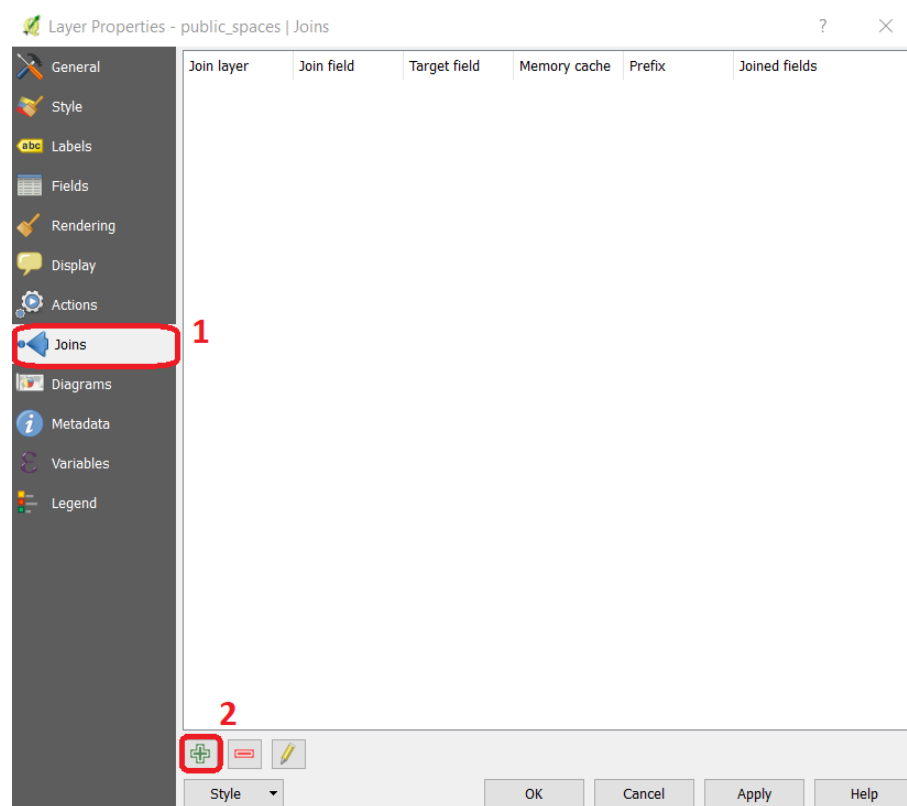


Figure 3 – The Joins dialog

- ▶ In the **Add vector join**, enter the join conditions and click **Ok** to confirm and go back to the **Joins** tab (Figure 4).

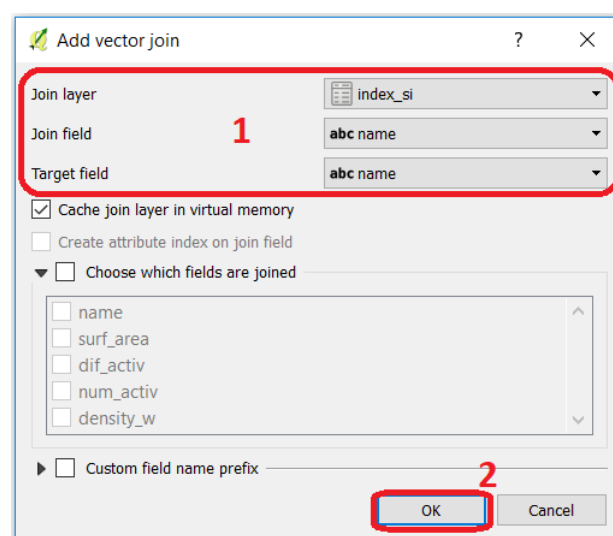


Figure 4 – Defining the join conditions

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- Dismiss the join dialog by hitting the **Ok** button. Open the attribute table of the layer `public_spaces` and confirm that the attributes have been extended with the fields from `index_si` (Figure 5)

	id	name	dex_si_surf_area	index_si_diff_act	dex_si_num_act	dex_si_density	index_si_density	lex_si_age_grou	ex_si_communit	index_si_events	index_si_index_s
1	7	Municipal Gar...	1	0	0	0	0	1	0,33	0	0,22
2	5	Bandabulya m...	0,04	0,6	0,57	0,41	0,28	1	0	0	0,27
3	4	Buyuk Han ma...	0,02	0,6	0,57	0,56	0,85	1	1	0,50	0,65
4	2	Faneromeni S...	0,09	1	0,97	0,21	0,22	1	0,67	0,50	0,53
5	1	Ledras Street	0,09	0,6	1	0,52	1	1	1	0,50	0,72
6	6	Markou Drako...	0,05	0,8	0,94	0,06	0,04	0	1	1	0,54
7	3	Lokmeci Street	0,00	0,2	0,25	1	0,85	1	0,83	0	0,54

