SDSU

Addressing Urban Homelessness in Downtown San Diego

A multifaceted approach using GIS and Deep Learning

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Introduction

- Urban homelessness is a pressing concern in San Diego
  - 2021 – 961
  - 2022 – 1515
  - 2023 – 1565
- Our research project aims to address this issue through a multifaceted approach utilizing Geographic Information Systems (GIS) and Google Street View imagery.

Project Objectives

Image acquisition

Geospatial analysis

Image classification (Deep learning)

Approach

Get the API key

Use key to fetch satellite images

Generate the metadata (Pan ID, Coordinates, Year, Month, bearing, Image Urls)

Perform Spatial Analysis using ArcGIS Online

Apply deep learning techniques to custom-trained data

Why Google Street View?

Google Street View is a feature of Google Maps that provides panoramic views of streets worldwide.

Enables virtual street navigation, detailed location exploration, and access to past years' imagery.

Offers 360-degree panoramic imagery captured by specially equipped vehicles, trekkers, and other platforms.

Image Acquisition

GSV API Access

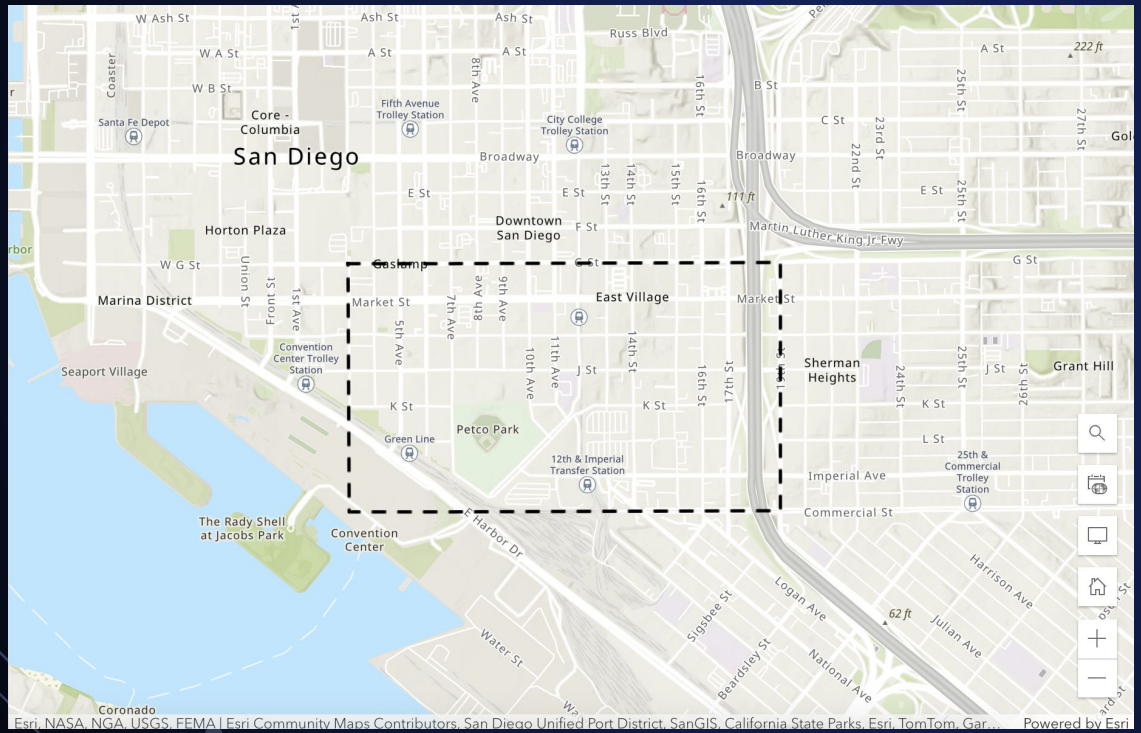
Define Code Parameters

Collect Images

Geospatial Analysis

- ArcGIS Online
- Starting point: Downtown San Diego
- Create map with point classification to determine dense areas of homelessness

Geospatial Analysis



Streets chosen for preliminary analysis:

