VisualCommunity

User Manual

Data Collection and Visualization Tool for
Gaining Community Knowledge
from Geo-encoded Videos and Narratives.

Contents

More Information

VisualCommunity Website: http://vis.cs.kent.edu/GeoVisuals/VisualCommunity.html

GeoVisuals Project Website: http://vis.cs.kent.edu/GeoVisuals/

GeoVideo Mobile App Website: http://vis.cs.kent.edu/GeoVisuals/mobile.html

Contact: geovisuals.project@gmail.com

Developer Team:

http://vis.cs.kent.edu/GeoVisuals/team.html

Feedback:

http://vis.cs.kent.edu/GeoVisuals/feedback.html

License:

The VisualCommunity software is developed under BSD license. See details:

http://vis.cs.kent.edu/GeoVisuals/license.html

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A. Overview

VisualCommunity software is designed for the study of a community where people live, work and interact. It is part of the GeoVisuals Project. Knowledge can be gained from spatially coded data including streetview videos, photos, and audio narratives that accompany these data. Such information can provide temporal data that captures fine scale changes, and provides context to help explain process and guide intervention.

VisualCommunity provides a cross-platform visual analytics (VA) tool on desktop and laptop computers. VisualCommunity allows users to upload visual and audio data collected in their community trips. The geo-encoded multimedia data can be conveniently captured by our GeoVideo APP on iOS or Android smart phones. AI-based tools are provided which automatically extract semantic segments from video frames, and transcribe audio data into textual narrations. These information is integrated together and managed in a multimedia spatial database. Users can perform interactive data editing and exploration with intuitive visualization tools for the analysis of video, audio, image, and semantic information. Figure 1 shows the software pipeline.
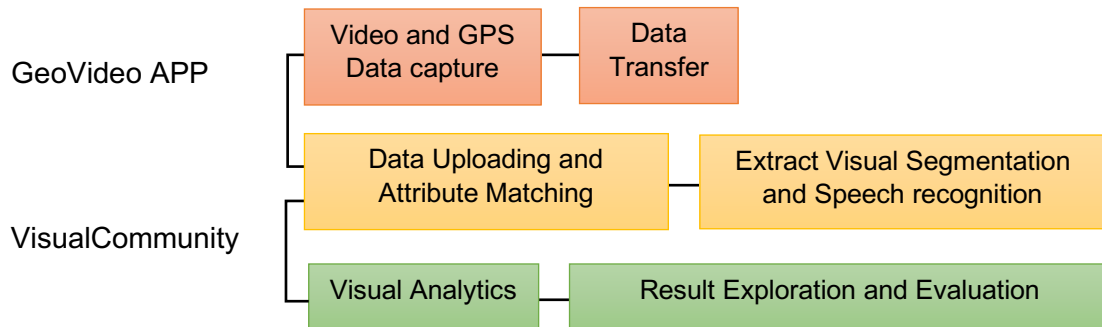

Figure 1: Data pipeline with GeoVideo app and VisualCommunity software

B. VisualCommunity Data

GeoVideo app allows users to capture visual information while walking or driving on a path in the field (i.e., a trip). Meanwhile, they can collect location-related audio narrations by themselves or from information providers. GeoVideo app records videos and audios together with corresponding GPS streams of geolocation coordinates. GeoVideo works without internet, it is totally based on phone and GPS functions. After installing VisualCommunity software, you can upload the captured datasets of multiple trips. Next, we show the data types and formats supported by VisualCommunity. Please note that users may also use other apps or tools to generate similar datasets and upload to VisualCommunity for visual analysis. GeoVideos generates raw trajectory data and video data which are integrated to represent data capture trips. You can find sample datasets in the downloaded package.

A. Raw Trajectory Data (.CSV table)

VisualCommunity allows users to upload GPS trajectory datasets in CSV (comma-separated values). Each GPS trajectory data should consist of sequences of sampling points in a small time gap (e.g. every one second from GeoVideo). The values should include geolocations (longitude, latitude), date, time, and media time (optional). Here the media time refers to the timestamps in corresponding video and audio data.

B. Video Data (.MP4 or .MOV video)

Users upload video clips in .MP4 or .MOV format from mobile phones. The timestamps of the video are used to match the video to geographical locations in it corresponding trajectory data.

C. Video Data (.MP4 or .MOV video)

AI-based tools are integrated in VisualCommunity. Users can process the video to extract image frames and find **semantic visual contents**[1] (e.g., road, sky, building, etc.). Users can also transcribe audio narration into **text geo-narratives**[2].

The trajectory, video, image, semantic visual contents, text geo-narratives are the heterogeneous data which are managed in a multimedia spatial database in VisualCommunity.
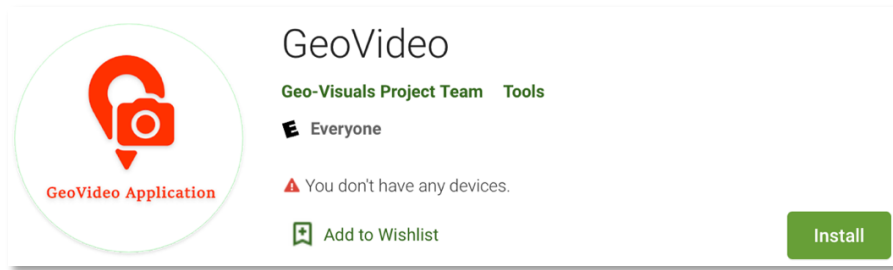
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[1] *We use PSPNet from Pyramid scene parsing network, Zhao, et al., CVPR, 2017*

