

CS-GY 6643: Computer Vision

Project 4

GeoGuessr StreetView: US State & GPS Location Prediction



Fall 2024

New York University
Tandon School of Engineering

Due Date: December 19th, 2024
Total Points: 100

Project Member Details (Google Sheet):

<https://docs.google.com/spreadsheets/d/1gNEixzlwvR0ukfcJwKby2N9GXlnwWCDJyheL9gY0X64/edit?usp=sharing>

Kaggle Invite Link:

<https://www.kaggle.com/t/7fa8363cd1f54bd8a5ee818f167d03cd>

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1 Project Overview

1.1 Introduction

Can you predict where in the United States a street view image was taken? This project challenges you to build a computer vision model that predicts both the US state and precise GPS coordinates from panoramic street view images.

Real-world applications include:

- Search and rescue
- Disaster response
- Journalism verification
- Historical and cultural research

1.2 Dataset

Total Size: 82,475 samples (329,900 images — 4 directional views per location)

Training Set:

- 65,980 samples
- 263,920 images
- Full GPS coordinates + state labels

Test Set:

- 16,495 samples
- 65,980 images
- Labels hidden (Kaggle evaluation)

Coverage: 33 US states **Image Format:** 256×256 RGB images

Each sample has four images:

- North (0°)
- East (90°)
- South (180°)
- West (270°)

1.3 Tasks

This is a **dual-task** project:

1. **State Classification (70%)** — weighted top-5 system
2. **GPS Regression (30%)** — normalized Haversine distance

2 Technical Requirements

2.1 Problem Formulation

2.1.1 Input

For each sample:

- `img_XXXXXX_north.jpg`
- `img_XXXXXX_east.jpg`
- `img_XXXXXX_south.jpg`
- `img_XXXXXX_west.jpg`

2.1.2 Output

State Classification:

- `predicted_state_idx_1` (required)
- `predicted_state_idx_2` to 5 (optional)

GPS Coordinates:

- `predicted_latitude`
- `predicted_longitude`

2.2 Evaluation Metric

$$\text{Final Score} = 0.70 \times \text{Classification Score} + 0.30 \times \text{GPS Score}$$

2.2.1 Top-K Weighted Scoring

Position	Weight	Credit	Required?
1	1.00	100%	Yes
2	0.60	60%	Optional
3	0.40	40%	Optional
4	0.25	25%	Optional
5	0.15	15%	Optional

Table 1: Weighted Top-K Scoring

2.2.2 GPS Regression

Scored using normalized Haversine distance:

$$\text{GPS Score} = \max\left(0, 1 - \frac{\text{mean_distance_km}}{5000}\right)$$

3 Submission Requirements

3.1 Kaggle Competition

Competition URL: <https://kaggle.com/competitions/geo-guessr-street-view-cs-gy-6643>

Submission Limits: 5 per day

Leaderboard Split:

- Public — 50%
- Private — 50%

3.2 Submission File Format

Required CSV columns:

Column	Type	Description
sample_id	int	Test ID
image_north/east/south/west	str	Filenames
predicted_state_idx_1	int	Required
predicted_state_idx_2-5	int	Optional (-1 allowed)
predicted_latitude	float	Required
predicted_longitude	float	Required

Table 2: Submission Columns

3.3 Validation Rules

Your file must:

- Contain exactly 16,495 rows
- Contain all 12 columns
- Have valid predictions (0–49)
- Use valid lat/lon ranges
- Use -1 or NaN for optional positions