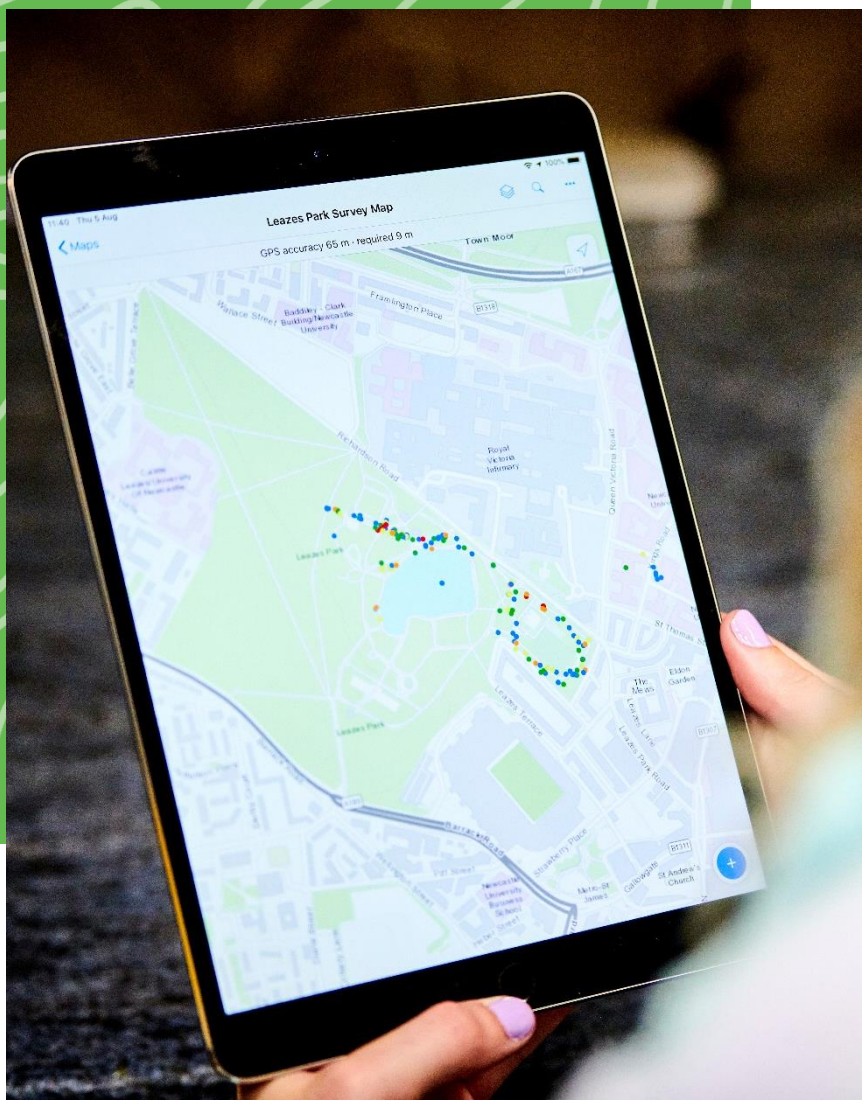
Geospatial UK



Survey123 for Students

This exercise will guide you through how to collect data using the Survey123 app while examining the geographic relationship between public transport and the retail/service industry

40 – 60 mins

Newcastle University

Introduction

This guide will take you through how to collect data with the Survey123 app.

To complete this task, you will need:

- A smartphone/tablet for the data capture
- A desktop computer to perform the analysis (although your smartphone/tablet could also be used for this instead)

Whilst this exercise will focus on capturing data and analysing the geographic relationship between public transport and the retail/service industry, the concepts explored can be easily applied to many areas of geography and the tools can prove useful for any coursework or non-examined assessments you may have.

Town and city councils are increasingly concerned that the commercial centres of towns/cities are declining, as there is potential for large problems for run-down centres which can become very dangerous at night and unattractive to investors and new shops.

Council Urban Planners see the importance of a social and economic meeting point for a city or town. A number of strategies are being devised to help the city centre "fight back" and become a popular destination again:

1. The provision of a more attractive shopping environment with pedestrianised streets, new street furniture (seating etc.), floral displays, paving and landscaping
2. Safer environment and better facilities for those walking or cycling (active travel)
3. Greater availability of low-cost city centre parking
4. The improvement of public transport links to the centre of town, with rapid transit systems, park and ride schemes and shopper buses.

Our investigation will look at the last of these strategies: **public transport**.

The geographic relationship between public transport and the retail/service industry can help us to understand the local geography of an area. It may provide insight into why certain businesses choose to locate themselves in certain places. For example, would you want to carry heavy shopping over a long distance to get the bus home?

We can also see if there is a relationship between the quality of shops/restaurants against the accessibility by public transport.

Learning Outcomes

In this exercise, students will learn how to:

- Download the Survey123 App
- Download a pre-made survey
- Conduct fieldwork using Survey123
- Perform proximity analysis in ArcGIS Online
- Perform density analysis in ArcGIS Online

This activity is aimed at KS4 – KS5 students, however students of all ages are welcome to complete the activity.

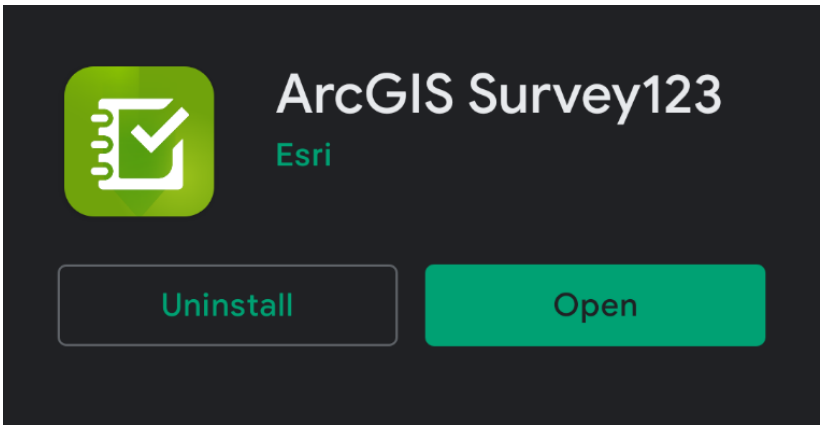
Contents

Section 1: Using Survey123 for Data Collection

This exercise uses an application called Survey123 to collect data with your phone/tablet. It is free to access provided that your school or academy has signed up for the service.