1. Commercial St
2. G Street
3. K Street
4. 17th Street
5. 16th Street
6. 19th Street

Geospatial Analysis

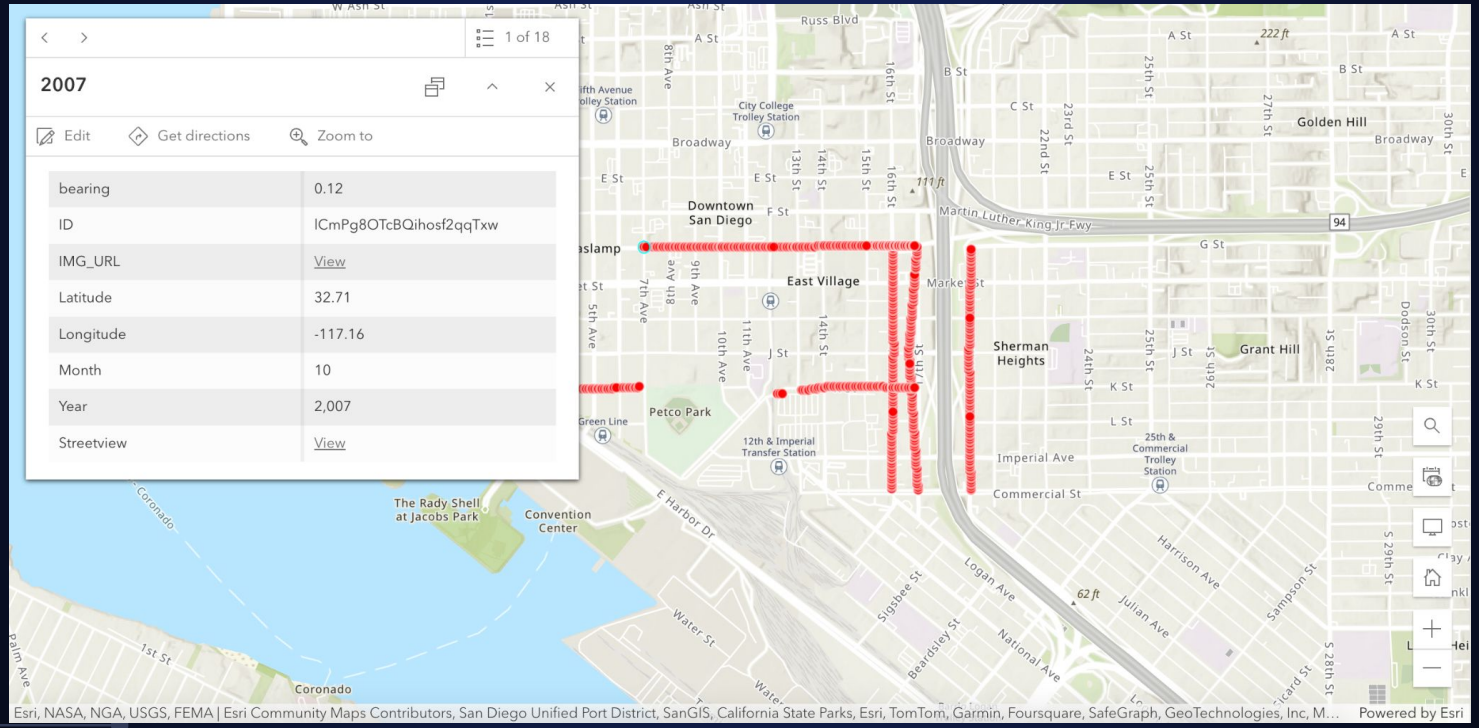
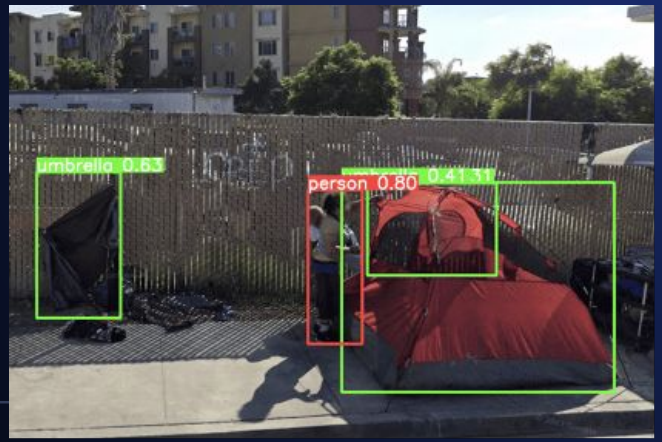


Image Classification

- We will utilize state-of-the-art deep learning architectures such as YOLO (You Only Look Once).
- The custom train dataset comprises diverse images capturing various indicators associated with homelessness.



Progress Update

Image acquisition

- Collected current and past year's street view images from selected streets using Google Street View.
- Modified code for efficiency to eliminate fetching redundant images.
- Curated a training dataset with available temporal metadata from Google Street View.

