High Resolution Image Viewer for 360 Images

OpenStreetMap

Xinyi (Cynthia) Fan
Google Summer of Code 2022

04.19.2022

Overview

JOSM is an extensive editing tool for OpenStreetMap (OSM) geodata created in Java. It provides a variety of advanced features that cannot be found on the OSM default editor such as presets, different imagery tools, and data validation and filtering. Among these, we are interested in one feature of its imagery tool to view 360 images in JOSM. People can either view their own 360 images by opening in JOSM or using Mapillary images in imagery to open targeted 360 images. However, one problem with this feature is that the resolution of the 360 image produced is pretty low and the display of the detail for the image is not efficient.

Goals

1. Implement a high-resolution image viewer for 360 images while providing the feature to zoom in at different zoom levels and display details as required.

2. Implement the GUI in JOSM for users to select between different resolution image viewers.

Specifications

Image Viewer

Since the current image viewer that uses GPU in JOSM is unable to generate high resolution images while the processing time is not fast, we would like to change gear to produce an image viewer that only uses CPU which might not be as fast but provides an accurate image with desired resolution.

Specifically, with the inspiration from [GIMP](#), we can modify our code implementation of *mouseDragged()* and *getRotation()* into several features (either only use mouse control or use mouse and keyboard control) that could be included in our image view:

Pan: the input of mouse control (click and drag) to specify the horizontal region that needs the projection;

Tilt: the input of mouse control (shift+click and drag) to tilt the image;

Spin: the input of mouse control (Ctrl+click and drag) to rotate the region;

Zoom: the input of mouse control (Alt+click and drag) to zoom in to a certain level of the image

After these specifications are done, we will be ready to target that area of our input 360/panoramic image and convert it into a high resolution flat image and display it in the JOSM image viewer as a equirectangular image using a similar implementation as *Equirectangular.java*.

GUI

Under the imagery feature of JOSM, we will be able to implement a selection button in the 360 image viewer to allow users to pick whether they want the normal 360 viewer or a high-resolution image viewer to a specific area of that image.

Timeline

I.   June 13-17

Familiarize myself with the workflow of converting a 360 image and the code support behind every step. Specifically, familiarize with the code *ImageProjectionRegistry.java, Equirectangular.java, IImageviewer.java* and *Perspective.java.*

II.   June 20-24

Work through the GIMP implementation and get familiar with the key idea behind it. Start to adapt the feature into codes.

III. June 27-July 1

Implement our new image viewer using the GIMP feature with CPU and without the help of GPU in codes.

IV.   July 4-8

Implement the mouse control feature for our image viewer and test with image inputs.

V.   July 11-15

Implement the converting procedure of turning the 360 image into equirectangular images.

VI.   July 18-22

Test and debug the image viewer and make sure it is working properly.

VII.   July 25-29

Start to implement the GUI feature of adding an option choosing feature of the image viewer. Work through the existing code and get familiarize with it.

VIII.   August 1-5

Implement the GUI feature for image viewer in JOSM.

IX.   August 8-12

Test and debug the whole procedure to improve any corner cases.

X.   August 15-19

Catch-up week if previous procedure is late or exploration week for identify anything in addition to the current feature

XI.   August 22-26

Summing up the work done and start to write the documentation for the feature implemented

Personal Information

Detailed information and implementation please refer to
https://github.com/cyfan11/GSoC-proposal

Name: Xinyi (Cynthia) Fan

OSM account name: fanxy11

Current occupation: Senior Undergraduate at Davidson College in Davidson, NC, USA;
Incoming graduate student at Carnegie Mellon University in Pittsburg, PA, USA.

Website/Github: https://cyfan11.github.io/page/

Involvement in OSM: I mapped the data and updated the routing information near and in
Davidson College both using the OSM default method and JOSM.

Programming skills: proficient in Java with projects and upper-level courses taken;
proficient in other languages including Python, C, C++, HTML.