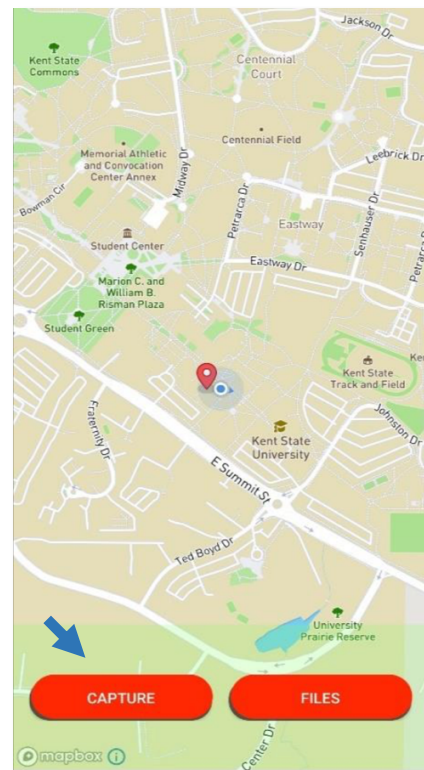[2] *We use DeepSpeech from Machine Learning team at Mozilla*
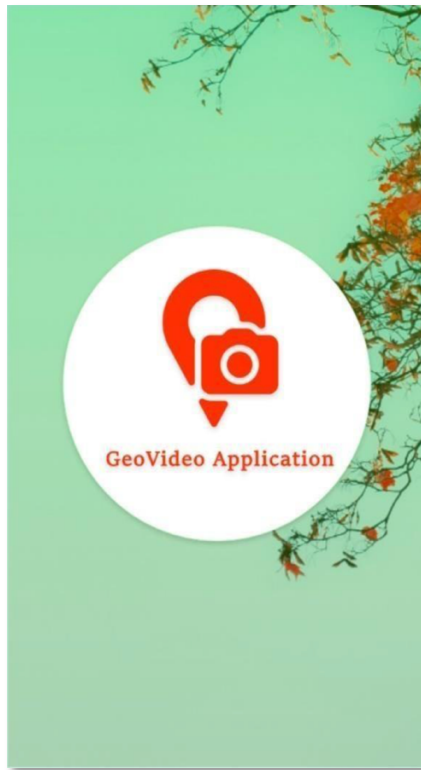
C. Data Capture and Data Transferring Guide

   A. GeoVideo mobile APP installation and data capture

   1. Install application on any platform (Android or iOS).

        2. Once installed, open the application to start (Left). Click on **CAPTURE** to start capture video and trajectory data (Right).

3. When finished recorded users can select to **RETRY** to retry record, **PLAY** to check recorded video, or **SAVE** to save recorded video (Left). Once saving the video, users can input any name for the recorded file (Right).
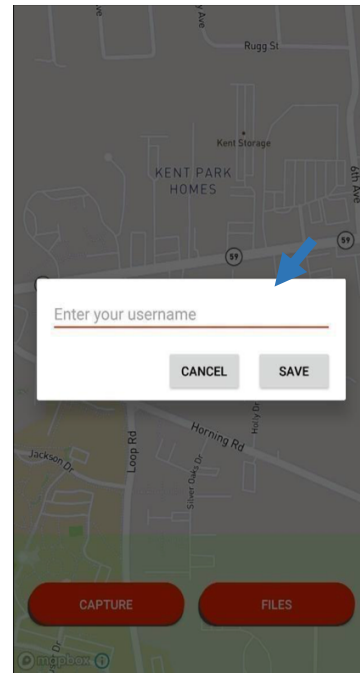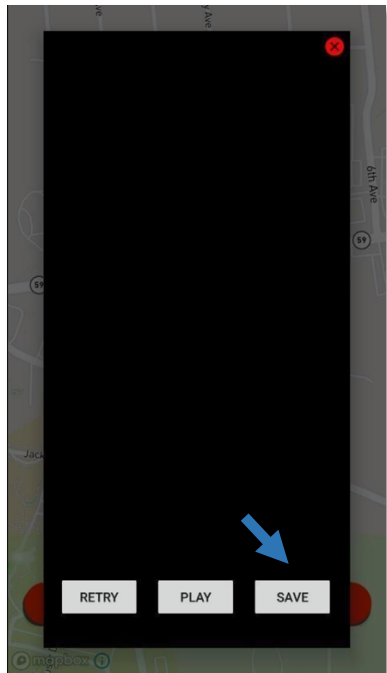
4. To check all saved data files, click on **FILES** to see the list of the captured data.
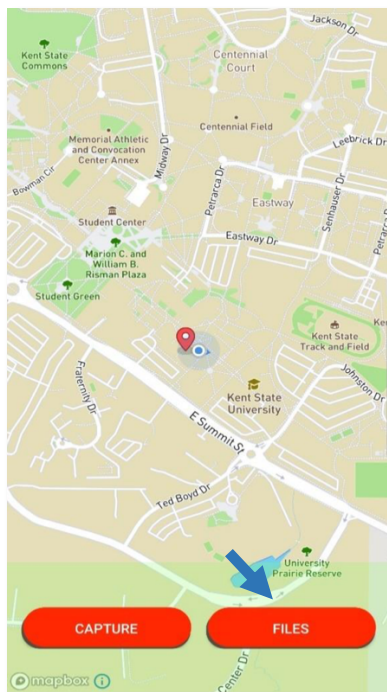
5. Click on any row on the list of the file will show the details of the captured video, which includes captured trajectory and video (Left). Both .CSV and .MP4 are stored in the file system named with its unique id (Right).
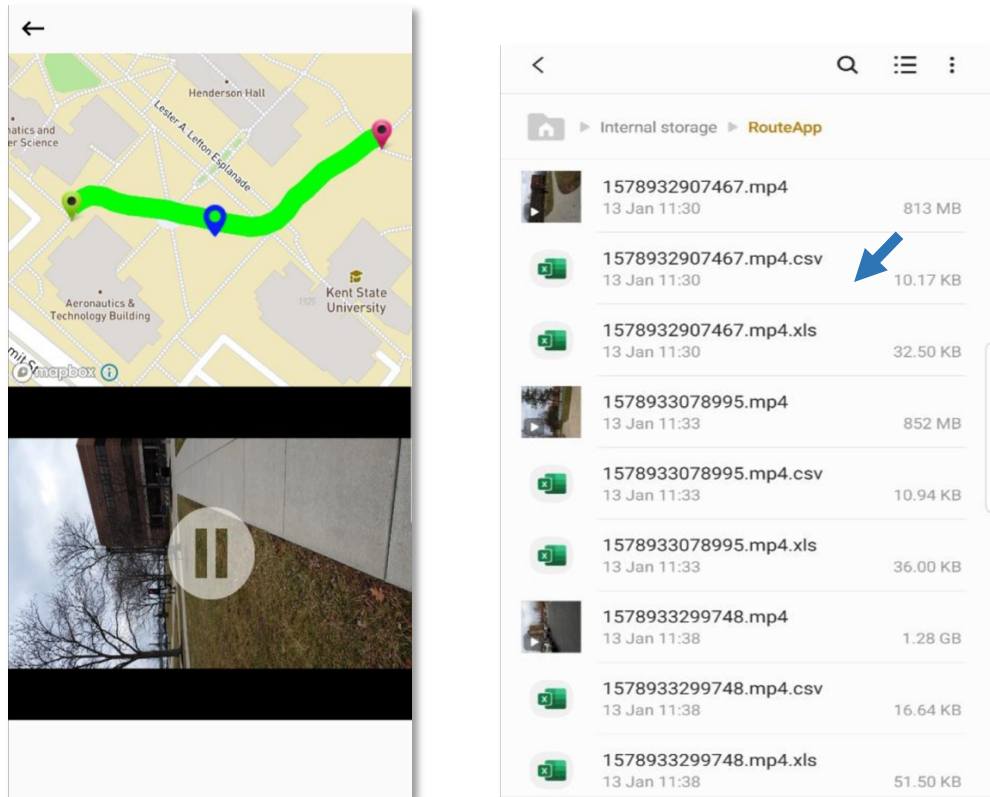
6. Connect mobile to computers with installed VisualCommunity software via USB port (or other data transfer port available).

