



ADDITIONAL MAPBOX LEARNING MATERIAL

This document is an addition to the information you might have already learned in the Mapbox theory pages. It will help you to deepen the knowledge of topics or functionalities which either have more unique methods of usage or settings than described in the lesson.

A lot of the information presented in this file will be in a form of links which will take you to websites where a topic at hand will be explained in more details so don't forget to check them out! If a page does not load or work anymore look up the topic online by yourself.

Good luck!

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MORE ABOUT...

GEOCODING

We have already learned what is geocoding, what it's used for and how to do it using Google Maps tool. In case you've forgotten here's a brief reminder of what it is and a bit more:

“*Geocoding* is the process of taking an address or the name of a place, and returning a latitude / longitude location on the Earth's surface for that place, while *reverse geocoding* converts geographic coordinates to a description of a location, usually the name of a place or an addressable location.”

Geocoded locations are useful in many situations:

- **GIS analysis** (recognize patterns within the information);
- **Cartography**;
- **Decision making workflow** (especially useful for businesses);

On the web, geocoding is used in services like routing and local search. Geocoding, along with GPS provides location data for geotagging media and the best example is something which we have already learned about in the Google Maps lesson - photography.

HOW GEOCODING WORKS IN MAPBOX

The Mapbox has two distinct parts: the source data we use to define locations and the tools we use to search for and return those locations. When it comes to **source data** Mapbox contains data sources from governments, open data projects, and private companies.

The Mapbox Geocoding API (a tool which makes geocoding in the Mapbox possible) source data contains the following types of geographic information, ordered from the most granular to the largest:

- **Points of interest (POI)**: A named place including commercial businesses, public buildings, monuments, and parks, among other features.
- **Address**: A specific mailing address, including the address number if applicable.
- **Neighborhood**: A colloquial name for a smaller area within a place. Neighborhoods do not necessarily have specific, legally defined boundaries. Only present in some countries.
- **Locality**: An administrative unit that is smaller than a place. Only present in some countries.
- **Postcode**: A geographic area of the address component used for sorting mail.
- **Place**: Cities, towns, and villages. Note that some large cities (such as Tokyo and Istanbul) may be categorized as regions rather than places.

- **District:** An administrative unit that is larger than a place but smaller than a region. Only present in some countries.
- **Region:** States, provinces, and prefectures. This is typically the largest sub-national administrative unit of a country. Note that some large cities (such as Tokyo and Istanbul) may be categorized as regions rather than places.
- **Country:** Generally recognized countries or, in some cases like Hong Kong, an area of quasi-national administrative status that has been given a designated country code under ISO 3166-1 (ISO - International Organization for Standardization).

So... what all of this means and how to use it?

The Mapbox Studio dataset editor allows you to create your own custom datasets by importing data, drawing it manually, or searching for it in the Search places toolbar. When you search for places in the toolbar, you're using the Mapbox Geocoding API to find data to add to your custom dataset. Note that within the dataset editor you can search for and add for countries, regions, districts, postcodes, places, localities, neighborhoods, and addresses, but not POIs. These must be added manually as most of the time they are very individual and not of crucial importance and so not available in the majority of maps.

DATA ANALYSIS

With geocoded addresses, you can spatially display the address locations and begin to recognize patterns within the information. This can be done by simply looking at the information or by using some of the analysis tools available either on Mapbox or other software (check this list of spatial analysis software: https://en.wikipedia.org/wiki/List_of_spatial_analysis_software).

You can also display your address information based on certain parameters, allowing you to further analyze the information. This is especially useful for journalists, geologists, sociologists and many other types of professionals.



Image taken from:
<https://desktop.arcgis.com>

SPATIAL ANALYSIS

Spatial analysis is a type of data analysis so if you ever hear people talking about data analysis in GIS - they are most likely talking about spatial analysis. Another term you might encounter is geospatial analysis which basically means the same.

As we have already discussed, spatial analysis is used in many industries: to find the nearest coffee shop, calculate travel time, show regional statistics or find correlation between specific POIs for an article in a local tabloid. It's also a huge part of GIS, where many problems are solved with spatial analysis. Here's an example of case of great importance:

The classic example of spatial analysis is this map, created by physician John Snow during the deadly 1854 cholera outbreak in London. Snow plotted cholera cases (highlighted in black) in the Soho area of London around Broad Street and noticed a cluster around the single water pump which was responsible for the whole infection. This approach of analysis led to improved sanitation facilities and the discovery that cholera infection was water-borne rather than airborne.

