Data Collection and Visualization Tool for Gaining Community Knowledge from Videos and Narratives.
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• This work is partially supported by U.S. National Science Foundation under grant numbers xxxxxxx.
VisualCommunity Website: http://vis.cs.kent.edu/VisualCommunity/

VisualCommunity website image (coming soon)
I. Overview

The study of a community where people live, work, and interact can involve a myriad of questions from multiple perspectives. Knowledge can be gained from spatially coded data including streetview videos, photos, and speech narratives that accompany these data from local residents, workers, and experts. However, they lack a convenient tool that can integrate multiple videos of a community for analysis. To address these challenges, we have developed a data capture and visualization software named “VisualCommunity”.

VisualCommunity is a data collection and visualization software tool that bridges the gap between the diversity of researcher and educator needs and data infrastructure challenges often encountered in the community or field. VisualCommunity software consists of a mobile APP for data capture and visualization system for interactive exploration.

- Data capture on Mobile APP
- Visual Analytic Interface

Figure 1 shows the VisualCommunity software pipeline.

![VisualCommunity software pipeline diagram]

Figure 1: VisualCommunity data capture and visualization software pipeline
II. Geospatial Datasets and Multimedia Data Types

A Geospatial dataset consists of a set of trips and multimedia sources. A trip refers to a trajectory in a specific period of time defined by users. A trip includes a consecutive set of spatial sampling points along with latitude, longitude, and timestamp.

A Multimedia data types consist of a set of videos and audios. The videos illustrate user's field of views. In addition, the audio recorded a set of narratives such as user's speech or ambient voices.

A. Raw Trajectory Data (.CSV table)

VisualCommunity allows users to upload their raw GPS datasets in CSV (comma-separated values). Each GPS data consists of sequences of sampling point in every one second. The values should include geolocations (longitude, latitude), date, time, and media time (optional). Here the media time refers to the multimedia time such as video and audio time.

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

In VisualCommunity, users are able to upload their video clips in .MP4 or .MOV format. The video should illustrate their moving path such as walking or driving. We are highly recommended user to record their video at 720p or 1080p.

C. Data Capturing Tool

VisualCommunity provides a flexible Mobile APP for users to capture both of above datasets named “GeoVideo”. This GeoVideo mobile APP is available on both Android and iOS operating system. Users can install from links provided below:

- iOS: https://apps.apple.com/us/app/geovideo/id1492419929
III. Data Capture and Data Transferring Guide

A. Mobile APP installation and capture

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

2. Once installed, open the application to start. Click on **CAPTURE** to start capture video and trajectory data.
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 their 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 computer via USB port or any available computer’s port.
B. Data Transfer from Mobile APP 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 to computer.
3. On computer, drag both .CSV and .MP4 data to any location of interest.
IV. Visual Analytic Software

A. Upload Data

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

2. Click on **BROWSE** to select `.CSV` file and `.MP4` file and click **»** icon to continue.

3. To match data attributes with VisualCommunity supported attribute, select on the dropdown list to match on both sides.
4. Next, users can provide any information about their recorded data such as recorded date, description, and comments.
5. Click on ➔ icon to start uploading data and wait until it done.
B. Trips List and AI-Based Data Processing

Once the data is uploaded, it will generate a new item in the TRIP list on the left panel. This panel help user to manage recorded trip including process visual segments, extract speech narratives, or remove uninterested trip.

1. Click on i icon to see information about selected trip.
2. Click on Image icon to process AI-Based visual segmentation.
3. Click on Dialog icon to process AI-Based speech and narrative extraction.
4. Click on Trash icon to remove any selected trip.
5. User can also adjust color of the selected trip. Adjusting color on the TRIP list will correspond to the Map View.

C. Keyword Filters

The keyword filters consist of Keyword list and Keyword bubble. Keyword list include top keywords sorted by frequency. User can also perform fuzzy search on any keywords to search any interested keyword.
1. Mouse over each keyword will highlight trajectory with hovered keyword. For example, hover a word “Beauty” will show a blue circle over the Map View.