B. Data transfer from mobile phone to computer

1. Go to File Explorer (Windows) or Finder (Macintosh). User will see your mobile icon.
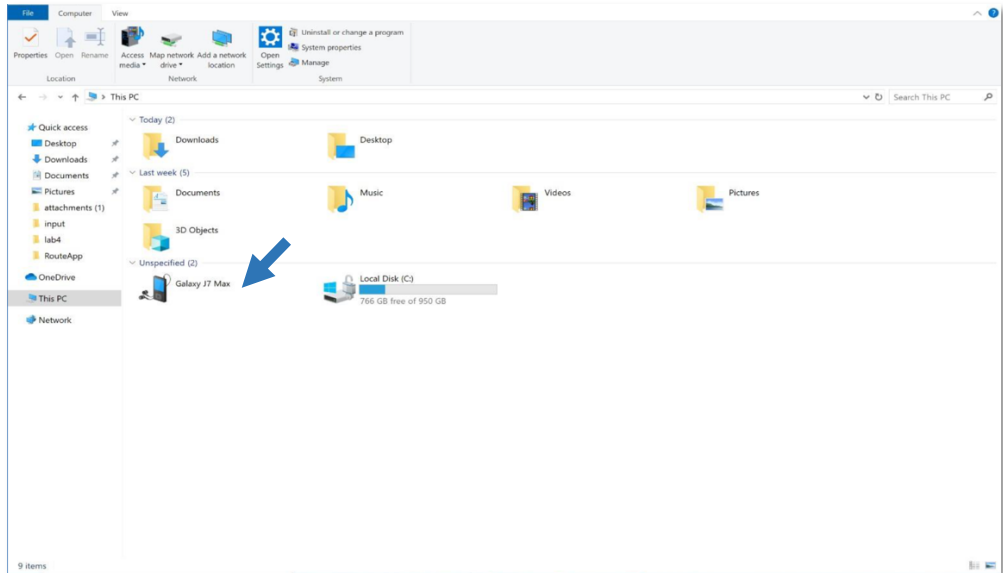
2. Locate GeoVideo Folder to transfer recorded .CSV and .MP4 data.
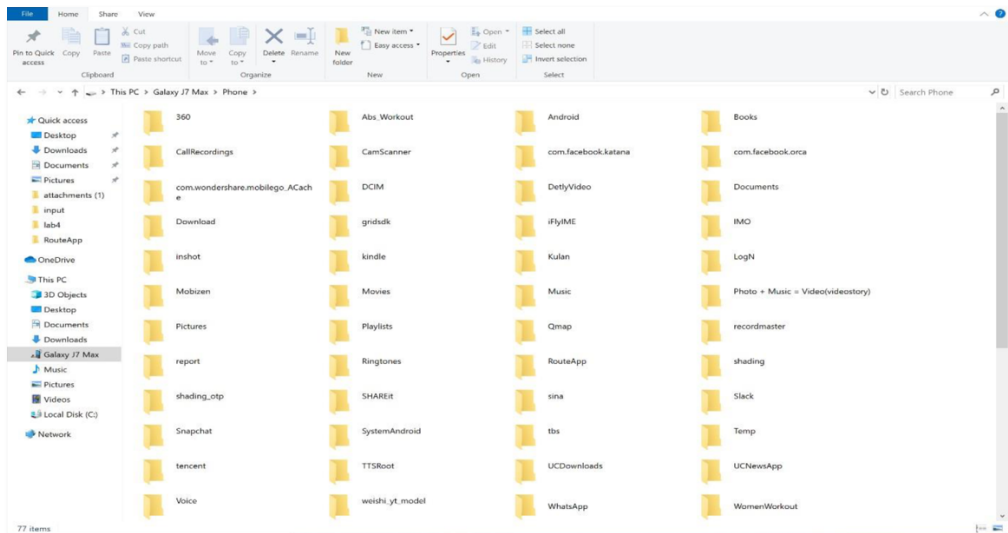
3. On computer, drag both .CSV and .MP4 data to a folder you created for VisualCommunity data.
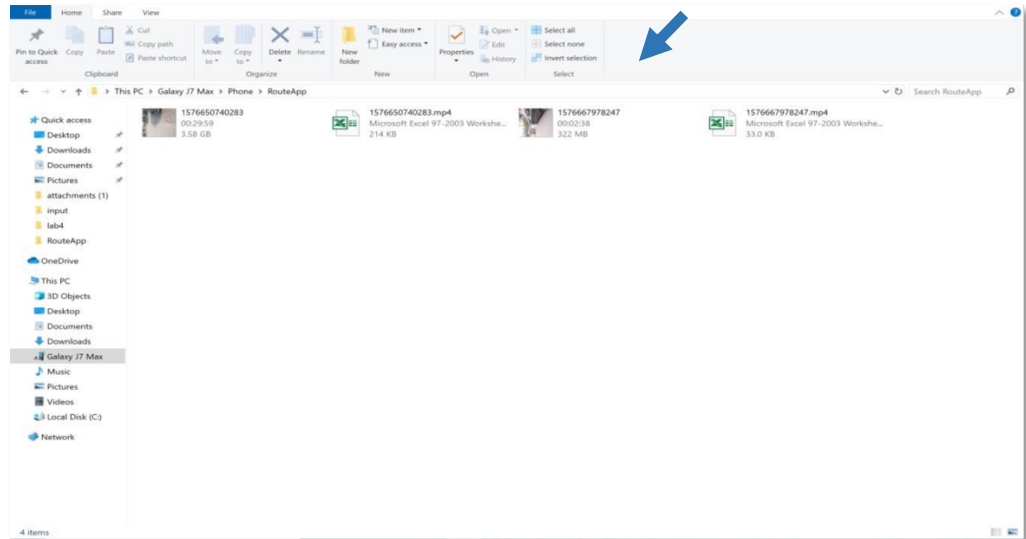
D. Upload Captured Data to VisualCommunity

