Working with GIS Data

A GIS is used to visualize data geospatially, i.e. using maps. The Google Maps API provides is an example of a toolkit that allows web programmers to visualize data in a geospatial form.

|  |  |
| --- | --- |
| Term | Definition |
| GIS | Geographic Information System |
| GPS | Global Positioning System |
| Waypoints | A location that is of specific interest |
| Track | A collection of locations that record the path followed |
| Route | A pre-defined path of waypoints |

Follow these exercises to collect, convert, cleanse and upload GIS data to your Cloud 9 environment in order to visualize the data geospatially.

# Exercise #1: Collecting the data

Collecting the data is currently a manual process and involves the following equipment & tasks.

Table 1. Required Equipment.

|  |  |  |
| --- | --- | --- |
| Device | Vendor | Purpose |
| GPS receiver | Garmin eTrex 20  w/ 2 AA batteries | Collects Track and Waypoint data |
| Camera | Coleman video camera w/ 2 AA batteries | Collects image and video data |
| USB cable |  | Connects GPS or camera devices to a computer |
| Computer | Windows O.S. | Remove old image and video files from camera.  Remove old GPX track and waypoint files from GPS receiver |

## Task #1: Remove old data from the GPS receiver

Follow these steps to remove old data files from the GPS receiver:

1. Power-On the computer.
2. Power-On the GPS receiver.
3. Plug USB cable into GPS receiver.
4. Plug USB cable into computer.
5. Open a file manager window on the computer.
6. In the file manager, find the **GPS** drive.
7. On the **GPS** drive, locate the **Garmin/GPX** folder.
8. In the **GPX** folder, ONLY delete the GPX files, i.e. files that end in **.gpx**
9. When you’ve completed this task, continue on with the next task.

## Task #2: Remove old data from the Camera.

Follow these steps to remove old data files from the camera:

1. Power-On the computer.
2. Power-On the camera.
3. Plug USB cable into camera.
4. Plug USB cable into computer.
5. Open a file manager window on the computer.
6. In the file manager, find the camera drive.
7. On the camera drive, locate the **DCIM/100Media** folder.
8. In the **100Media** folder, ONLY delete the image & video files, i.e. files that end in **.JPG or .MOV**
9. When you’ve completed this task, continue on with the next task.

## Task #3: Calibrate GPS receiver

The GPS receiver needs to be calibrated before using it to collect data. The following procedure is for the Garmin eTrex 20 device:

1. Find a location outdoors where you have clear visibility of the sky.
2. Power-On the GPS receiver.
3. From the Main menu, find the Satellite menu.
4. Click the Satellite menu to begin acquiring satellites.
5. Acquire a minimum of 5 satellites.
6. When you’ve acquired enough satellites, return to the Main menu.
7. When you’ve completed this task, continue on with the next task.

## Task #4: Collect the data

Collect data on a minimum of 10 object. For each object, collect the following data:

1. A waypoint identifying the location of the object.
2. An image of the object.
3. A five to ten second ***video*** of the object.
4. When you’ve completed this task, continue on with the next task.

# Exercise #2: Converting the data

Sometimes, the format of the collected data needs to be converted to another format supported by the GIS program. In our case, we want to convert our location data from GPX to comma-separated value (CSV) format. CSV files can be further manipulated using Microsoft Excel.

Table 1. Required Equipment.

|  |  |
| --- | --- |
| Software | Purpose / URL |
| GPS Visualizer | Converts GPX files into CSV files. http://www.gpsvisualizer.com/convert\_input |
| Microsoft Excel | Manipulate CSV files. |

## Task #1: Offload data from GPS receiver

Follow these steps to remove old data files from the GPS receiver:

1. Power-On the computer.
2. Power-On the GPS receiver.
3. Plug USB cable into GPS receiver.
4. Plug USB cable into computer.
5. Open a file manager window on the computer.
6. In the file manager, find the **GPS** drive.
7. On the **GPS** drive, locate the **Garmin/GPX** folder.
8. In the **GPX** folder, ONLY copy the GPX files, i.e. files that end in **.gpx,** to the **F:\day2data** folder.
9. When you’ve completed this task, continue on with the next task.

## Task #2: Offload old data from Camera

Follow these steps to remove old data files from the camera:

1. Power-On the computer.
2. Power-On the camera.
3. Plug USB cable into camera.
4. Plug USB cable into computer.
5. Open a file manager window on the computer.
6. In the file manager, find the camera drive.
7. On the camera drive, locate the **DCIM/100Media** folder.
8. In the **100Media** folder, ONLY copy the image & video files, i.e. files that end in **.JPG or .MOV,** to the **F:\day2data** folder.
9. When you’ve completed this task, continue on with the next task.