2. Select Keyword Bubble to show a bubble of keyword frequencies labeled by colors. Click on any keyword (e.g., “So”) will highlight a trajectory on the Map View.
3. User can adjust numbers of keyword bubbles by adjusting on the slider. In addition, user can also select any keywords and remove it by clicking on “☒” icon.

D. Visual Category

Once already process the video segmentation, user can click on VISUAL CATEGORY on the left panel. VISUAL CATEGORY provides a statistic of several visual category such as building, sidewalk, road, person, and etc.
1. Click on each category to filter specific category in term of percentages (%). For example, select “building” with above of 10 percentages (%). This will change the visual on the Map View.

2. User can also drag the slider to adjust percentages and drag the marker over the Map View to investigate the video contents and narratives.
E. Video Controls

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.

- 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.

F. Video Narratives and Comments

After extract the narratives, user can see speech contents of the video. User can also give any comments on any specific part of the video clip.

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.

Audio Transcript / Comments filters

User Comments

Audio Transcript

so now we can walk allowed in the sand came so this is beauty donatello about it the you dining in distemper so the first one be eyes on our beauty so he met them at the calm silvery so here's a boding ah and this money is carterson home this beading we going to go to the er i er toinette she did were good so we gonna walk allow it a bit and be just all i may often be the beauty on the left he recalled as some home so all the vases and some engineering disparities you you see the toiling on the right never renselear so in and have the only i my bread is in the

User: user_3
Date: 2020-05-16 07:28:16
Comment: comment_3

cameron a rite the harder cunningham i think this was also designs being so most paradis area is always about her since they so mutineer in committee and communities is an this one is the method and i are to be the miss belding the harder it is such beauty it is connected this with a so
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.
G. 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. Users can compare visual elements in both **KEYWORD FILTERS** and **VISUAL CATEGORY**, which visualized on the current trip and other trips. In addition, Users can click on any trip of interest over the map and select it to study for more details.

Comparison Example of visual elements in both **KEYWORD FILTERS** and **VISUAL CATEGORY**

Click to select the trip of interest.
so now we can walk allowed in the sand came so this is beauty don’t know about the sea dining or dinnerkeeper so the first one be ears on our body so he lost them at the calm where so here’s a bedding all and this money is carry on home this bedding we going to go to the air or toilette she did seem go then the pear is on every week allow it a bit and be just all may afford be the beauty on the left he recalled as some home so at the ways and some engineeringDiggy you you say he telling on the right never never so in and have the only my bread is in the

Then on the right the harder curving I think this was also devising to most parallel area is always about her since then she surrounded in commerce and communities is an

This one is the method and use to the mission the beauty it such beauty it is connected it with to we are in to local area there is chemistry over there inside this beauty so distinctly at display next one is caused a siberian who the the other the man is her nearest beauty be like last year or two years these ones called ingredient beauty is pretty and the transitions detail look are what is described as a hot home cut it like

The big the landing that somewhere the big one is the claim students supercaliber the lessable good coverage and some the opossum the old description the canvas he will call the reading students and so is a library in

the beauty on the left he recalled as some home so all the ears and some engineering Diggy you you say he telling on the right never never so in and have the only my bread is in the

KEYWORD LIST

key word bubble

search keywords

SO(452)
beauty(217)
are(105)
home(49)
walk(59)
area(54)
big(52)
student(30)
students(43)
art(52)
allowed(38)
and(38)
donate(38)
dining(38)
dinnerkeeper(38)
first(38)
eye(38)
et(38)
donate(38)
here’s(38)

TOP KEYWORDS: 20

allowed
beauty
dining
distemp
distemp
area
first
home
met
student
donate

KEYWORD FILTERS

VISUALCOMMUNITY USER INTERFACE

DATA UPLOAD

AUDIO TRANSCRIPT / COMMENTS

TRIP LIST

VISUAL CATEGORY

USER COMMENTS

MAP VIEW

VIDEO CONTENTS

AUDIO TRANSCRIPT

VISUALCOMMUNITY USER INTERFACE