1. Click on **UPLOAD** button on the navigation bar

2. Click on **BROWSE** to select the folder you stored **.CSV** file and **.MP4** file and click ➔ icon to continue. The two files should be the matched files of one data capture trip.
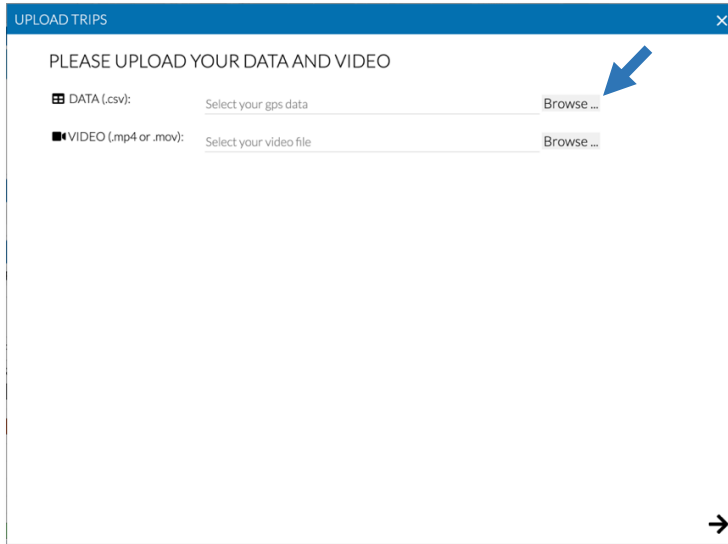
3. To match data attributes (may be with a specific names) in the CSV file with supported attributes, select on the dropdown list to match on both sides.