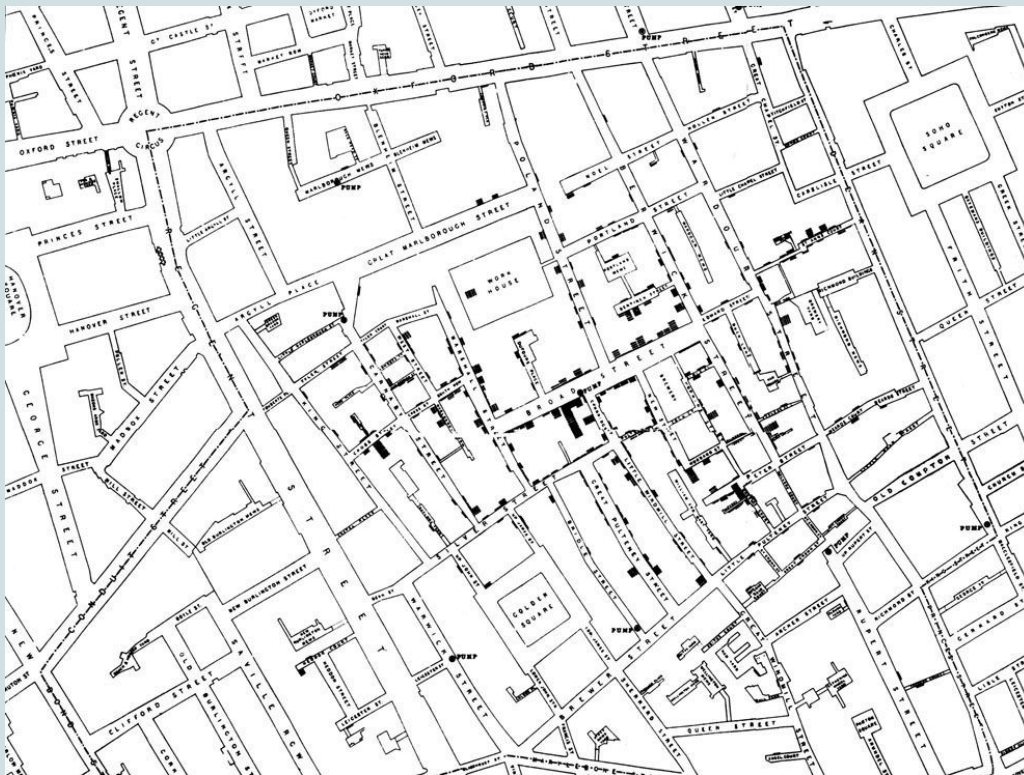


Image taken from:

<https://www.nationalgeographic.org/activity/mapping-london-epidemic/>

Today, spatial analysis is also used in epidemiology, biology, statistics, economics, commerce and business, urban planning, geology, oil and gas, and in many other industries.

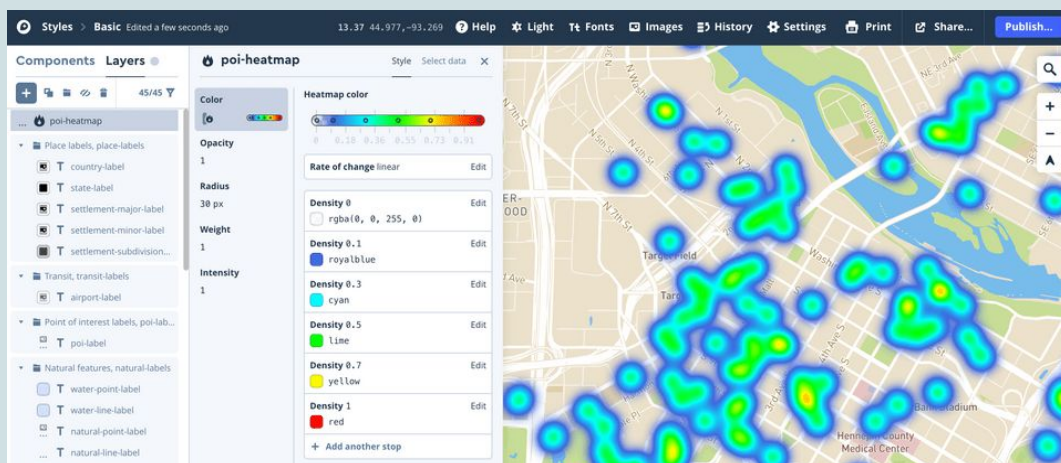
STYLES

You can use Mapbox to control nearly every aspect of the map design process, including uploading custom data, tweaking your map's color scheme, adding your font, creating data-driven visualizations, and more. The core of the map design process is the style: a document, written in JSON, that defines exactly how your map should be drawn. In this chapter we will talk about other options you can choose from when designing your map.