Figure 5 – Attribute table of layer `public_spaces` with joined attributes

### Styling [2]

There are many ways to visualize the data. For this example we will be exploring two perspectives: the total social interaction index (SI) and the distribution of the variables used to calculate that SI per public space.

For visualizing the distribution of the variables we will use a simple circular graphic and for the total SI we will graduate the circular graphic size as a function of the total SI value. In other words, the higher the SI index the larger the circular diagram will be (Figure 6). The next steps will show how to achieve a result similar to the one depicted in Figure 6.

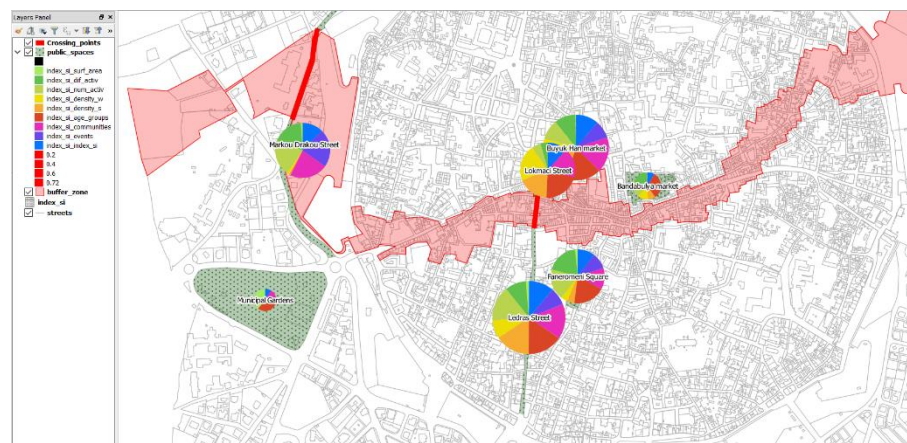


Figure 6 – Visualizing social interaction indexes per public space

- From the *Layers panel*, **right-click** on the layer `public_spaces` and access the layer **Properties**. In the *Layer Properties* dialog click on the **Diagrams** tab and from there choose **Pie chart** as diagram type, then click on **Attributes** and highlight which of them will be represented in the pie chart – all the attributes with “index”

as prefix except the last one. Once the selection is made, click on the **plus button** to add the selected attributes to the **Assigned attributes** panel and choose whatever colors you wish or accept the default color assignment proposed by QGIS . Finish the process by clicking on **Apply** (Figure 7)

