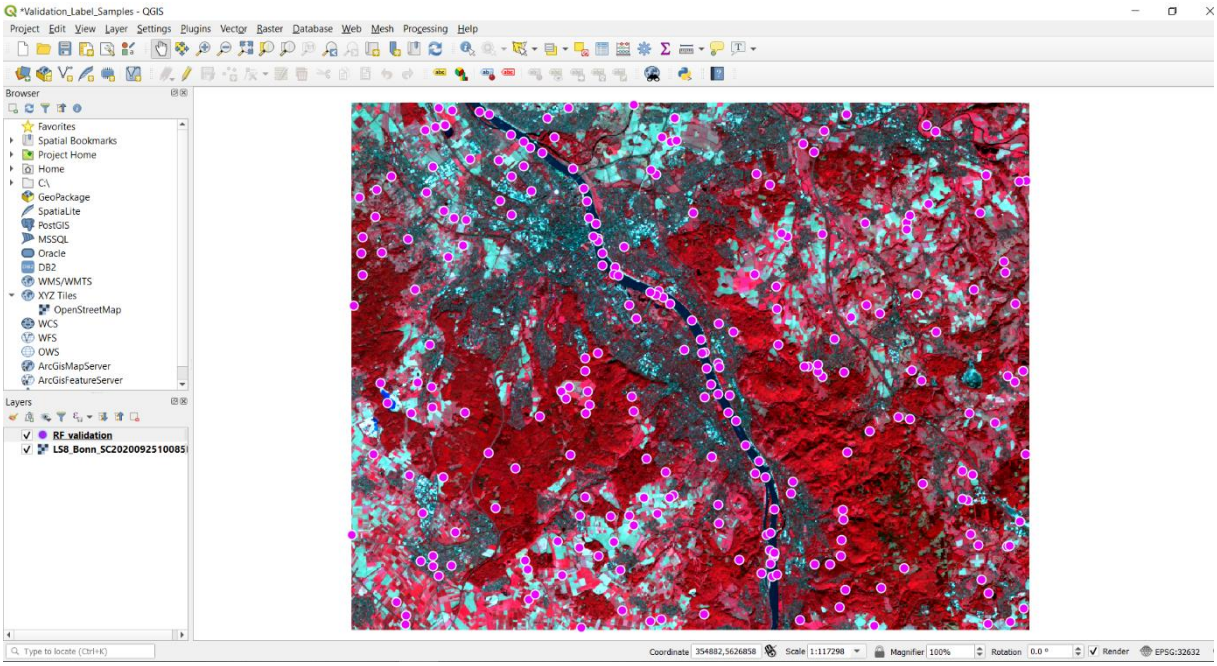
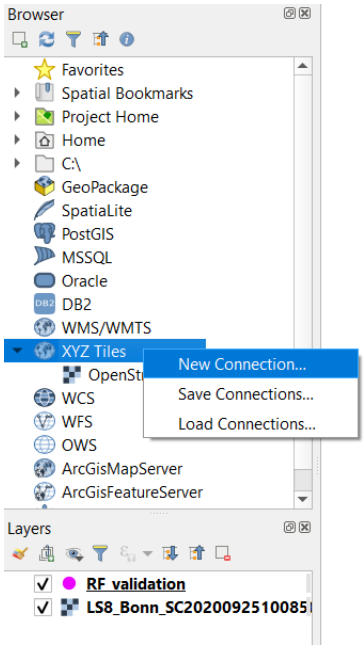
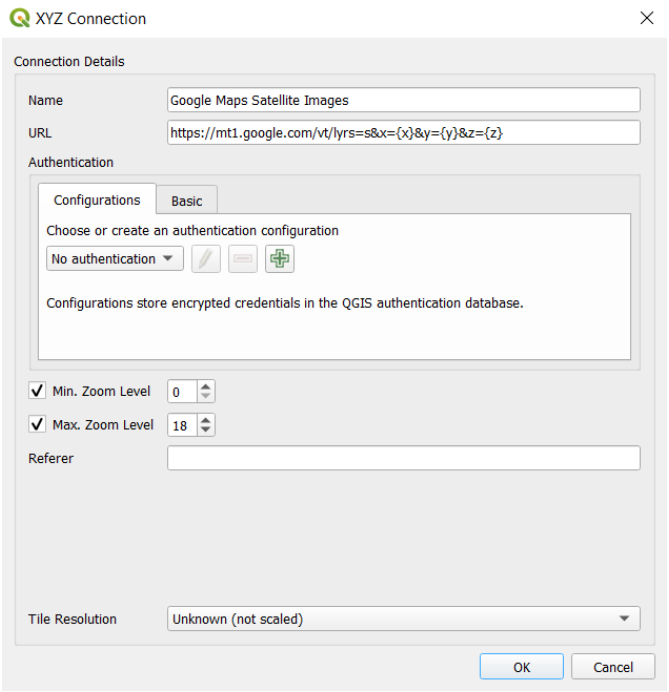
Classification in R: Label samples in QGIS

