QGIS: XYZ Tiles & GPX File Heatmap

Prepared using QGIS v3.10

Welcome to the Essential QGIS Task Sheet Series. This series supplements the Iowa State University Geospatial Technology Training Program and the Spatial Data Science workshops and short courses. The task sheets are designed to provide quick, easy instructions for performing a variety of mapping, analysis and data visualization tasks.

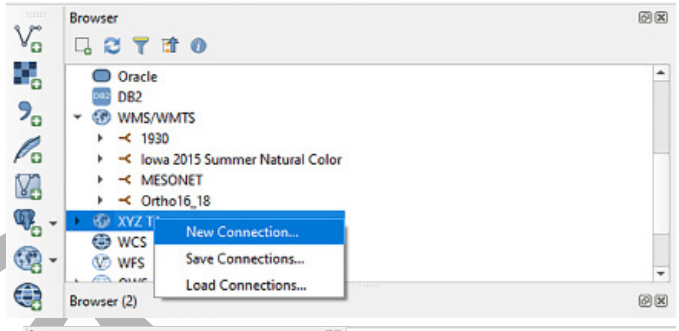
Data recorded using a GPS capable device and app such as Strava, MapMyRun, or other GPS application can often be exported in GPX format and then opened in QGIS. In this task sheet you will be adding basemap imagery using the XYZ tile connection and creating a heat map based on a single runners data from past Thanksgiving 'Turkey Trot' 5K runs. You can also use these steps to work with your own GPS/GPX data.

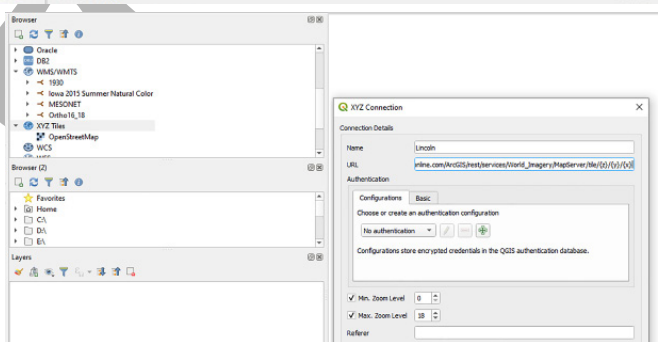
1. Creating New XYZ Tile Connection

a. Download the data for the this task sheet at https://isueogtp.github.io/TaskSheets/data/PM2082-19o_data.zip and expand the .zip file.

b. In QGIS you can add a basemap using **XYZ Tiles**. Scroll to find **XYZ Tiles** in the QGIS Browser panel. Then right-click and select **New Connection...** The **XYZ Connection** window opens, provide a **Name** such as **World Imagery**, and copy/paste the following URL into the **URL** field: https://server.arcgisonline.com/ArcGIS/rest/services/World_Imagery/MapServer/tile/{z}/{y}/{x}. *Note: a list of additional XYZ tile connection URLs can be found at https://isueogtp.github.io/TaskSheets/resources/xyzTileURLs.*

c. Click **OK**. The new raster layer will be added to the **XYZ Tiles** connections list. Add the **World Imagery** layer to the **Layers** pane, a world map will load into the Map Canvas.



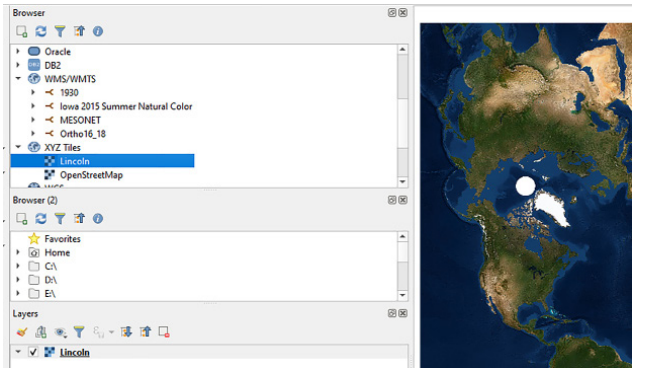


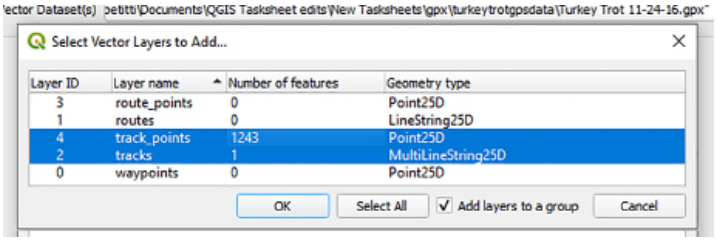
2. Adding GPX Files

a. Drag and drop the downloaded GPX files from the file directory or folder into the Map Canvas area. *Note: multiple GPX files can be selected and added at the same time.*