1.1. Downloading the App

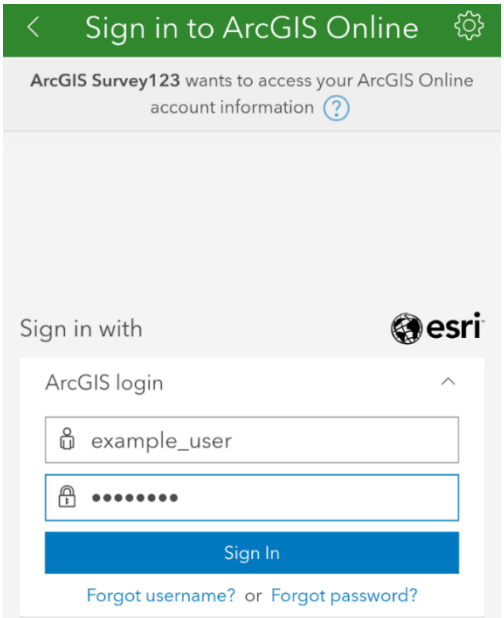
a. On your device, install the Survery123 application. The app can be found on both iOS and Android app stores. Just search for Survey123 (the app is made by Esri).



b. When installing, if the app asks for permission to access your **location** (or similar), please click '**yes**' and agree. Enabling this allows the Survey123 app to record a location for each point you collect when using it for field work, making mapping the collected data very simple.

c. Once installed, open the app on your device.

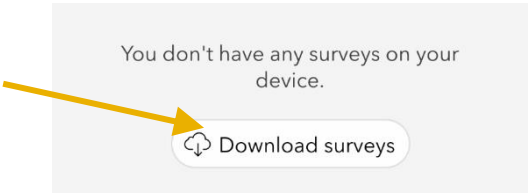
d. Sign in with the login details provided by your teacher.



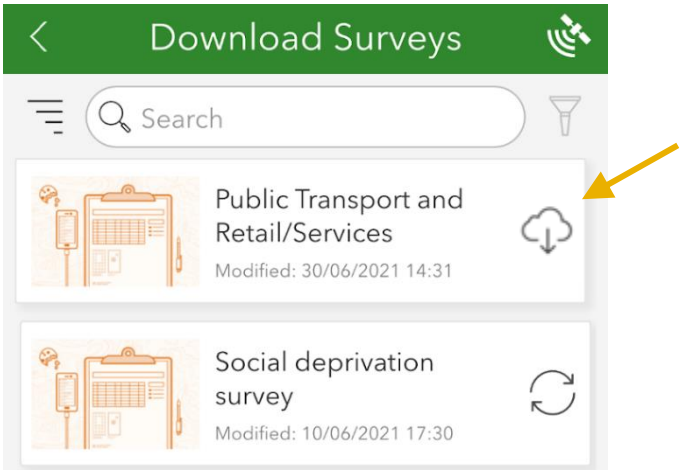
1.2. Downloading the Survey

a. Your teacher may have already created a survey for you, and now all you need to do is download it!

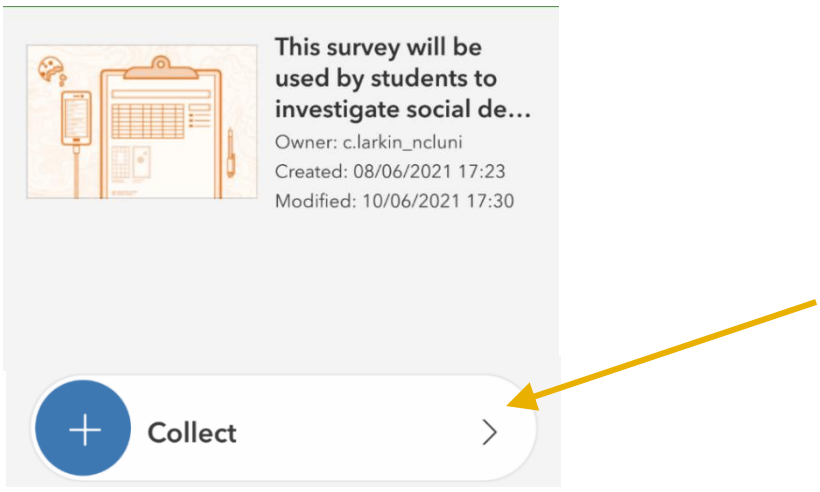
b. From the button at the bottom of the screen, select 'Download Surveys'. (If this option does not appear, click on the icon in the top right corner and the select the 'Download Surveys' option from the menu that appears.)



c. Then click the cloud symbol next to the survey which you are planning on using. Your teacher will inform you what the name of the survey is. In the example below, we have used the survey 'Public Transport and Retail/Services'.



d. Now with the survey downloaded, click the survey and click 'Collect'. You are now ready to go out and collect your data! Remember you must have 'Location' enabled on your device so the GPS receiver in your phone/tablet can be used.