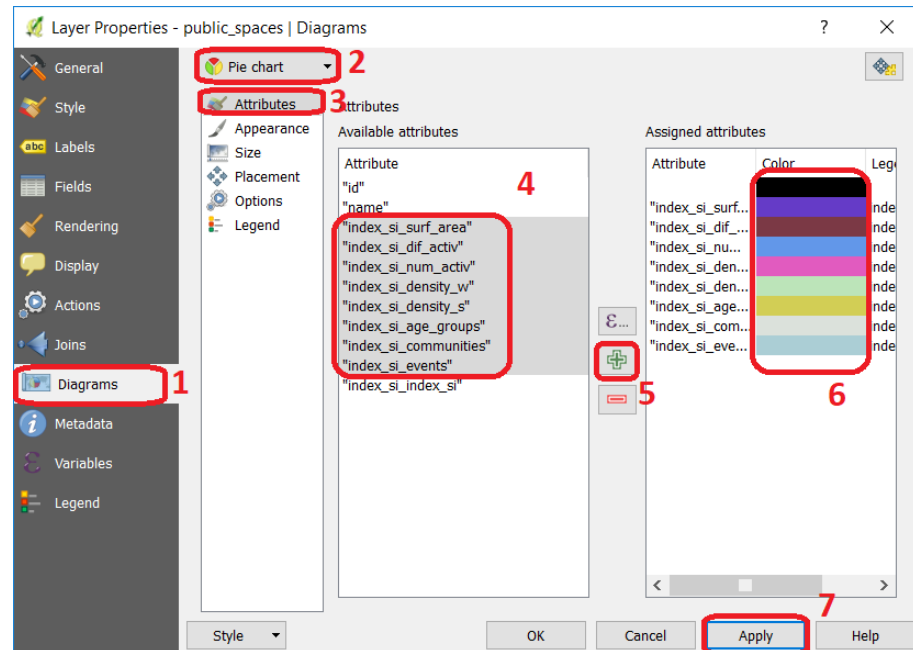




Figure 7 – Setting Pie chart graphics

At this moment you will see that each public space has its own pie chart and the size of the slices of course varies depending on how much weight a given index indicator has over the other. The Final step is make the diameter of these pie charts proportional to their global SI.

 QGIS allows the definition of styles based on the data we have in the attribute table of the layer(s) we want to style. This is especially useful, as we will see next because it opens the possibility of defining symbols with a direct relationship with the underlying data.

- From the *Layers panel*, **right-click** on the layer `public_spaces` and access the layer **Properties**. In the *Layer Properties* dialog click on the **Diagrams** tab and from there choose **Pie chart** as diagram type, then click on **Size** and choose **Scaled size**. The attribute you will use to scale is the `index_si_index_si`. Click on **Find** to automatically calculate the maximum value we have under the `index_si_index_si` attribute and set the **Size** to 30 or experiment with other values. . Finish the process by clicking on **Apply** (Figure 8)

 The linear scaling we are applying means that the reference size for our diagram is 30. Therefore if to our maximum attribute value of 0.72 corresponds a diagram

of size 30, an attribute of value 0.36 would be represented by a diagram of size 15.

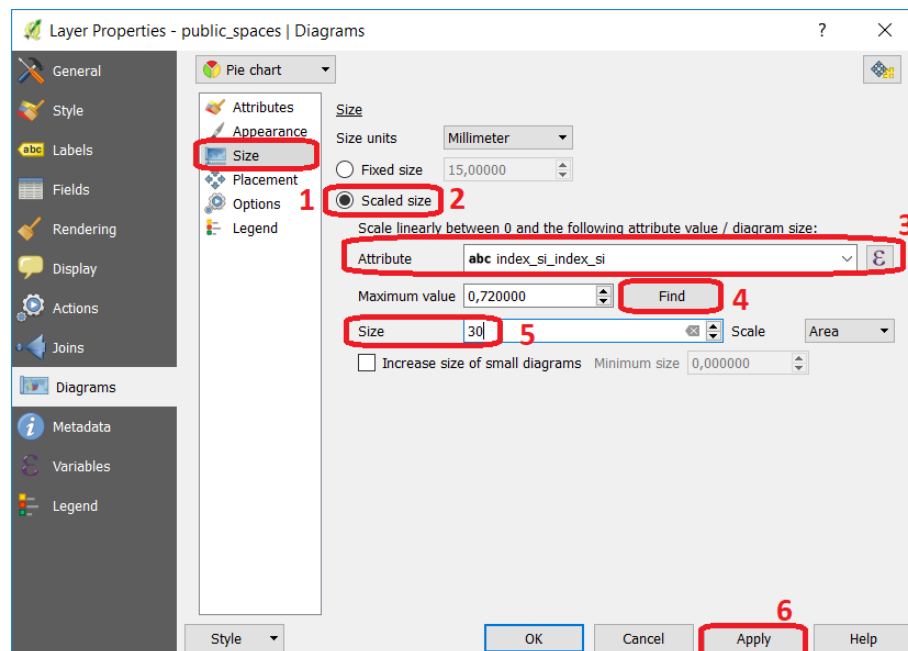


Figure 8 – Setting Pie chart graphics sizes

The last step of our visualization is to label the public spaces.

- From the *Layers panel*, **right-click** on the layer `public_spaces` and access the layer **Properties**. In the *Layer Properties* dialog click on the **Labels** tab and from there activate the option **Show labels for this layer** and choose `name` as the attribute to be used to generate the labels. Explore the available options on how the label should look like and finish the process by clicking on **Apply** (Figure 9)