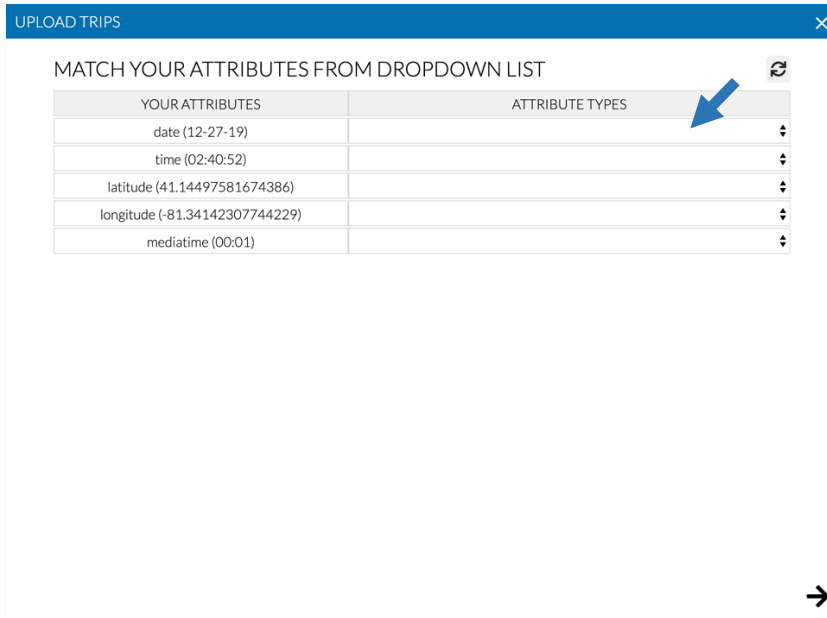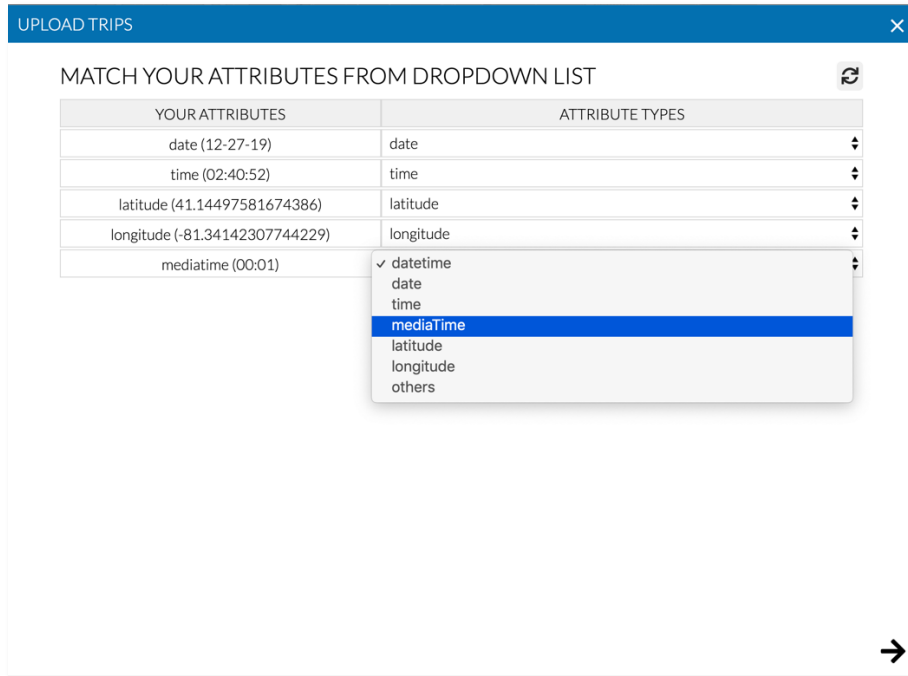
4. Users can provide any supplemental information about their recorded data such as recorded date, description, and comments.
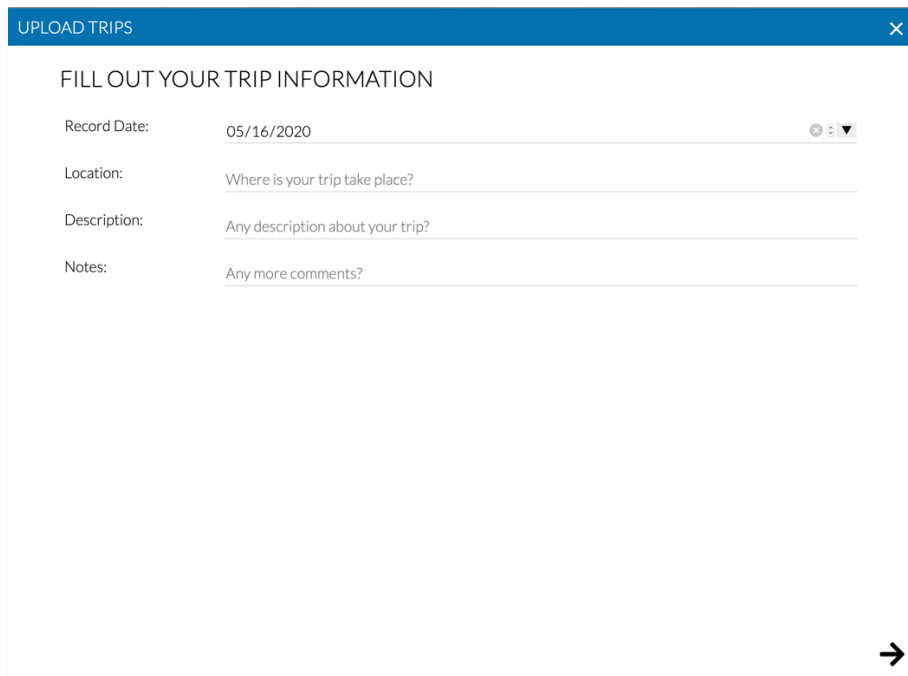
5. Click on ➔ icon to start uploading data and wait until it is done.
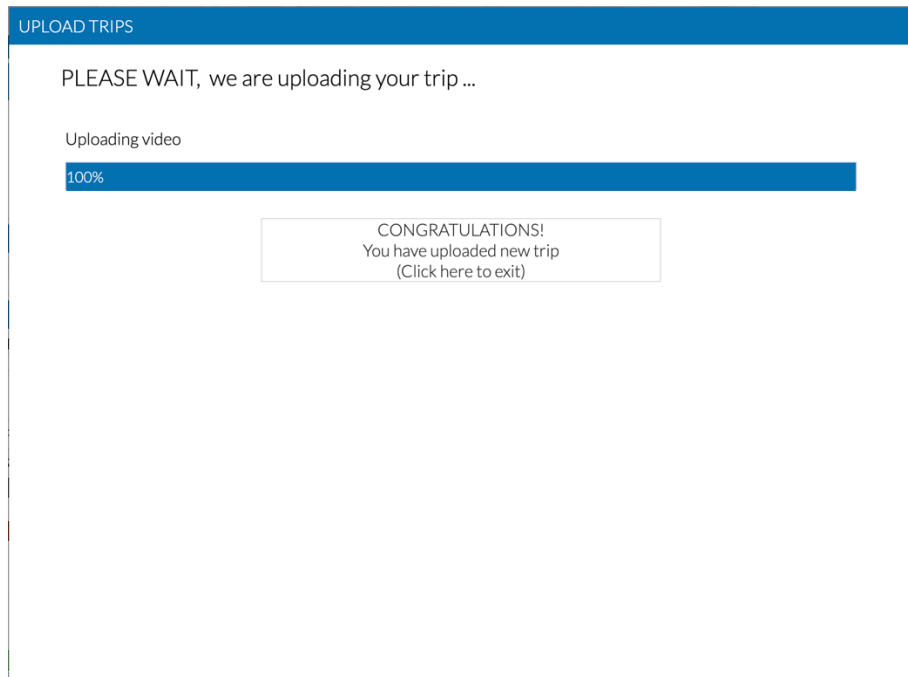
6. Steps 1-5 complete the process of uploading data of one trip. You can repeat them to upload data from multiple trips.