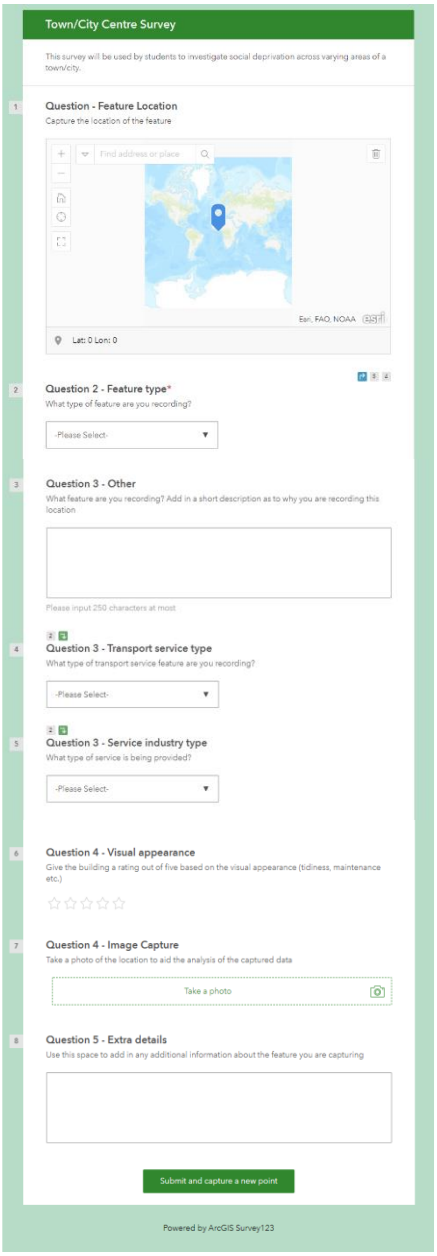


1.3. Collecting the Data

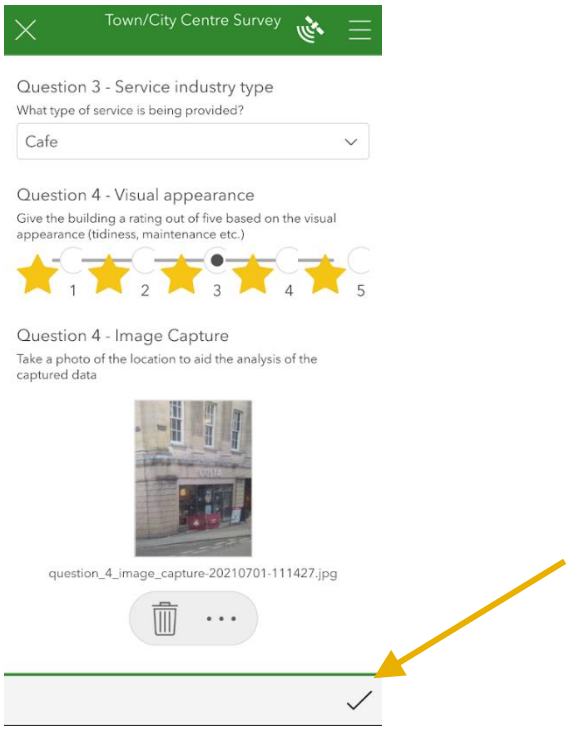
a. For this exercise, your survey should focus on capturing retail and service industry (shops/restaurants) locations, as well as public transport features. This will allow us to understand the relationship between the location of features by finding out whether there is a link between where shops/restaurants are found and how easy they are to access through public transport. We will also collect some extra data, such as the visual appearance of the location or photographs of the location. This can be used for further analysis discussed at the end of this exercise.

b. Begin collecting data using the survey form.

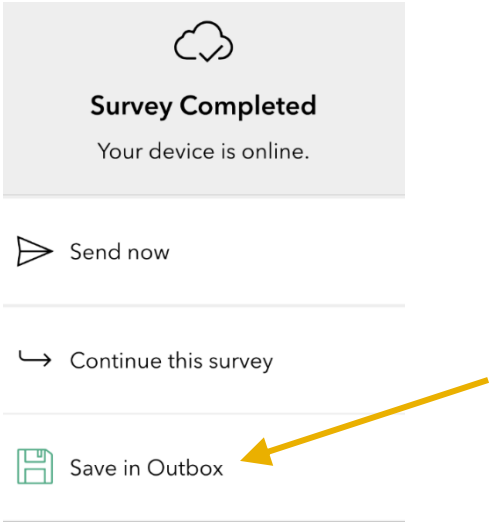
c. The survey forms are simple to use. Here is an example of what a survey might look like.



d. Fill out all the questions by clicking through the various options. Once you are happy with information you have collected about a location, click the 'tick' mark at the bottom of the survey.



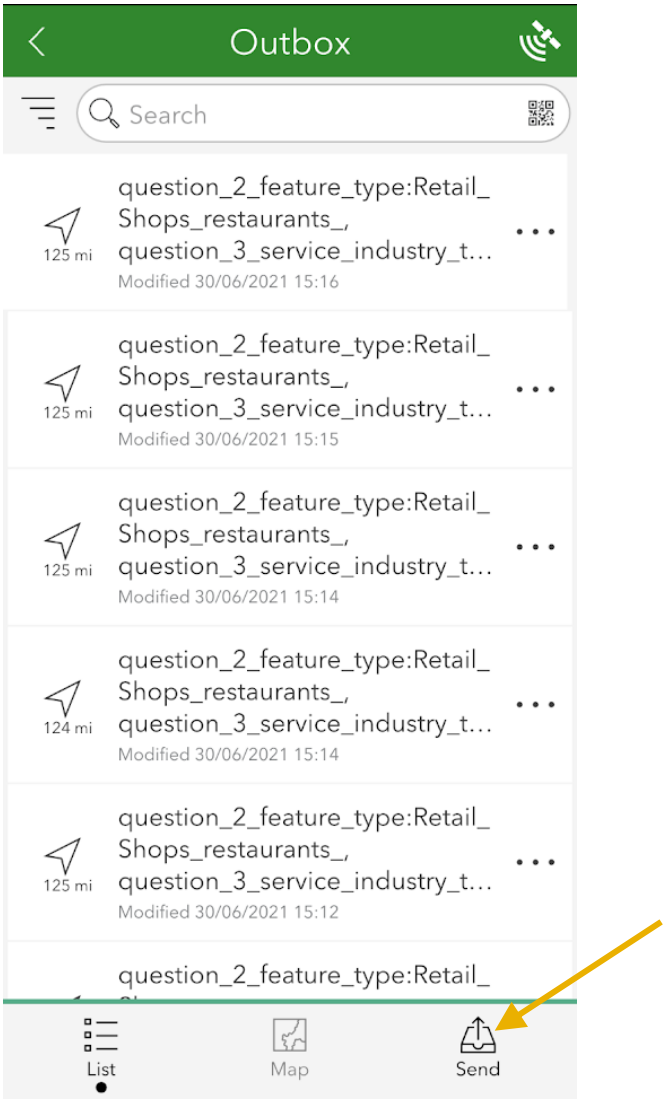
e. The next screen will give you three options. Choose 'Save in Outbox'. This means that you can use the Survey123 app without internet. We will talk about how to submit the data in more detail in point g below.



f. Now you can collect another feature. Click 'Collect' again. You should aim to collect a minimum of 50 points and try to collect as many features as you can within the time you have as it is likely to produce more accurate results later on when we start doing some analysis.

g. Once you are happy with the number of points collected, return to your classroom and click on 'Outbox'. In the example below, you can see we have collected 8 points, but you may have more or less than this.

h. Ensure you have a Wi-Fi connection and click 'Send' at the bottom of the page. This will upload all of your points so we can view them all together in map form.