Open QGIS and import your initial image dataset (LS 8 scene, “LS8_Bonn_SC20200925100850.tif”) and the newly created point shapefile `validation_RF.shp` containing the test samples from the previous assignment. Display the image data using a RGB composite of your choice. A good, high-contrast (e.g. red: band 5, green: band 4, blue: band 3) presentation makes it easier to interpret the scene during validation:



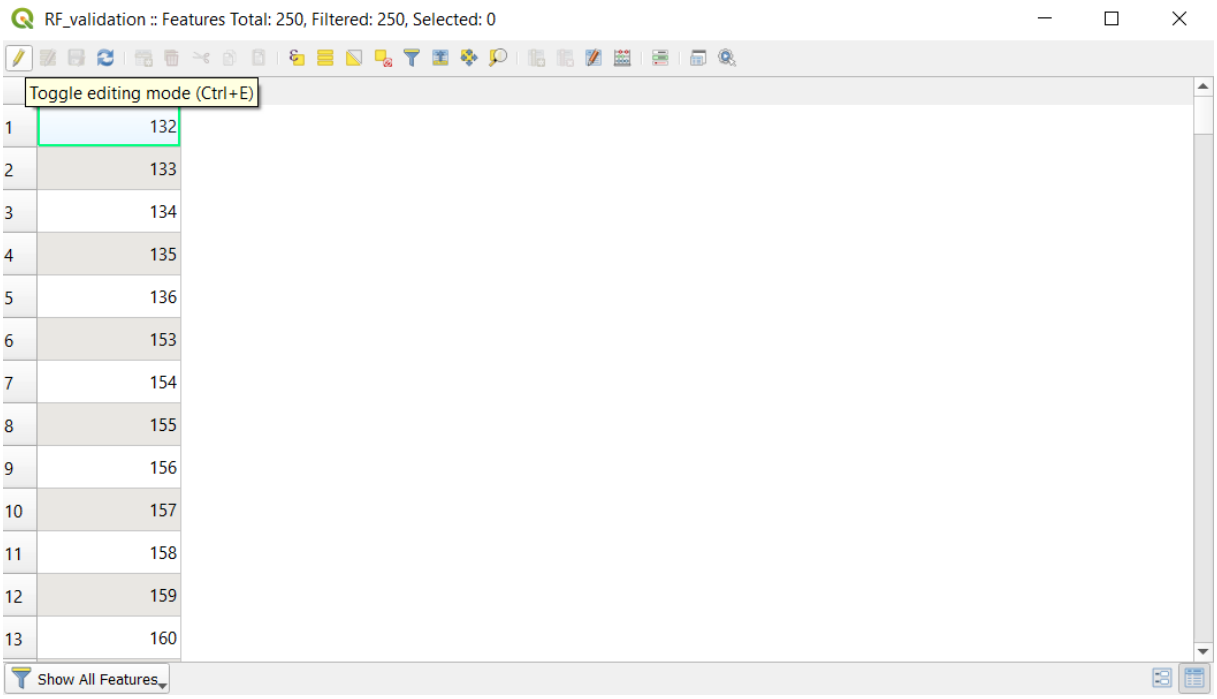
For visual support, we also want to look at the high-resolution information provided by Google Maps. In QGIS 3.10 we do not need an additional plugin, but we can simply add Google Maps satellite images as XYZ server connection. Right click on “XYZ Tiles” in your browser and click on “New Connection”. Add Google Maps as shown in the screenshot underneath:



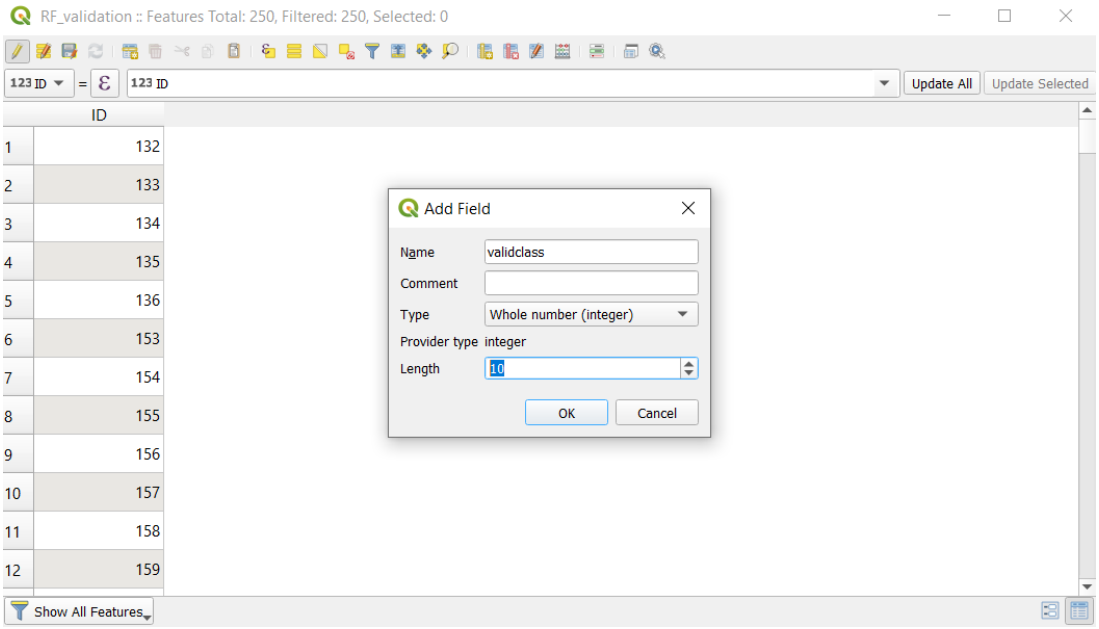


Once this is done, we can add Google Maps Satellite images to our layers. Your data may look slightly rotated after the import of external Google Maps imagery. This is because the Google Maps data are subject to a different projection and they cannot be reprojected on-the-fly. Because of this, your data will be temporarily adjusted so that everything is on top of each other. You can hide the Google Maps data for now, we will use it later.

Right click your point shapefile ("RF_validation.shp") and choose "Open Attribute Table". Enable the editing features by pressing the pencil in the toolbar of the attribute table:



Now press the "new field" button  in the toolbar to add a new column to the attribute table into which we will write the correct class labels. We just want to enter the number for the corresponding class, instead of typing the complete class names every time. So we need an integer column, which we call "validclass". Copy the following settings and confirm with OK:



Reminder: You wonder what numbers represent which class? Look again at the assignment in which we prepared our samples in R. Starting from our training polygon shapefile, we were able to display the individual class labels and the corresponding class IDs in the following step. The order results according to the alphabetical sorting of the class names:

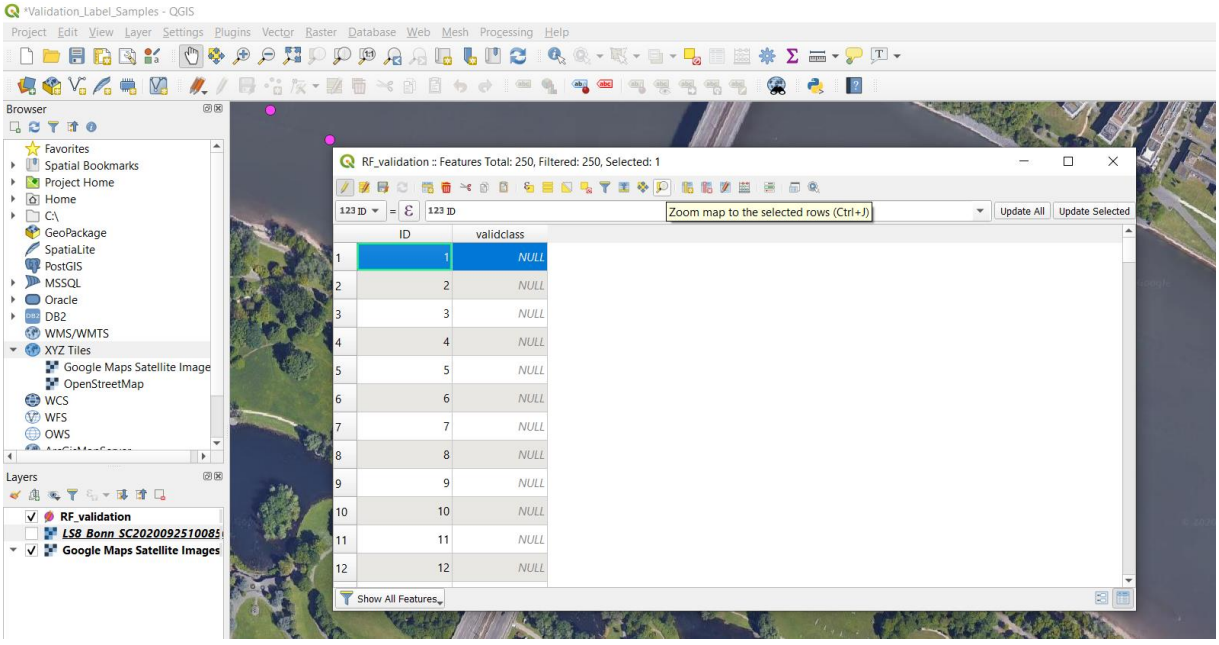
```
levels(as.factor(shp$class))
```

```
for (i in 1:length(unique(shp$class))) {cat(paste0(i, " ",
levels(as.factor(shp$class))[i]), sep="\n")}
```