HEATMAP LAYER

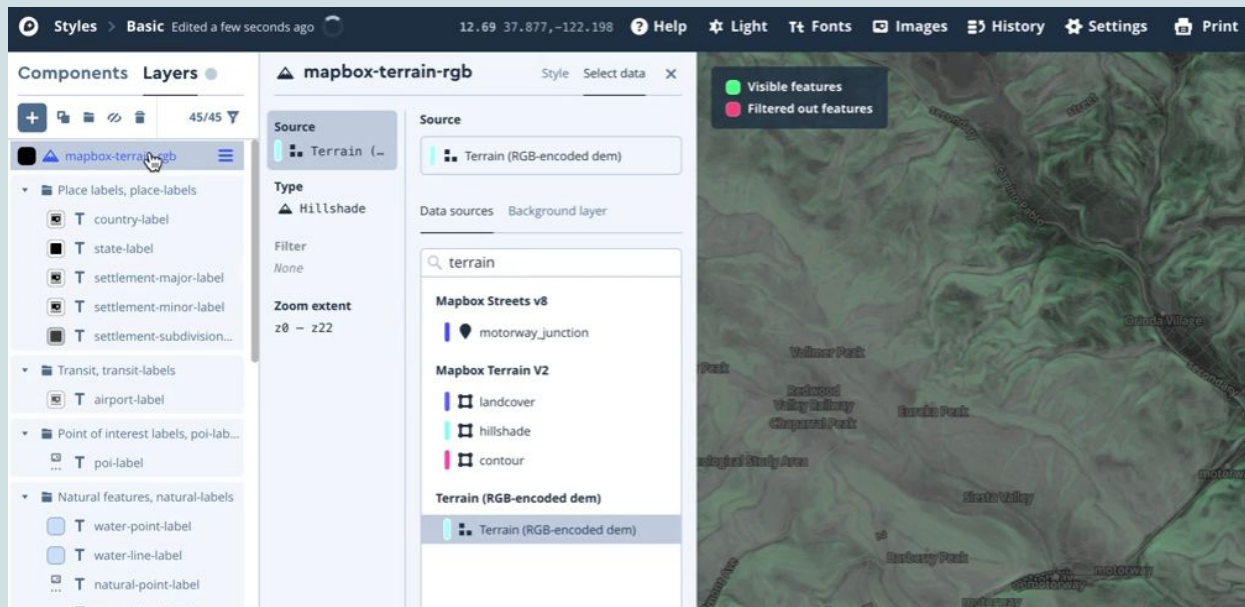
A heatmap is a data visualization in which a range of colors represent the density of points in a particular area. Adding a source layer as a heatmap layer allows you to represent the layer's features in terms of their proximity to one another. Heatmap layers in Mapbox Studio have several configurable properties that allow you to customize your heatmap:

- **Color:** Defines the heatmap's color gradient, from a minimum value to a maximum value. You can adjust the density and color of each stop individually, as well as add and delete stops. For inspiration on color choices for your heatmap, try **Color Brewer** (<https://colorbrewer2.org/#type=sequential&scheme=BuGn&n=3>).
- **Opacity:** Controls the global opacity of the heatmap layer.
- **Radius:** Sets the radius for each point in pixels. As the radius number increases, the heatmap will get smoother and have less detail.
- **Weight:** Measures how much each individual point contributes to the appearance of your heatmap. Heatmap layers have a weight of one by default, which means that all points are weighted equally. Increasing the weight property to five has the same effect as placing five points in the same location. You can use the **Style across data range** and **Style with data conditions** options to set the weight of your points based on specified properties.
- **Intensity:** A multiplier on top of the weight property. Intensity is primarily used as a convenient way to adjust the appearance of the heatmap based on zoom level.