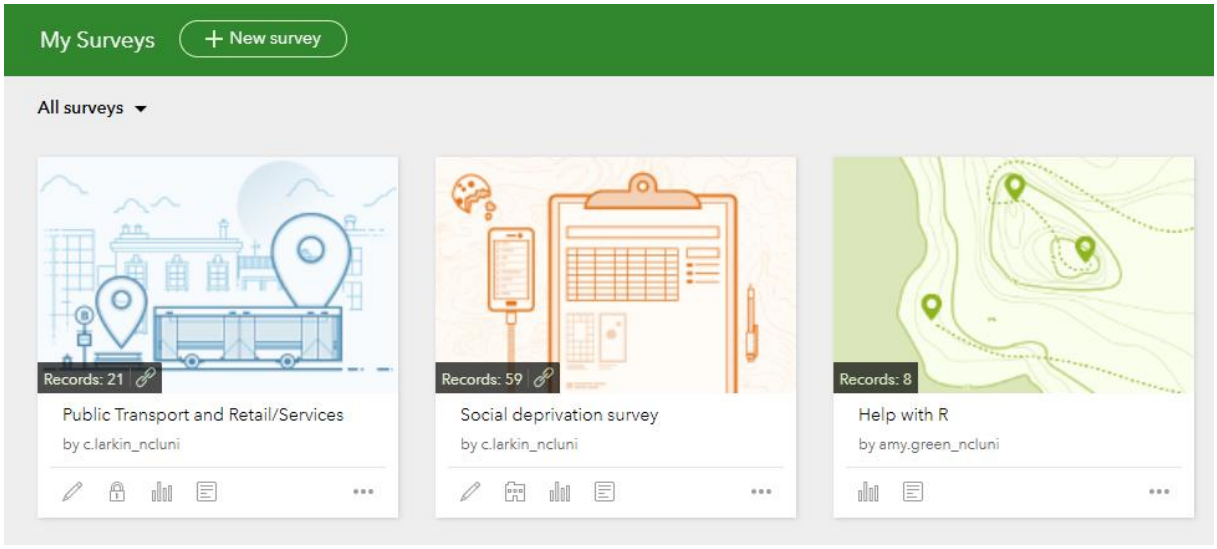
Section 2: Displaying your Data

Once you have collected your data and have returned to your classroom, we can now view the data using an online Geographic Information System (GIS).

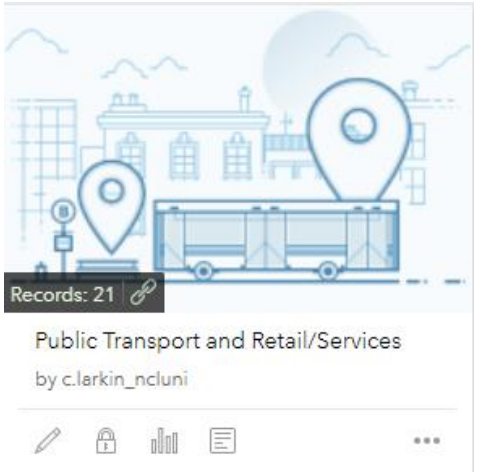
2.1. Viewing the Survey

a. In a web-based browser, go to https://survey123.arcgis.com/.

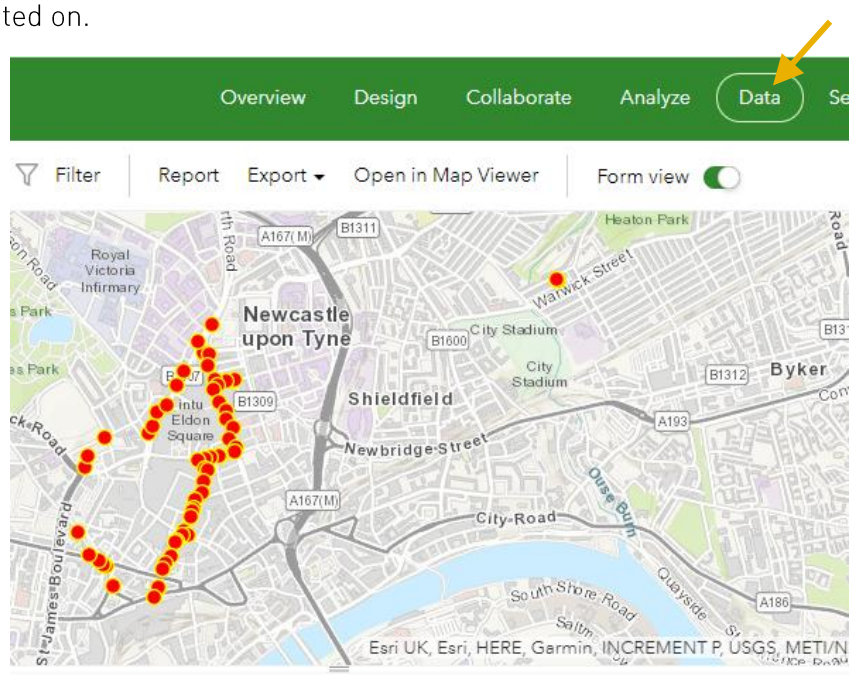
b. Sign in with the same details used to login to the Survey123 app in your phone/tablet. It should look something like this:



c. Then select the survey you have previously completed. In our example, this would be 'Public Transport and Retail/Services'.

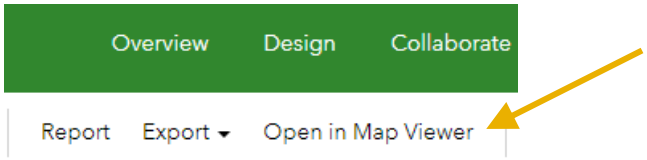


d. Now select the 'Data' tab. You should be able to see a map with the points you collected on.

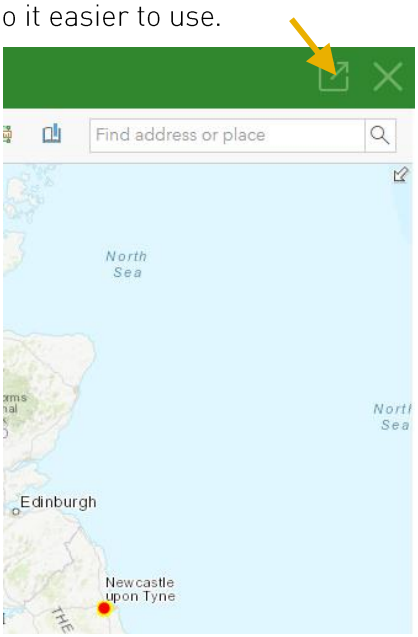


2.2. Displaying the Data in ArcGIS Online

a. This will display your captured points on a map. To get a better understanding of how we can use this data, select 'Open in Map Viewer'.