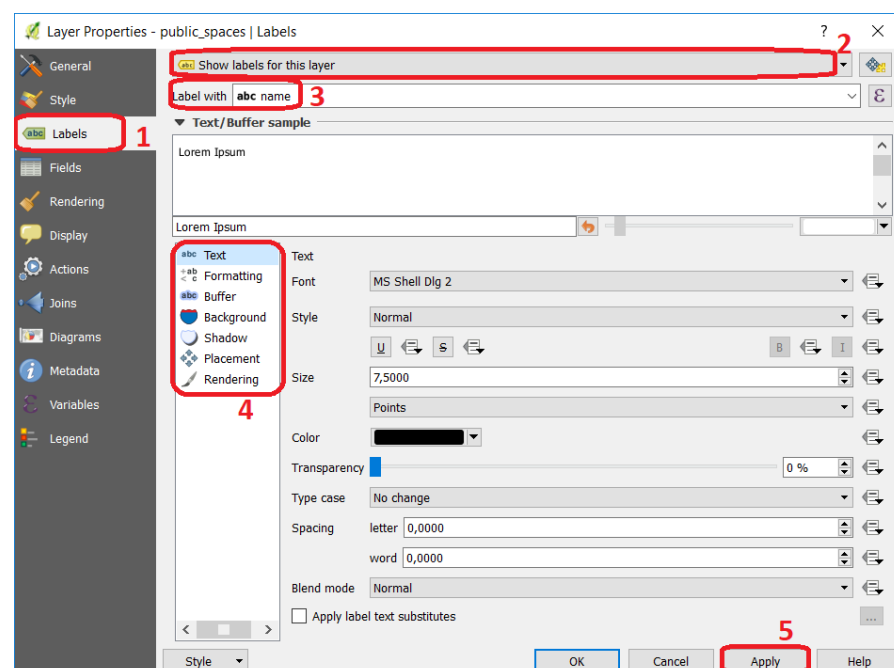


Figure 9 – Applying labels

The results you have will probably look different from what is depicted in Figure 6 depending on what colors and scaling factors you choose. The important thing is that hopefully you are able to analyse a and compare the data with respect to distribution of the variables and magnitude of the SI.

- ▶ If you got lost in the steps described above, you can simply apply the style file `public_spaces.qml` that we provide along with the data for this methodological demonstration. From the *Layers panel*, **right-click** on the layer `public_spaces` and access the layer **Properties**. From any tab In the *Layer Properties* dialog click on the **Style** button and choose **Load Style** and point to the file `public_spaces.qml`. Finish the process by clicking on **Apply** (Figure 10)

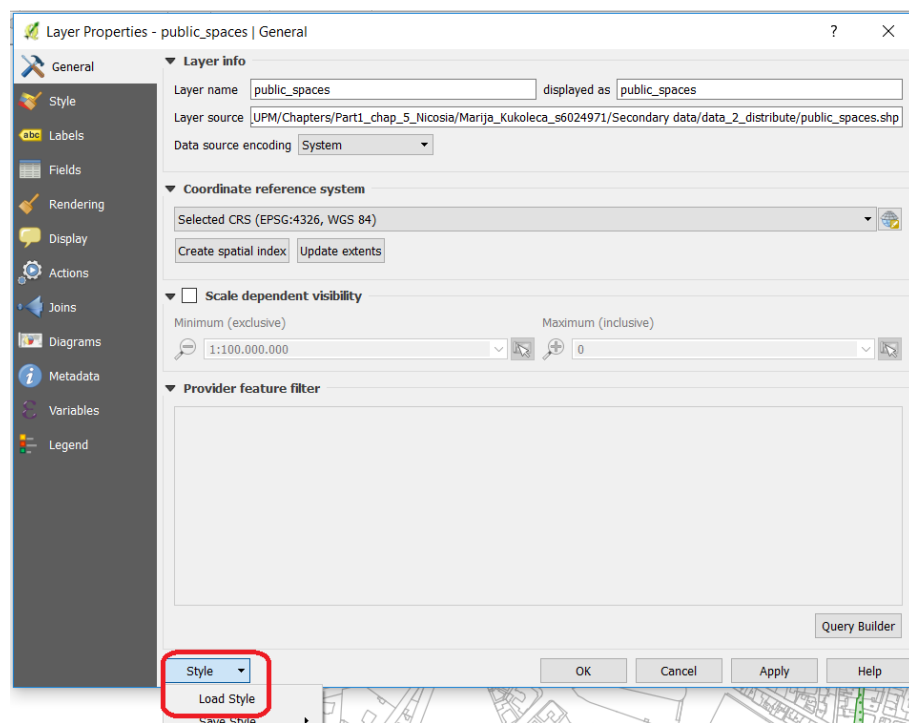


Figure 10 – Loading styles



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Flowchart of operations