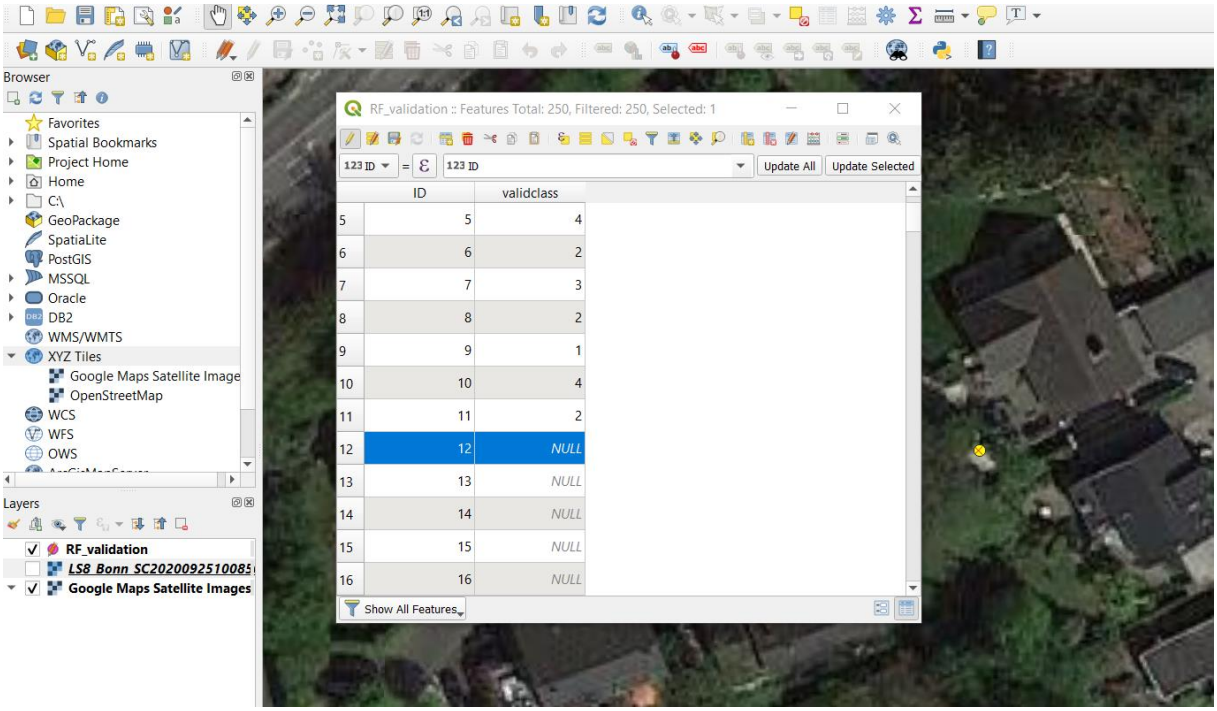
```
1 field

2 forest

3 grassland

4 urban

5 water
```

Write down the classification key! A wrong labeling of the points would be fatal for your validation statistics!

If the class IDs are finally known, you can start:
Zoom to a scale level that allows you to differentiate your target classes in Google Earth. Then click on the left part of a line in the attribute table to highlight/select it. Once selected, press the icon "Zoom to selected Features" in the toolbar or simply **Control+J** on your keyboard to automatically navigate to the respective point in the Map View:



Use both your initial dataset (Landsat 8) and any high-resolution information (Google Maps) to decide which class the pixel that contains the point belongs to. If you are unsure how to assign a pixel, it is also possible to leave the associated field empty, like in the example underneath:



This case might appear every now and then, where it is better to rather not assign any class than a wrong one. If you are finished, save your edits and leave the editing mode.

The edits are saved in the shapefile “RF_validation.shp.” You can close QGIS now, we do not need it anymore.

Questions / prove your knowledge:

- How do you proceed, if you cannot decide to which class a certain pixel belongs?
- What is the advantage of using e.g. Google Maps images in the labeling process?