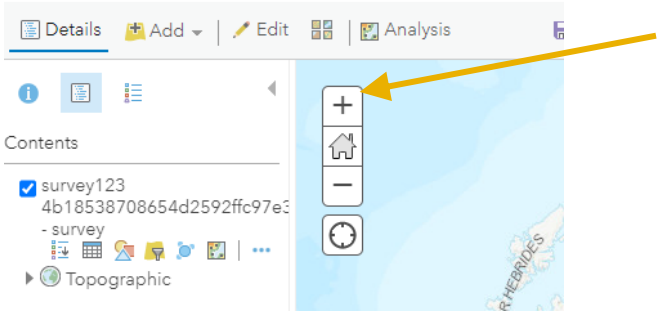


b. With the map view open, select the button on the top corner of the map to open this map in a new window so it easier to use.

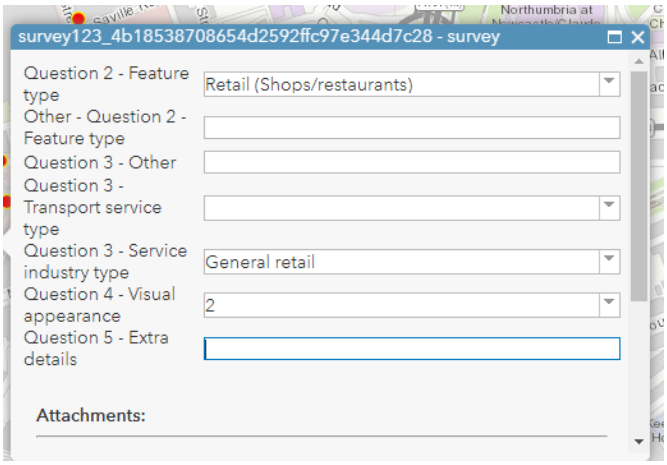


c. This opens data into ArcGIS Online. ArcGIS Online is a geographic information system which we can use on the internet, which offers methods to analysis and visualise data.

With this new map open, get conformable with how to navigate the map. Drag to move around the map and use the plus and minus symbols to zoom in and out of an area.

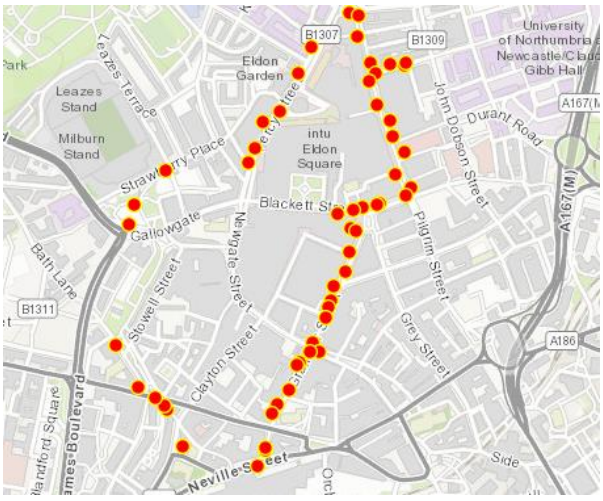


d. You can also fix any mistakes you may have made when recording features by using the 'Edit' link. You can now change any of the questions which you may have recorded incorrectly or forgot to answer.

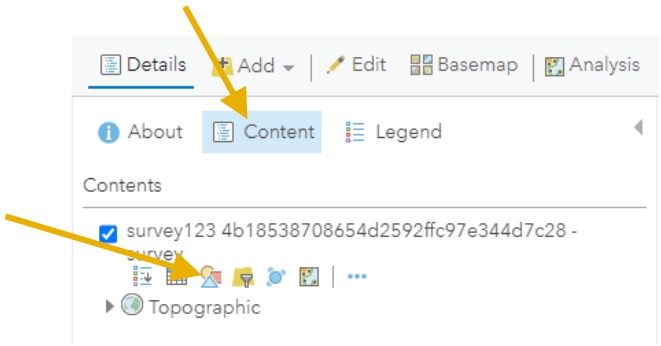


2.3. Changing Symbology

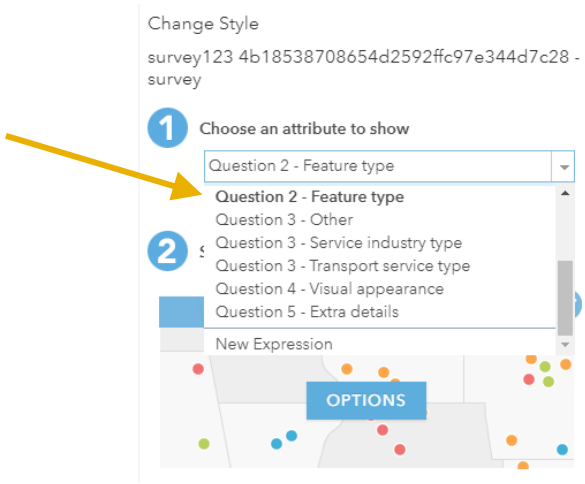
a. Try to locate the area with your points in. They will appear as red dots with yellow outlines at first. Look at the image below for an example of what your points may look like.



b. To change what the points represent, we can change the symbology. To perform this process, start by selecting the 'Content' tab. Then select the symbology button.



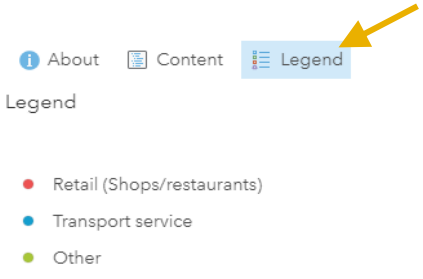
c. From the following drop-down menu, select one of the questions where the answers to the question you gave will now be used to visualise the data on the map. In our case, we have chosen 'Question 2 – Feature type' so this will change the colour of the points to represent the classes of features we have collected: retail and transport (yours may be different).



d. You can explore different visualisations using the 'options' menu.

e. Once you are happy with how the points will be displayed, select 'Done'.

f. Now select the 'Legend' tab to find what the colours represent. Is there any visual relationship between the locations of points you have collected (in the example case, between retail and transport services)?



Section 3: Analysing the Data

We can choose to analyse many different factors from the data we have collected. This can help us to understand the reasons behind a phenomenon/pattern occurring.

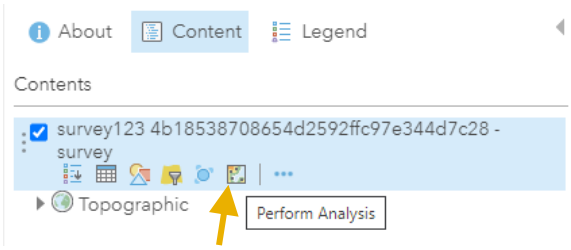
For this section we will use our example dataset, points of shops/restaurants and transport services, but the methods shown can be applied to any dataset.