E. Data Management and AI-Based Data Processing

The uploaded datasets are managed in VisualCommunity in a **TRIP** list on the left panel. This panel help user select any trip to process the video and narrative data, conduct visual analysis and remove trip data if needed.
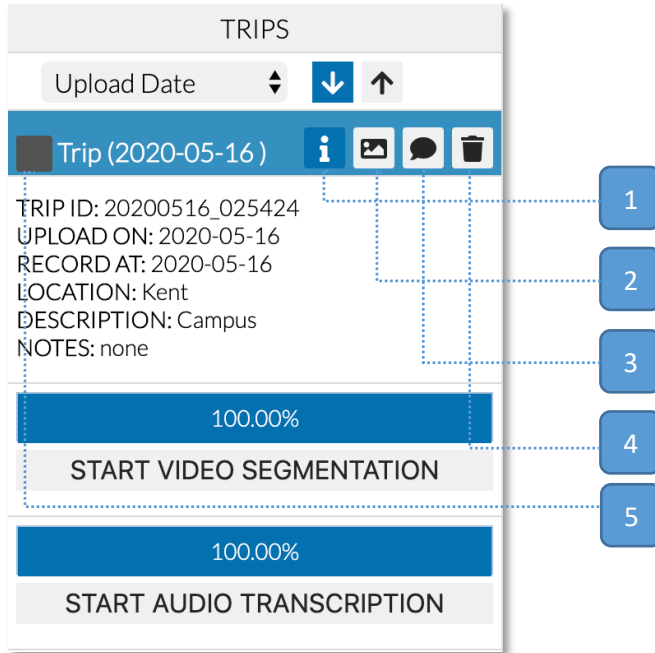
1. Click on **information** icon to see information about selected trip.

   Click on **Image** icon to perform AI-Based visual segmentation. Semantic image segmentation results are then stored in database for the trip.
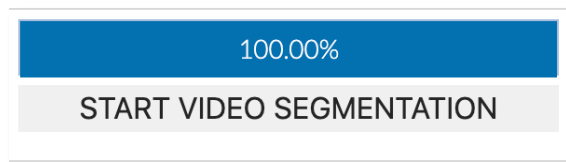
   Click on **Dialog** icon to perform AI-Based speech transcription and narrative extraction. Texts of geo-narratives are then stored in database for the trip.
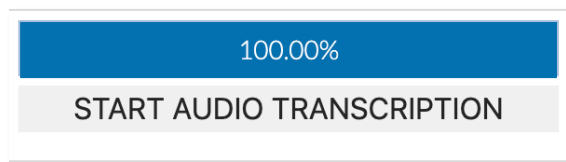
2. Click on **Trash** icon to remove a selected trip.

3. User can also define unique colors of the selected trip to be visualized in the map view.
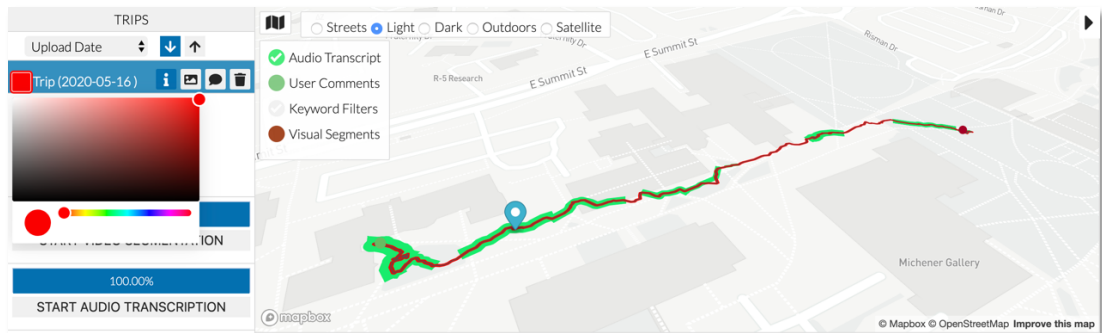
Next, we show VisualCommunity interface and interactive functions.

F. VisualCommunity Interface

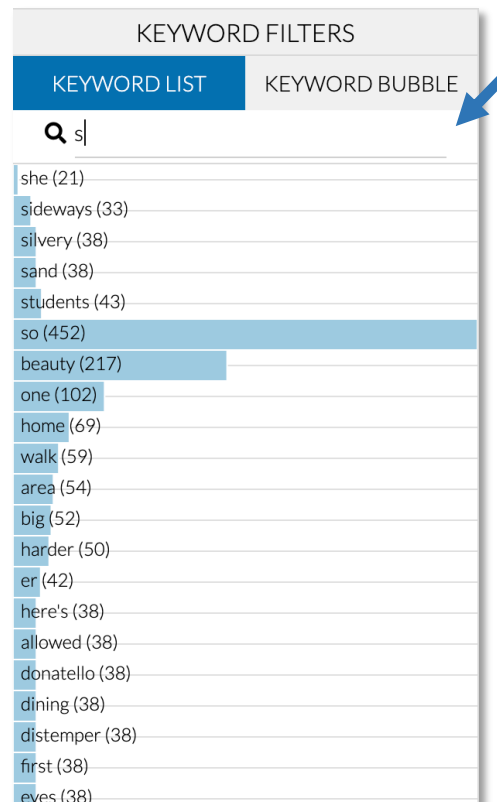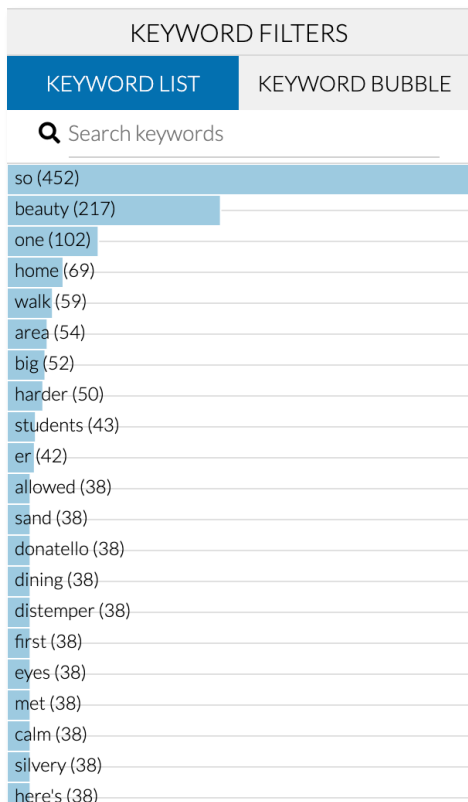Please see details in next sections and full functions in the tutorial video.