HILLSHADE LAYER

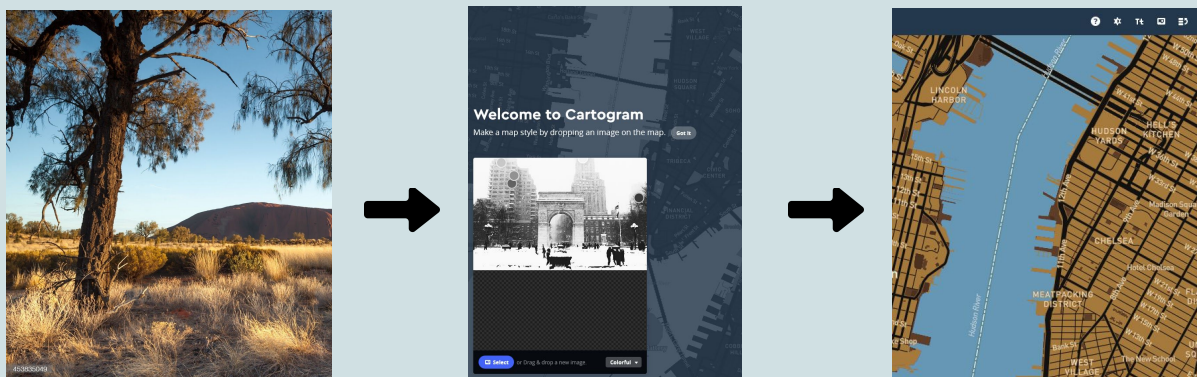
Under the available sources when you create a new layer there's a new raster source: **Mapbox Terrain RGB**. When selected, it uses the hillshade layer type to provide many properties to style it. With hillshade layers, you can customize the color, illumination direction, and intensity of the hill shading effect. Open this style in the style editor to experiment with hillshade style properties.



CARTOGRAM

Use **Cartogram**, a drag-and-drop tool, to create a custom map in seconds. Upload a picture, select the colors you want to use, and create a map style that fits your brand. Your new map style will be ready to use on a website or in a mobile application. You can also open it in the Mapbox Studio style editor to continue customizing the style or add custom data.

Click here to start using cartogram: <https://apps.mapbox.com/cartogram> .

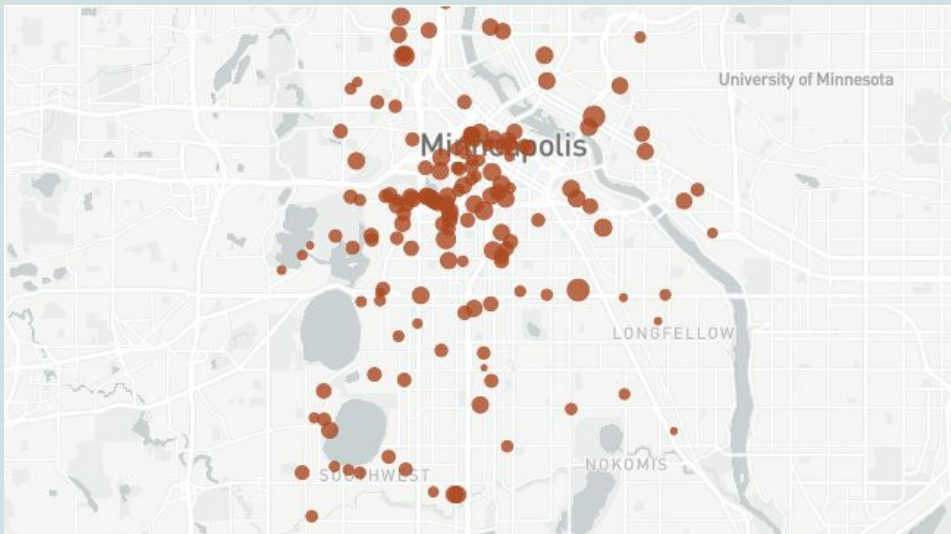


DATA - DRIVEN STYLES

Data-driven styles allow you to change a layer's style based on properties in the layer's source. For example, you might create a data-driven style rule that sets the color of countries in the EU based on the population of each country. Here are some examples and tutorials on how each unique data-driven style can be created:

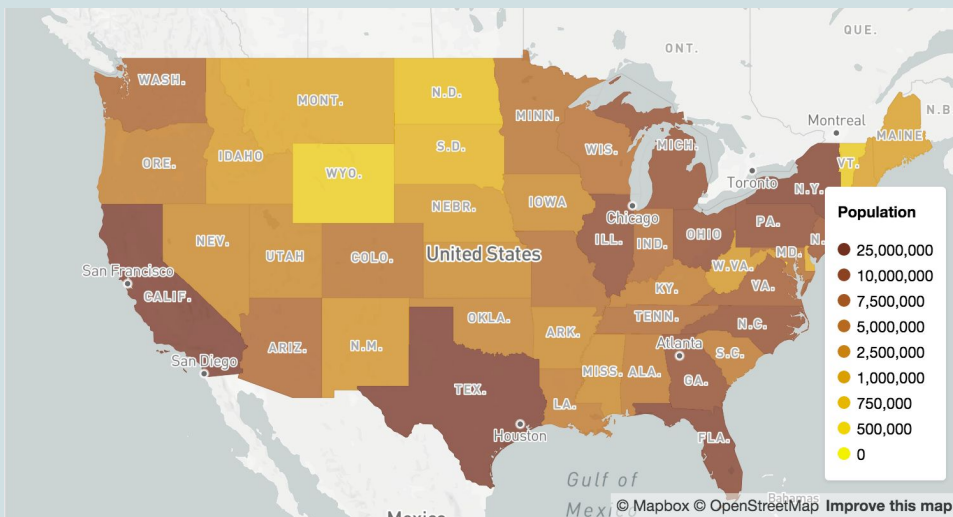
- In this guide you'll learn how to write expressions in Mapbox GL JS to style custom data based on a data property and by zoom level.

<https://docs.mapbox.com/help/tutorials/mapbox-gl-js-expressions/>

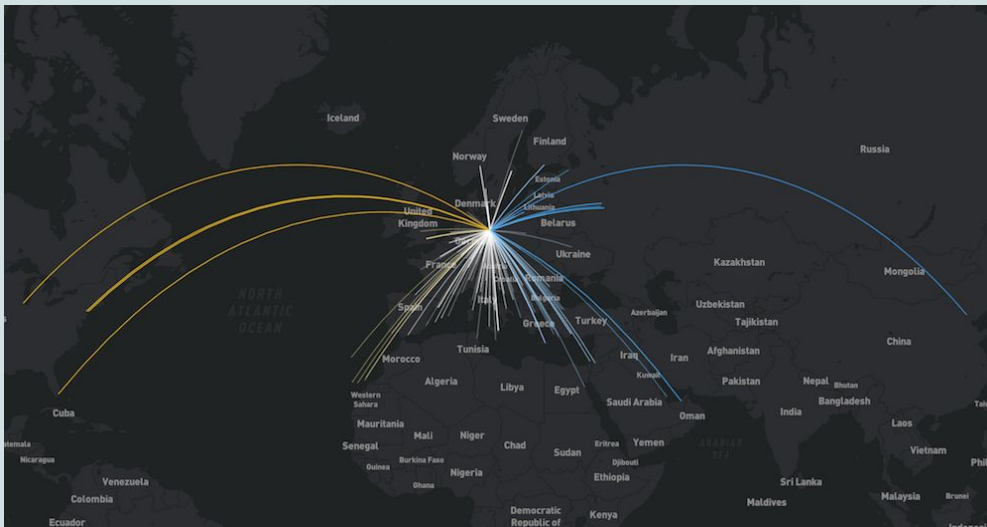


- In a choropleth map, a *fill* layer changes color based on data properties. In this tutorial, the color of a state changes based on the population in the data.

<https://docs.mapbox.com/help/tutorials/choropleth-studio-gl-pt-1/>



- In a colored line map, a line layer changes color based on data properties. In this example, the color of a flight path changes based on the difference between local time at the flight's origin and destination.



- Using a fill-extrusion layer, extrude buildings in 3D based on data properties. In this example, the extrusion height of the building changes based on the *height* and *min_height* of the building polygon.