3.1. Proximity Analysis

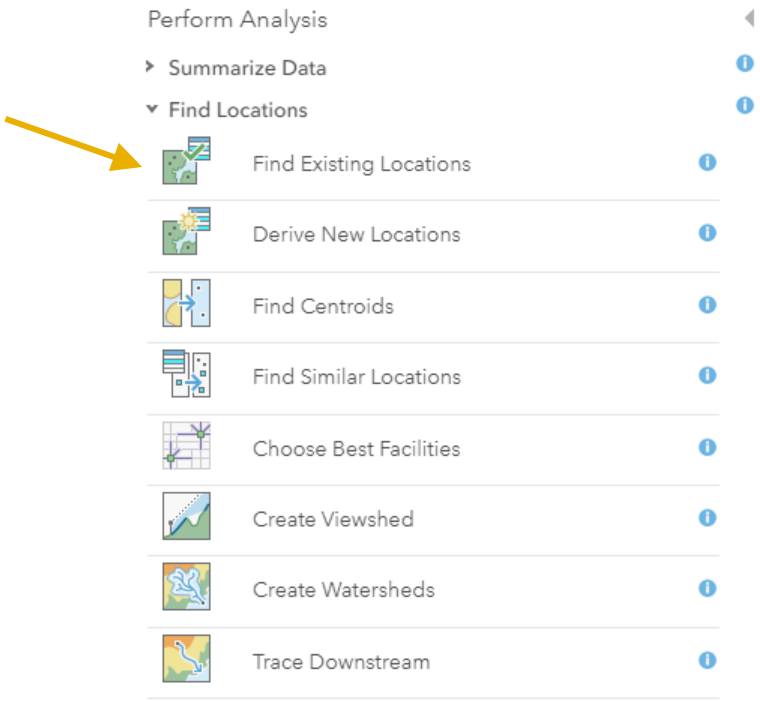
a. First, we shall investigate if there is any relationship between the location of restaurants and train stations. If your town centre does not have multiple stations, you may want to use bus stops instead.

   In the example, the centre of Newcastle-Upon-Tyne is used. Newcastle has a rail transport system known as the 'Metro' (similar to the London Underground or Manchester Tramways). Metro stations are the stations used in the following analysis.

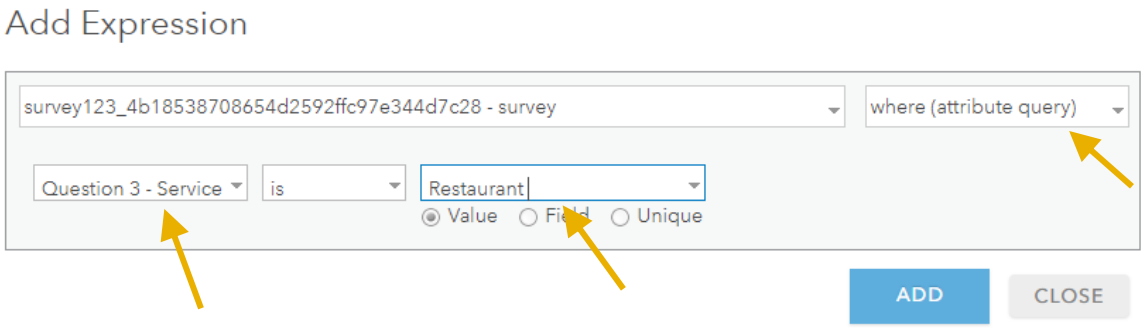
b. We first need to select the location of all the restaurants and all of the train stations. Click the 'Analysis' button:



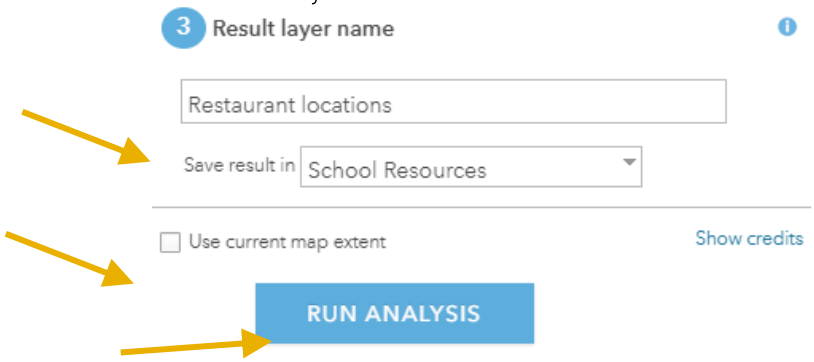
c. Now, under the 'Find Locations' tab, select 'Find Existing Locations'.



d. Click 'Add expression' and use the drop-down menu to set the following parameters.

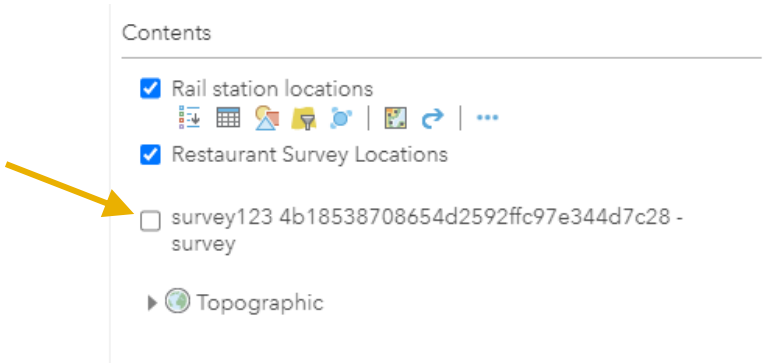


e. Now click add. Give the resulting layer a sensible name, such as 'Restaurant locations', as this will be added to our map as a new layer. Untick the 'Use current map extent', as this may cause some points to be missed depending how far zoomed in you are. Now hit 'Run Analysis'.

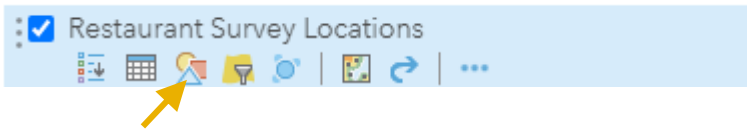


f. Once you have completed this step, find all Metro stations using the same process. Remember to give the results layer an appropriate name.

