Guideline for Calculating Point of Interest (POI) Count

This script calculates the number of POIs within a 1 km buffer around the centroids of dissemination areas (DAs). The final output is an Excel file that lists each DAUID along with the adjusted POI count, which represents the local availability of destinations for active living environments.

1. Data Sources

The analysis uses two main types of spatial data:

- **DA Shapefile:** A file containing the boundaries for all dissemination areas in Canada.
    - **2006:** gda_000b06a_e.shp
    - **2011:** lda_000b11a_e.shp
    - **2016:** lda_000b16a_e.shp
    - **2021:** lda_000b21a_e.shp

- **POI Shapefiles:** Two separate files from OpenStreetMap containing POIs:
    - One file contains POIs as points (gis_osm_pois_free_1.shp).
    - The other file contains POIs as polygons (gis_osm_pois_a_free_1.shp). Since polygons are not directly comparable to point data, the code converts any polygon features into their centroids.

Furthermore, some POI records are filtered out because their “code” values indicate they are not relevant to active living environment variables.

“code” NOT IN (2423, 2725, 2424, 2951, 2961, 2734, 2422)

2. Spatial Data Preparation

1. **Reading and Filtering DA Data:**
   The code reads the DA shapefile and filters it to keep only the records for the related PRUID.

2. **Coordinate Transformation:**
   The DA data are re-projected to the Statistics Canada Lambert projection (EPSG:3347). This projection is chosen because it provides reliable area and distance measurements for Canada.

3. **Computing Centroids and Creating Buffers:**
   The centroids of each DA are specified. Then, for each centroid, a circular buffer with a radius of 1-km is created.

3. Processing POI Data

1. **Reading and Transforming POI Files:**
   Two POI files are read, one with point data and one with polygon data. Both files are transformed into the same projection (EPSG:3347) to ensure they are spatially aligned with the DA data.

2. **Conversion and Data Cleaning:**
   For the POI file that contains polygons, the script repairs any geometry errors and then converts the polygon features to their centroids. This step ensures all POI features are represented as points.

3. **Merging and Filtering:**
   The two POI datasets are merged into one, and POIs with undesired attributes (based on specific OSM codes mentioned earlier) are removed from the analysis.

4. Spatial Join and POI Count Adjustment

In this step, all POIs are spatially matched to the 1-km buffers created around DA centroids. The script then counts how many POIs fall within each buffer. To avoid double-counting, it applies a small correction when a POI is located exactly at the centroid of a DA. Finally, for each DA, all POI counts within the 1 km buffer are summarized. If a DA is completely missing POI data, its count is set to zero.