<https://docs.mapbox.com/mapbox-gl-js/example/3d-buildings/>



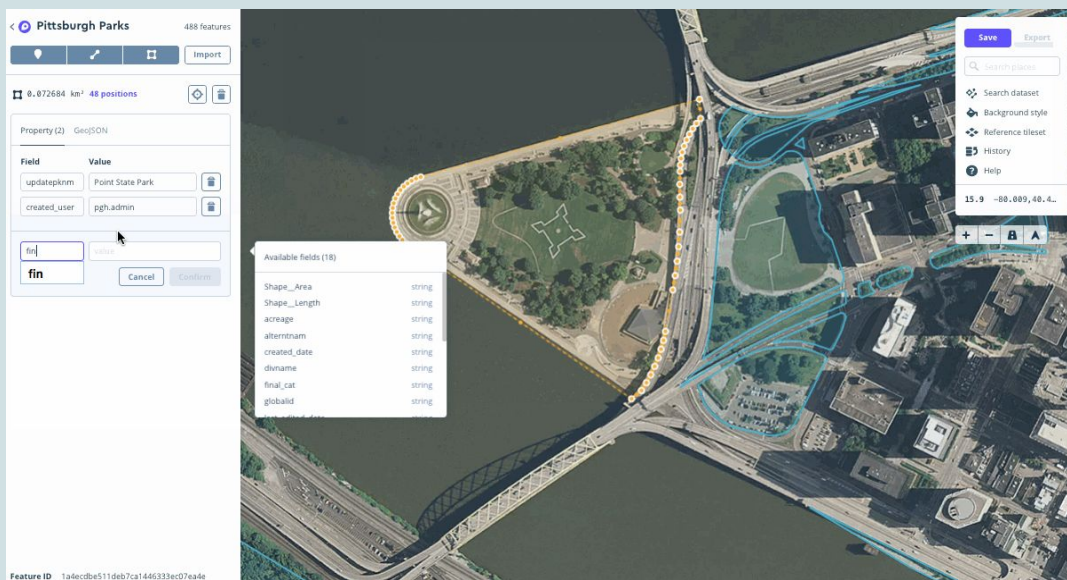
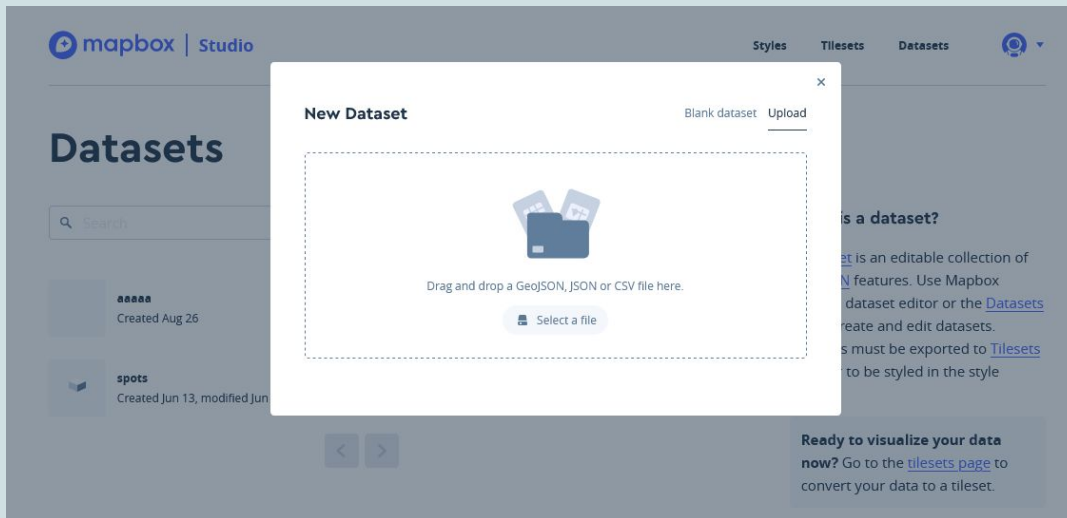
These tutorials are not for the beginners. It requires previous knowledge of HTML in order to get the results shown in the example images. So if you have any knowledge in programming or are willing to learn - these styling options can become of great importance and value for those of you who are interested in spatial analysis.