Map creation

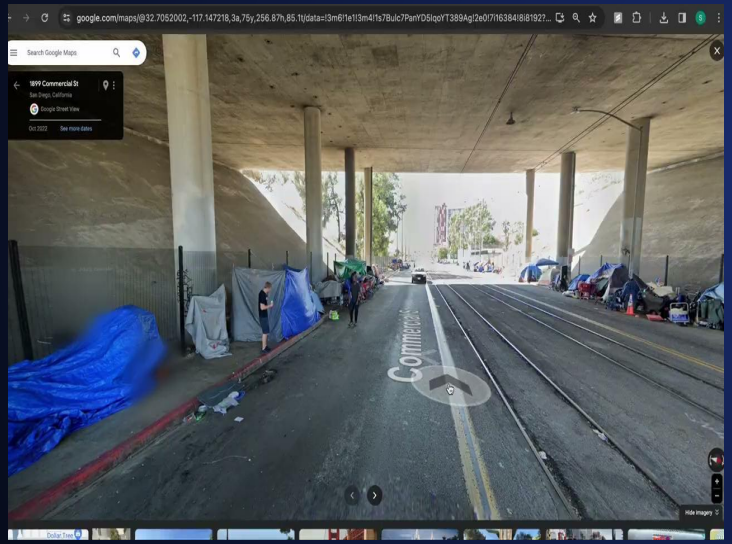
- Map created with original data set of images
- New map being created with new data set created from modified code

Sample Data

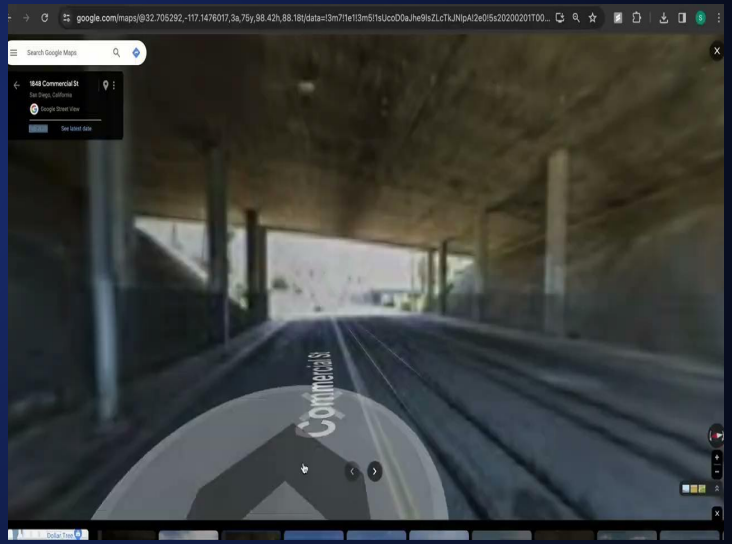
A	B	C	D	E	F	G
p_id	year	month	latitude	longitude	bearing	url
EMDF67jXYYpQMY3sNG2LPg	2022	10	32.7052911	-117.1517803	90	https://maps.gooc
pkP0aBaLERK2j1PiUyZ2sw	2020	11	32.7052911	-117.1517803	90	https://maps.gooc
jbg5HuNe8MG4wPNSE0_2hw	2020	2	32.7052911	-117.1517803	90	https://maps.gooc
JU4kMjlKe-C3WreU_dXx0g	2019	5	32.7052911	-117.1517803	90	https://maps.gooc
LOauovH9ZJkNrZzu94pskg	2018	4	32.7052911	-117.1517803	90	https://maps.gooc
g0QQyo0TLtL19MKwpOlrWA	2017	5	32.7052911	-117.1517803	90	https://maps.gooc
3eCAMu_0WgnKiYkWue-_LQ	2016	6	32.7052911	-117.1517803	90	https://maps.gooc
50a1SoNk4tK_wk4z2IF8Aw	2016	1	32.7052911	-117.1517803	90	https://maps.gooc

Interesting Insights

Comparing the homelessness activity in Commercial St between 2022 and 2020



October 2022



February 2020

Next Steps

Finalize image data set

Complete map

Build training data set

Begin algorithm training

Challenges

Cost

Data labeling

Conclusion

- Integration of GSV and deep learning methods offers a better understanding of homelessness in San Diego
- Through this research, we are able to uncover spatial patterns and trends related to homelessness

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Thank you

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