## Task #3: Convert GPX Waypoint files to CSV

Use the GPS Visualizer website to perform the file conversion. The URL is:

<http://www.gpsvisualizer.com/convert_input>

Follow these steps to remove old data files from the camera:

1. Set the following options at the GPS Visualizer website:

* Output format: **plain text**
* Choose file: select the GPX waypoint file from **F:\day2data**
* Force your data to be this type: **waypoints**
* Plain text delimiter: **comma**
* Plain text output units: **U.S.**

1. Press the **Convert** button.
2. Click the link, “**Press to download … data.csv**”.
3. When you’ve completed this task, continue on with the next task.

## Task #4: Convert GPX Track files to CSV

Use the GPS Visualizer website to perform the file conversion. The URL is:

<http://www.gpsvisualizer.com/convert_input>

Follow these steps to remove old data files from the camera:

1. Set the following options at the GPS Visualizer website:

* Output format: **plain text**
* Choose file: select the GPX track file from **F:\day2data**
* Force your data to be this type: **trackpoints**
* Plain text delimiter: **comma**
* Plain text output units: **U.S.**

1. Press the **Convert** button.
2. Click the link, “**Press to download … data.csv**”.
3. When you’ve completed this task, continue on with the next task.

# Exercise #3: Cleansing the data

Cleansing the data involves correcting bad field names, including additional fields in the dataset, and correcting erroneous or missing data.

## Task #1: Cleanse the Image & Video files

Delete any image or video files that you do not wish to share with others.

Follow these steps to remove image & video files you do not wish to share:

1. Open a file manager window on the computer.
2. In the file manager, find the **F:** drive.
3. On the **F:** drive, locate the **day2data** folder.
4. In the **day2data** folder, double click on each JPG file to view it.
5. Delete ONLY the JPG files you do not wish to share with others.
6. In the **day2data** folder, double click on each MOV file to view it.
7. Delete ONLY the MOV files you do not wish to share with others.
8. When you’ve completed this task, continue on with the next task.

## Task #2: Cleanse the Waypoints file

Use Microsoft Excel to make the following changes to the CSV Waypoint file:

1. Add a new column with the heading: **imageURL**
2. Set the values in this new column to: https://
3. Add a new column with the heading: **videoURL**
4. Set the values in this new column to: https://
5. Add a new column with the heading: **altUnits**
6. Set the values in this new column to: ft
7. Change the column heading for **altitude (ft)** to **altitude**.
8. Save your changes and close Excel.
9. When you’ve completed this task, continue on with the next task.

## Task #3: Cleanse the Track file

Use Microsoft Excel to make the following changes to the CSV Track file:

1. Add a new column with the heading: **altUnits**
2. Set the values in the **altUnits** column to: ft
3. Change the column heading for **altitude (ft)** to **altitude**.
4. Save your changes and close Excel.
5. When you’ve completed this task, continue on with the next task.

# Exercise #4: Upload the data

You will be uploading your image & video files to Google Drive in order to make them accessible on the Web. To use Google Drive, you need a valid Gmail account. A valid Gmail account has been created for each Cloud 9 account. To get the username & password to your Gmail KHOKL CS account, finding your Cloud 9 username in the table below.

Table 1. Required Account Info.

|  |  |  |
| --- | --- | --- |
| If your  Cloud 9 Username is: | Then your  Gmail Username is: | Password |
| KHOKL1 | khokl1.cs@gmail.com | Same as your Cloud 9 password |
| KHOKL2 | khokl2.cs@gmail.com | Same as your Cloud 9 password |
| KHOKL3 | khokl3.cs@gmail.com | Same as your Cloud 9 password |
| KHOKL4 | khokl4.cs@gmail.com | Same as your Cloud 9 password |
| KHOKL5 | khokl5.cs@gmail.com | Same as your Cloud 9 password |
| KHOKL6 | khokl6.cs@gmail.com | Same as your Cloud 9 password |
| KHOKL7 | khokl7.cs@gmail.com | Same as your Cloud 9 password |
| KHOKL\_mentor | khokl8.cs@gmail.com | Same as your Cloud 9 password |

## Task #1: Upload Image & Video files

Follow these steps to upload image & video files to Google Drive:

1. In Google Chrome, enter **gmail.com** as the URL address.
2. Login to your Gmail account.
3. Click on the **Google Apps** icon in the upper right corner of browser window.



1. Click on the **Google Drive** icon.



1. Click on the **New** button and create a folder named **img**.



1. Create another folder named **vid**.
2. Double-click on **img** folder to open it.
3. Open a file manager window on the computer.
4. In the file manager, find the **F:**\**day2data** folder.
5. Select & drag ONLY the **JPG** files to Google Drive **img** folder.
6. Click on the **MyDrive** icon to move to the top Google Drive folder.
7. Double-click on **vid** folder to open it.
8. In the file manager, find the **F:**\**day2data** folder.
9. Select & drag ONLY the **MOV** files to Google Drive **vid** folder.