TILESETS AND DATASETS

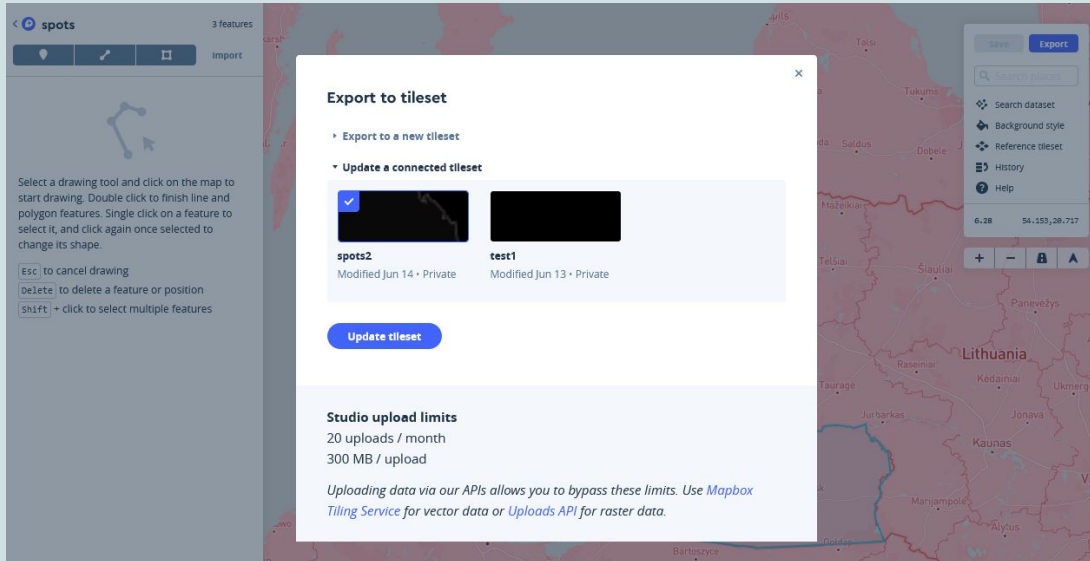
Datasets and **tilesets** are two different formats you can create when uploading custom data to your Mapbox account. If you want to upload data and edit it before adding to a map, upload as a dataset. If you want to upload data to add directly to a map, upload as a tileset.

UPLOADING DATA YOU CAN EDIT (DATASETS)

When you upload your data as a dataset, feature geometries (points, lines, and polygons) and properties (attributes) can be edited, added, or removed in the Mapbox Studio dataset editor. Once you have finished editing your dataset, you will need to save it and export it as a tileset to add it to a style.



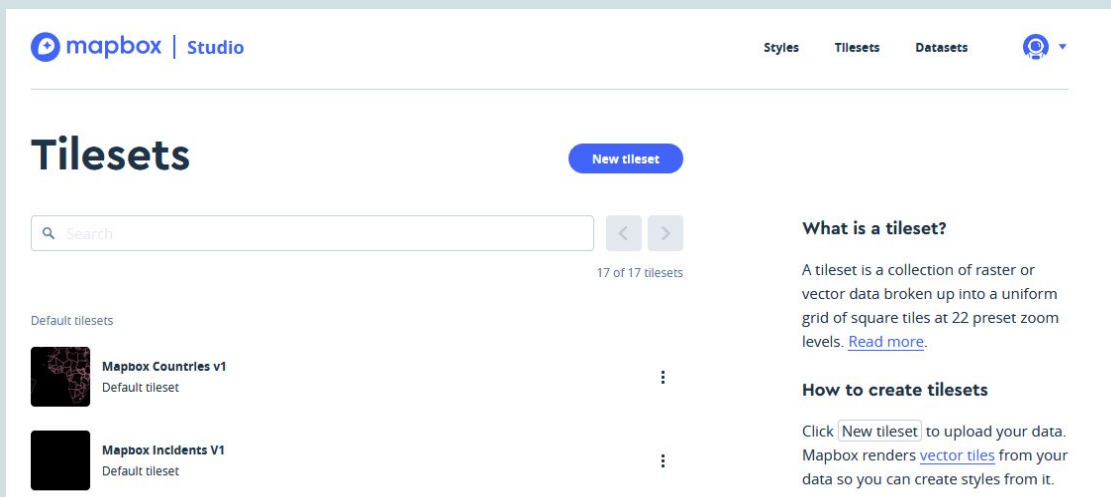
You can also convert a dataset to a tileset in a few steps: whenever you are ready click on the **export** button at the top right of the screen and choose either **export to a new style** or **update a connected tileset** if you have already created one before and wish to update it.



UPLOADING DATA TO ADD TO A MAP (TILESETS)

Tilesets are lightweight collections of vector or raster data that are optimized for rendering and are not editable but can be styled in the Mapbox Studio style editor. When you upload vector data as a tileset, it is simplified and cut up into vector tiles that can be used directly in your style. Once data is converted to a tileset, it is no longer editable.