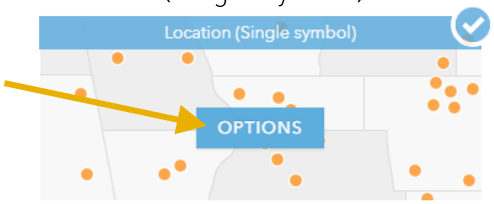
g. Under the content tab, you can now disable the original survey so that only restaurant and metro stations are shown. This is done by unticking the box by the layer.



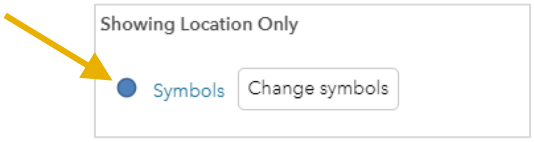
h. To distinguish between stations and restaurants on the map, we can change the symbology. Click the symbology symbol for either the metro or the restaurants.



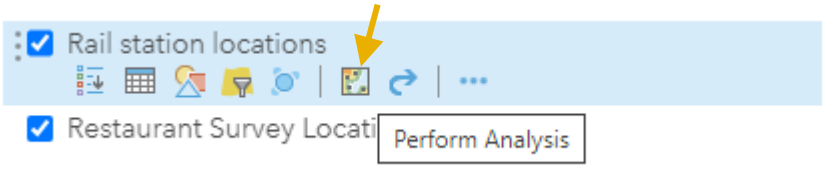
i. Click 'Options' under 'Location (Single Symbol)'.



j. Click 'Symbols'. Choose a colour or shape of your choice, then click 'Okay' to change the symbol.

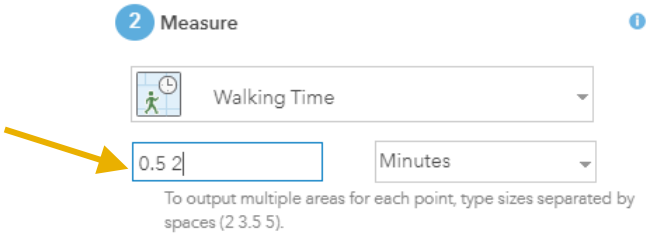


k. Next we will run some analysis to see using the rail stations to calculate walking distances from the stations to help us understand the accessibility of the restaurants from these locations. Click 'Perform Analysis' under the rail station locations as seen previously when finding locations.

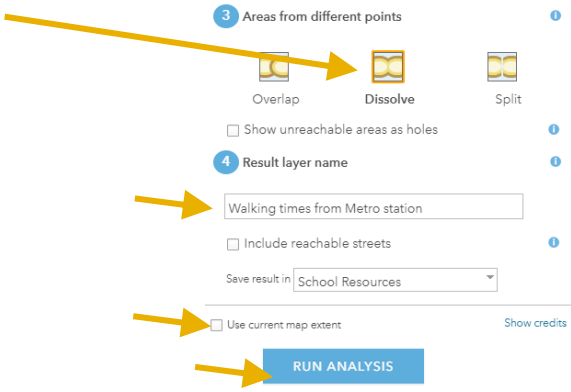


l. Under 'Use Proximity', select 'Create Drive-Time Areas'. This allows us to calculate the walking distance in time from a station to another location.

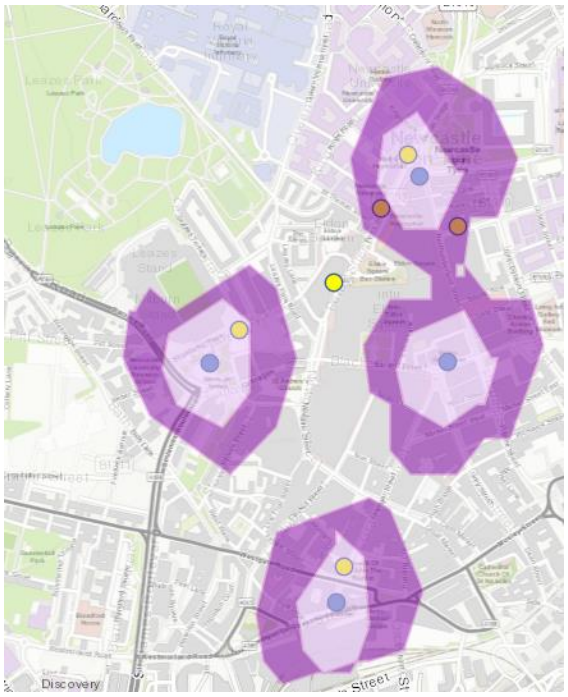
Ensure 'Walking Time' is selected in Step 2: Measure. In the box underneath type '0.5 2'. Make sure to include a space between the two numbers (0.5 and 2). This will let us see where can be travelled to in both 30s (the 0.5 value) and 2 minutes (the 2 value) of walking in one map layer.



m. At step 3 select 'Dissolve', and at step 4 give the layer a sensible name, such as 'Walking time from station'. Remember to untick 'Use current map extent' as this option is not required. Now click 'Run Analysis'.



n. The new layer should look something like this:



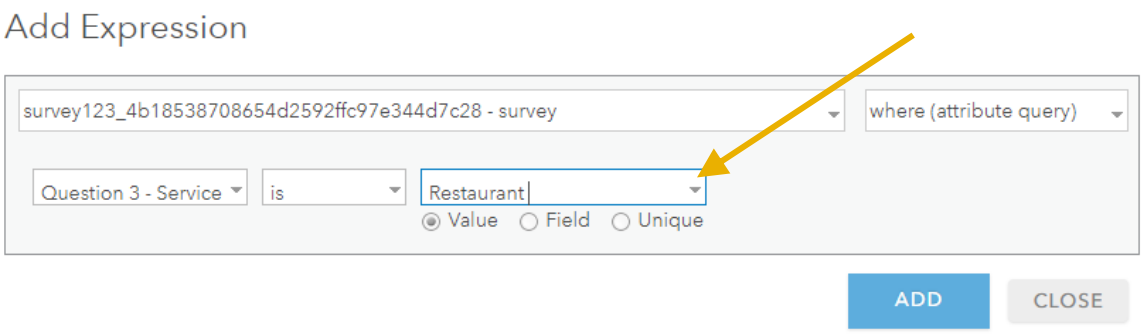
o. We can see that many of the restaurants fall within a 30s walk of a metro station. Do you think there is a reason for this?

p. We can repeat this process of selecting a feature and calculating the walk time to find further relationships. Try to repeat this process, but this time select 'Shops' and 'Bus Stops', or another pairing of your choice. What does this tell you about the location of retail or service industry?