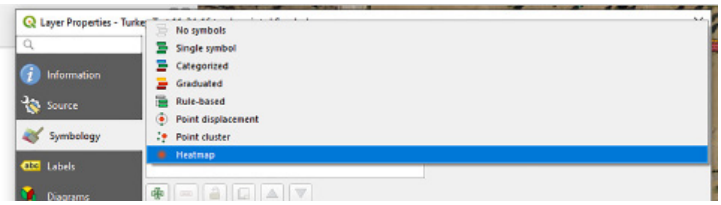
b. Once added, the window **Select Vector Layers to Add** will open. Look at the third column, **Number of Features**, only two layers have features. **Highlight** both **track_points** and **tracks** and click **OK**. You will need to do this for each GPX file. *Note: when adding the track_points and tracks you have the option to Add layers to a group layer.*

c. In the **Layers** pane, right-click the **Turkey Trot...** group or layer and select the first option **Zoom To Group** or **Zoom To Layer,** now you will see the course. You can zoom into the map and see each individual GPS point.





3. Creating A Heatmap With GPX Files

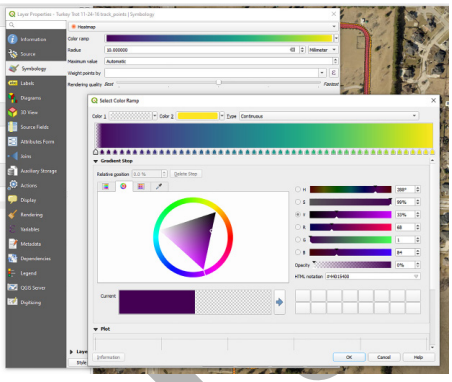


a. Open the **layers properties** for one of the **track_ points** layers by double-clicking the layers name.

b. In the **Symbology** tab, open the drop-down menu to change **Single Symbol** to **Heatmap**.

c. Below set the **Color Ramp** to something better such as **Red** or **Viridis** (color blind friendly). Optionally, make a custom color ramp.

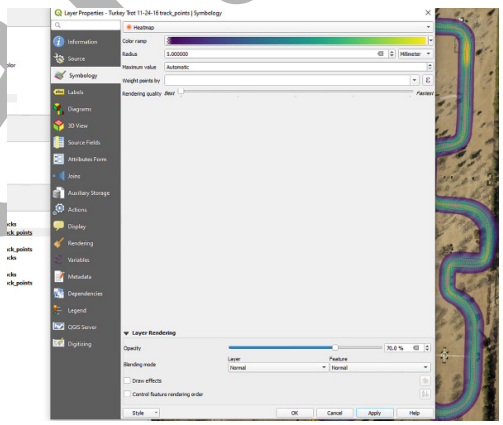
d. After choosing your color ramp, expand the drop-down menu again and go to **Edit Color Ramp...**



e. The **Select Color Ramp** window opens. On the long bar displaying the color ramp steps, click the **first step**,a black boarder will appear around the step.

f. With the first step selected set the **opacity** to **0%**. Now any value of zero will not be symbolized. Click **OK** to close the window.

g. Back in the **Select Color Ramp** window, set the last option **Rendering Quality** to **Best**.

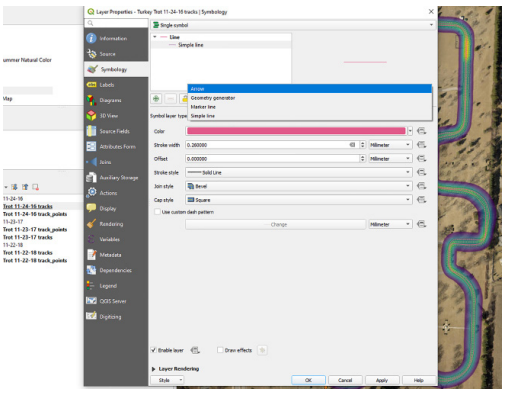


h. At the bottom, expand **Layer Rendering** and set that **opacity** to around **70%** click **Apply** then **OK** to close the window.

4. Creating Arrow Shaped Symbology

a. Open the **Symbology** for the tracks layer that corresponds to the track_points used previously.

b. Within **Symbology** click on **Simple line**. The window will change, and from the first drop-down menu **Symbol layer type** change to **Arrow**.



c. This option will show what direction the runner was traveling. Set the **Offset** to **3** mm, and change the **arrow color** to make it stand out against your heatmap. Click **Apply** and **OK** to close the window.

d. To copy the style to another layer, right-click the layer to copy from and select **Styles** > **Copy Style** > **All Style Categories**. Next, select the layer to paste it to and right-click and choose **styles**.

e. Optional: Create a heat map of all three track_points layers. Hint: use **Merge vector layers** from the **Processing Toolbox > Vector general**.

Contact: Thomas Petitti, Intern; Professor Christopher J. Seeger, ASLA, GISP cjseeger@iastate.edu, 515-509-0651 or GIS Specialist Bailey Hanson, GISP bahanson@iastate.edu, 515-520-1436. Additional task sheets and information about the Geospatial Technology and Spatial Data Science Programs is available at www.extension.iastate.edu/communities/gis.