Mapbox Studio allows you to upload your own custom data to use in your map styles. You can upload your files on the **Tilesets** page:



ACCEPTED FILE TYPES

The accepted file types and transfer limits for dataset and tileset uploads include:

File type	Datasets	Tilesets	Transfer limits
CSV	✓	✓	5 MB for datasets, 1 GB for tilesets
GeoJSON	✓	✓	5 MB for datasets, 1 GB for tilesets
MBTiles		✓	25 GB
KML		✓	260 MB with 15 layers or fewer
GPX		✓	260 MB
Shapefile		✓	260 MB (combined uncompressed size of <code>.shp</code> and <code>.dbf</code> files) You must upload shapefiles as a compressed <code>.zip</code> file.
GeoTIFF		✓	10 GB

Multiple files can be uploaded to the same dataset without limit — they need to be loaded 5 MB at a time. The size of a dataset is unlimited, but the Mapbox Studio dataset editor can only display datasets of 20 MB or smaller. If you run into errors, check the [troubleshooting](#) chapter.

INTEGRATION

WORDPRESS

In case you became curious about Mapbox integration into WordPress website builder here're some tips in order to get started:

- First of all, there is no way to add a map created on the Mapbox to WordPress without a plugin created especially for this exact purpose - **WP Mapbox GL JS Maps**. For more information on what this plugin does and more check this page: <https://wordpress.org/plugins/wp-mapbox-gl-js/>
- To embed the map in your website, you will also need an Access token from your Mapbox account. It will act as an authentication and provide access to the maps created on your account. Check documentation of the plugin for more information.

TROUBLESHOOTING

In case you don't see your problem in the list below please check this help page on Mapbox for other cases and ideas on how to solve them: <https://docs.mapbox.com/studio-manual/help/> & <https://docs.mapbox.com/help/troubleshooting/>. Below you will find the most common cases you might encounter and possible solutions or links to the pages with such information.

UNABLE TO EDIT CSV FILE

If you upload your CSV via the Mapbox Studio tilesets page or via the Uploads, the geometries and data attributes will not be editable. Use the **Mapbox Studio dataset editor** if you'd like to edit your data before you add it to your map.

SVG IMAGE ERRORS

Check this link in order to find the most common problems regarding SVG files and their appearance: <https://docs.mapbox.com/help/troubleshooting/studio-svg-upload-errors/>.

UPLOAD FAILURE

Upload failures directly in Mapbox Studio typically occur for two reasons:

- There's an explicit issue with your data.
- The data didn't process within one hour (two hours for MBTiles files).

If there is an explicit issue with your data, you will receive a descriptive error message when the upload fails. Check out this list of errors and provided solutions:

<https://docs.mapbox.com/help/troubleshooting/uploads/>.

If you receive a ***Processing timed out.*** message after a lengthy processing status, it is likely because your file has taken more than one hour (two hours for MBTiles files) to process and has timed out.

DICTIONARY

Access token - Mapbox uses access tokens to associate your account with incoming requests and grants access to different actions.

CSV - the CSV (comma-separated values) format is common for table data, like the kind you would use in Excel or other spreadsheet programs.

Data-driven styling - allows you to style spatial data based on its properties. For example, with data-driven styling you can change the radius of a circle at an intersection based on the number of pedestrians crossing the intersection.

Geocoding - the process of taking an address or name of a place and converting it into latitude and longitude values.

GeoJSON - an open standard file format for representing map data.

KML – a file format that is commonly used in Google products.

Mapbox GL - a suite of open-source libraries for embedding customizable and responsive client-side maps in web, mobile, and desktop applications.

Mapbox GL JS - an open-source JavaScript library that uses Mapbox GL to render interactive maps.

OpenStreetMap - is a collaborative map of the world that creates a world map. Anyone can contribute to OpenStreetMap, and OpenStreetMap's data is free to share and use.

Raster data - a pixel-based data format in which data is stored in a grid structure. Each pixel, or unit of information, has the same size and shape, but varies in value.

SDK – a software development kit. It is a collection of software development tools in one installable package.

Spatial Analysis - The process of modeling, examining, and interpreting model results. Spatial analysis is useful for evaluating suitability and capability, for estimating and predicting, and for interpreting and understanding

Style - a JSON document that defines the visual appearance of a map.

SVG - Scalable Vector Graphics are used to define two-dimensional vector-based graphics for the Web.

WordPress - is a free and open-source content management system. It's also the simplest, most popular way to create your own website or blog.

Vector tiles - a lightweight data format for storing geospatial vector data, such as points, lines, and polygons.

Zoom level - determines how much of the world is visible on a map. Mapbox provides maps in 23 zoom levels, with 0 being the lowest zoom level (fully zoomed out) and 22 being the highest (fully zoomed in). At low zoom levels, a small set of map tiles covers a large geographical area. At higher zoom levels, a larger number of tiles cover a smaller geographical area.