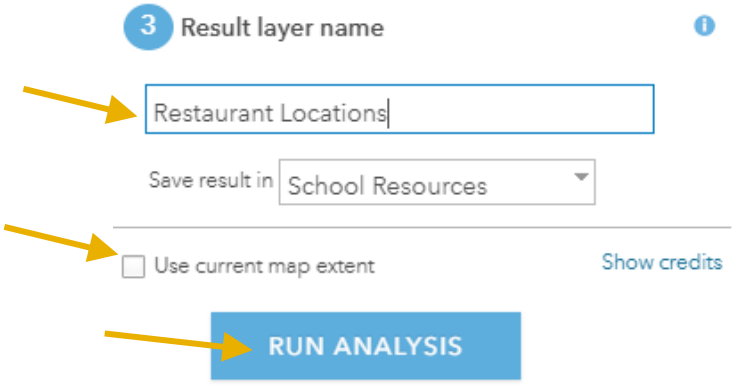
3.2. Density Analysis

a. Analysis using GIS can also help to statistically determine where clusters of certain features are. To do this we can use the 'Calculate Density' tool. Before we can use this tool, we must prepare our data once again.

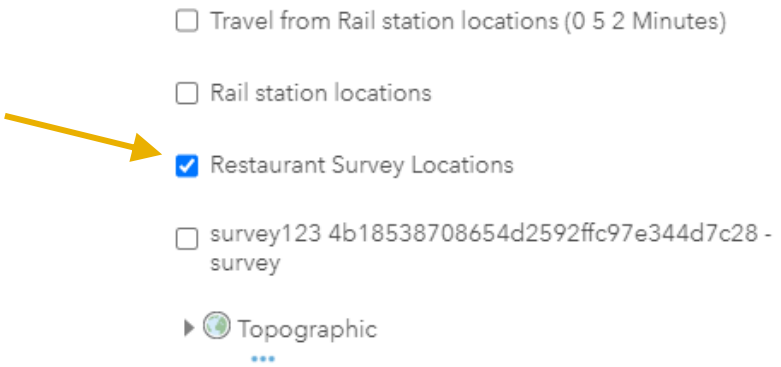
b. First, we want to create a layer of just restaurants – if you already have this layer from the previous analysis, go to step (d). If not, using the 'Find Existing Locations' tool (Section 3.1), build a query to select all Restaurants.



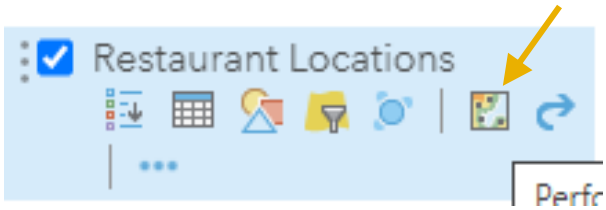
c. Remember to give the new layer an appropriate name and to untick the 'Use current map extent' box.



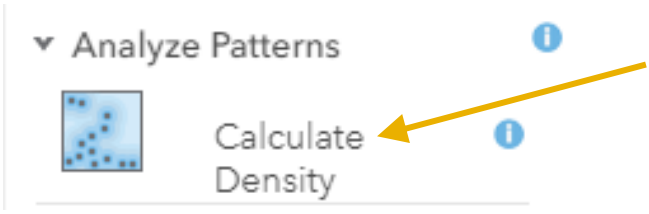
d. Untick all other layers under the contents tab so only Restaurants are shown.



e. Now select 'Perform Analysis' on the Restaurant layer.

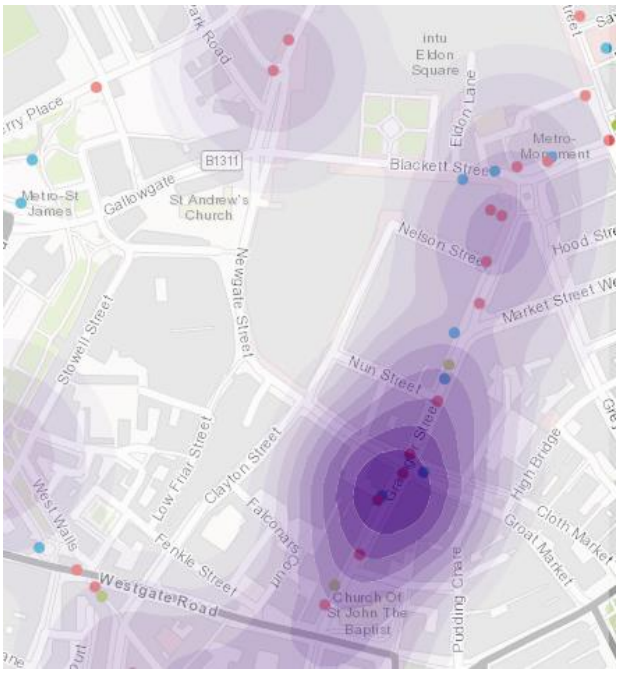


f. And under 'Analyse Patterns' select 'Calculate Density'.



g. Untick 'Use current map extent' then select 'Run Analysis'.

h. Now turn on the original survey layer using the tick box in the content tab, and your map should look something like this:



i. In this case, the darker colours show where the greatest density of restaurants are located, and the lighter areas where there is less restaurants. This sort of analysis can also be described as 'hotspot' analysis. We can now clearly see where the majority of restaurants are located.

j. You can re-enable (tick/turn on) any walking time layers you may have created to find out if the hotspot(s) of restaurants is related to the walking time from metro stations and thus how accessible they are.

k. Again, you can repeat the steps in this section using a different feature type (e.g., shops, cafes) to find any further trends and understand if accessibility to metro stations has an effect on where these businesses choose to open.

Section 4: Summary

This exercise has provided examples of how Survey123 can be used for fieldwork exercises.

In this example, we looked at capturing data and analysing the geographic relationship between public transport and the retail/service industry. However as Survey123 is highly customisable, it can be applied to all kinds of field work. Some suggested applications of the tool are:

- Traffic surveys
- Environmental Quality surveys
- Social inequality surveys
- Biodiversity surveys
- Recording locations of post-glacial erosion features
- Shopping basket surveys

The ESRI suite of products can be accessed for **free** by any UK school or Further Education college, however prior registration is required. By obtaining an educational licence for ESRI products, many more useful features in tools such as ArcGIS Online or Storymaps can be accessed, along with Survery123. You can find out more about the full range at: https://schools.esriuk.com/.

For support in suiting Survey123 to your own needs, feel free to email contact@geospatialuk.org.

This concludes the exercise.

Geospatial UK

This activity was created by Newcastle University on behalf of Geospatial UK.

For more resources or activities, visit

www.geospatialuk.org

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