G. Video Control

The video controls provide a control bar where users can control their video clip such as play/pause, mute/unmute, or navigate to specific part of the video.

▶ Play   2019-12-27   02:42:09   🔊

- User can click **Play** button to play the video.
- User can drag slider bar to navigate to specific part of the video clip.
- Click on Volume icon will mute/unmute sound of the video clip.

H. Keywords Filters for Geo-Narrative Study

The keywords filters consist of a keyword list and a keyword bubble view to facilitate study of geo-narratives. Both filters can be used to select keywords of interest in the narrative text. Keyword list includes top keywords sorted by their appearance frequency in all texts. User can input in the text box for searching any keywords in narratives.

KEYWORD FILTERS	KEYWORD FILTERS
KEYWORD LIST KEYWORD BUBBLE	**KEYWORD LIST** KEYWORD BUBBLE
🔍 Search keywords	🔍 s
so (452)	she (21)
beauty (217)	sideways (33)
one (102)	silvery (38)
home (69)	sand (38)
walk (59)	students (43)
area (54)	so (452)
big (52)	beauty (217)
harder (50)	one (102)
students (43)	home (69)
er (42)	walk (59)
allowed (38)	area (54)
sand (38)	big (52)
donatello (38)	harder (50)
dining (38)	er (42)
distemper (38)	here's (38)
first (38)	allowed (38)
eyes (38)	donatello (38)
met (38)	dining (38)
calm (38)	distemper (38)
silvery (38)	first (38)
here's (38)	eyes (38)

1. Mouse over each keyword will highlight trajectory locations where the transcribed narrative text includes the hovered keyword. For example, hovering a word **"Beauty"** leads to highlighted trajectory locations on the map.
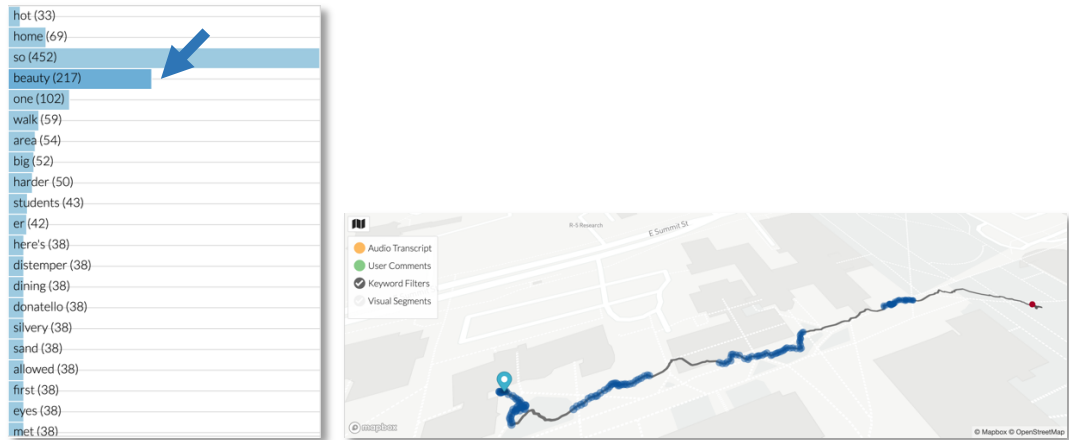
2. **Keyword Bubble** shows a group of keywords whose color indicates its appearance frequency. Click on any keyword (e.g., **"So"**) will highlight the trajectory locations.
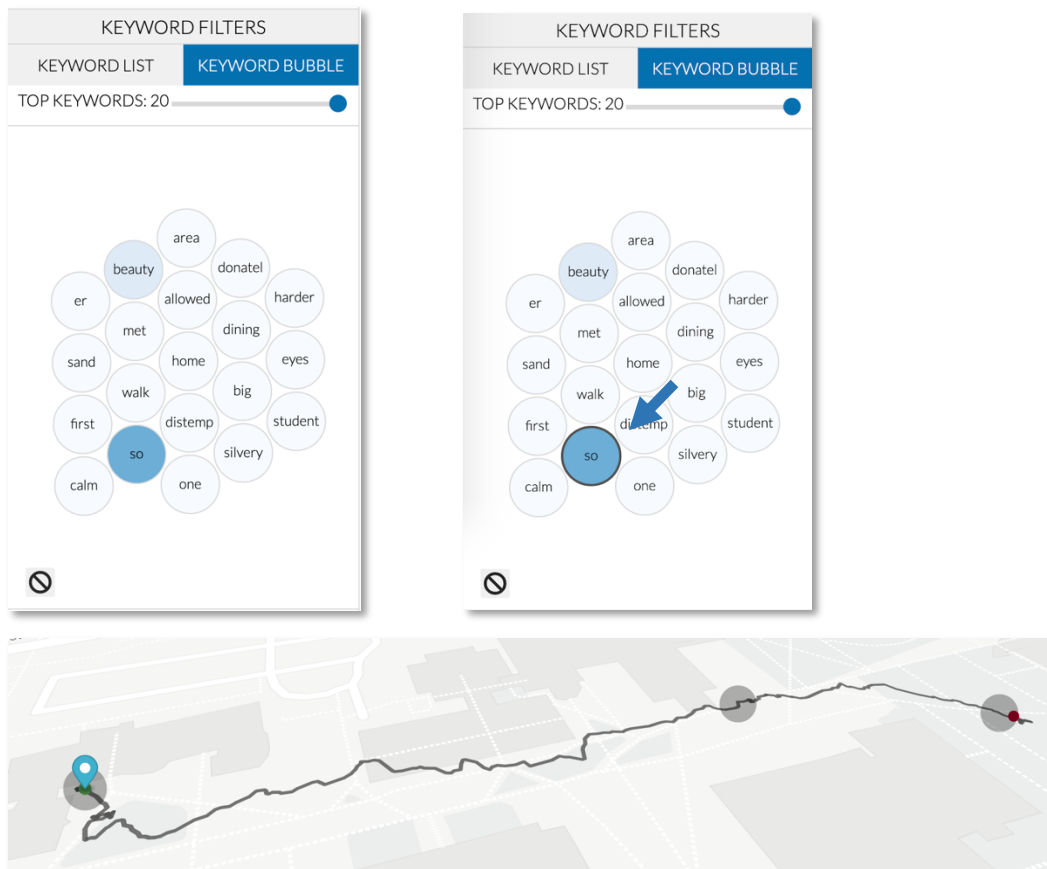
3. User can adjust the numbers of keyword bubbles by adjusting on the slider. In addition, user can also select any keywords and remove them by clicking on "Ø" icon.
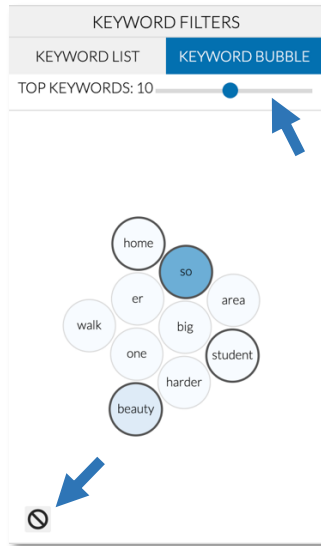
I. Visual Category for Video Content Study

A Visual Category view on the left panel shows a statistic view of visual contents for a trip, such as building, sidewalk, road, person, and etc. The value of a category represents the percentage of this category extracted from the video. For example, 56% in the video of the trip is road and 16% is sidewalk, etc.
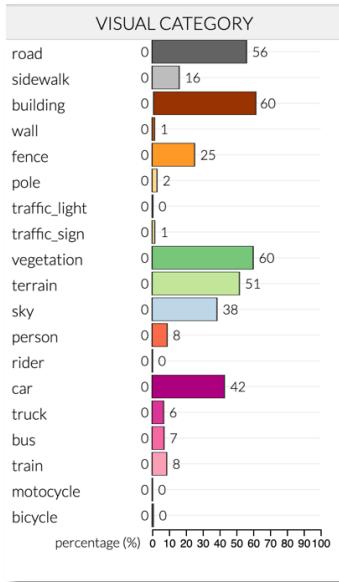
1. Users can click on one category and use the slider to define a threshold value. Then, locations with visual contents more than the threshold are highlighted on the map. For example, selecting "**building**" with a threshold of 10% will highlight locations where more than 10% video contents are buildings.
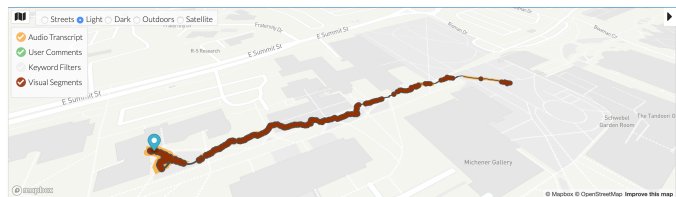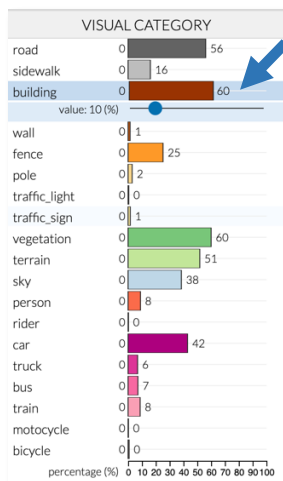
2. User can also **drag** the slider to adjust percentages for interactive study.

J. Geo-narrative Editing and Comments

The automatically generated text from audio may include errors. VisualCommunity allows users to edit the text. Moreover, user can give any comments on any location with respect to the video and narrative contents.

1. Click on ⬅ icon to see the narrative contents in the list. User click to select speech and skip to specific part of the video that contain that narrative.

2. Audio Transcript panel is located in the bottom. User can modify any audio transcript by clicking on the **Edit** button. User can also click on **Volume** icon, which will give a current speech voice for a clue.

3. User can click on **COMMENTS** panel to add/ edit/ remove any comments of interest.

K. Map View and Styling

1. User can toggle any check marks to filter and highlight contents over the Map View.
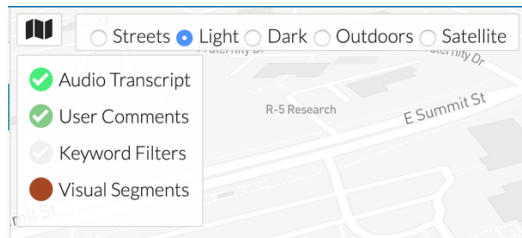
2. User can change Map Styles by clicking on Streets, Light, Dark, Outdoors, or Satellite Map themes.

3. User can drag a location marker on the map to visually study locations of interest. Together with the map view, they can also observe audio transcript, user comments, and visual images for the locations.