CSCI 1430 Final Project Report:
Predictive Geolocation Models in the Online Game GeoGuessr

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Abstract

With recent advancements in computer vision models that can determine geographic locations from images, we sought to develop a system that could play the online game GeoGuessr, where the model would analyze Google Maps Street View images and predict the location of the image. In addition to achieving high performance in the game, we also aimed to develop the system so that it could provide insight into its decision-making process, allowing human players to learn from the model and improve their own strategies and performance when playing GeoGuessr.

1. Introduction

GeoGuessr is an popular online game where players are placed in a random Google Maps Street View location and must guess their current location by clicking a position on a world map. In recent years, some online streamers have become particularly skilled at the game, often achieving very high guess accuracies and scores while only needing to analyze their surroundings over short periods of time. Much of this skill is driven by strategies and techniques that these expert players have learned over time. However, for the average player, the game can be quite difficult, as it requires both a strong knowledge of geography and the ability to recognize subtle visual cues in the images. With recent research surrounding computer vision models that specialize in geolocation-related images, we sought to develop a system that could play the GeoGuessr game with a high level of accuracy, potentially rivaling the performance of the top human players.

In addition to achieving this performance, we also aimed to develop the system so that it could provide insight into its decision-making process though an analysis of the images that it processes. This explainability could allow human players to learn from the model's strategies and improve their own performance when playing GeoGuessr. Through the creation of this tool, we aim to lower the barrier of entry for less experienced player to enjoy the game and develop their own knowledge of geography through the process.

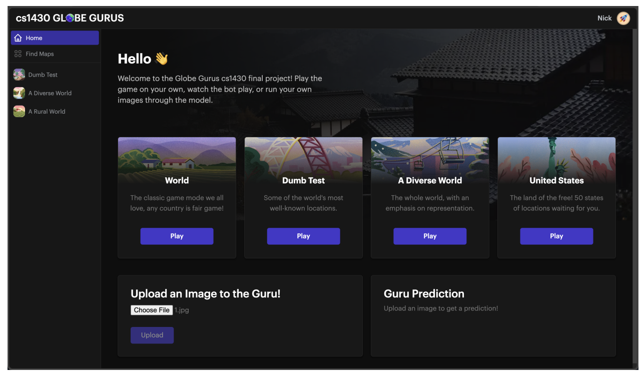

Figure 1. Screenshot of the GeoHub interface, adapted for use in our geolocation model.

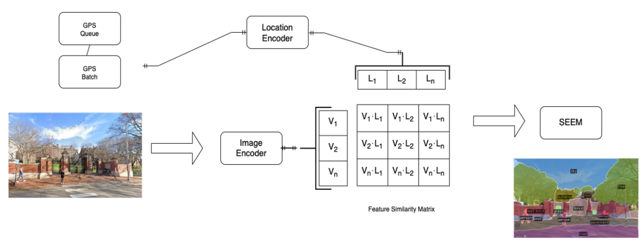

Figure 2. Architecture of the geolocation model pipeline, including the GeoCLIP model for geolocation prediction and the SEEM model for semantic segmentation.

Map Name	1Q	2Q	3Q	Mean
A Diverse World	250	505	1337	934
Dumb Test	0.171	0.222	2	68
Providence	56	121	380	334
United States	85	179	365	254

Table 1. Results. Quartiles and means of error distances in km for each map (validation set). Measures distance between guess and true location (lower is better).

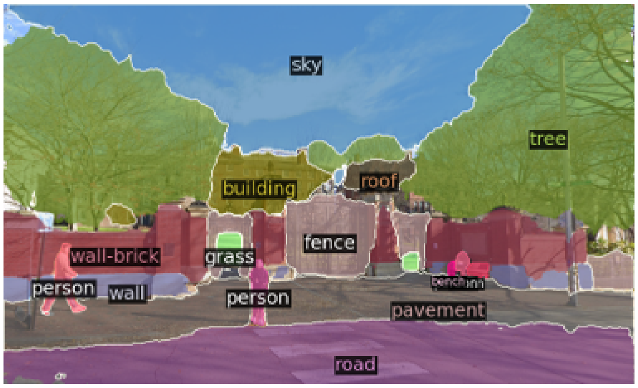

Figure 3. An example of the SEEM model's semantic segmentation output for a Street View image.

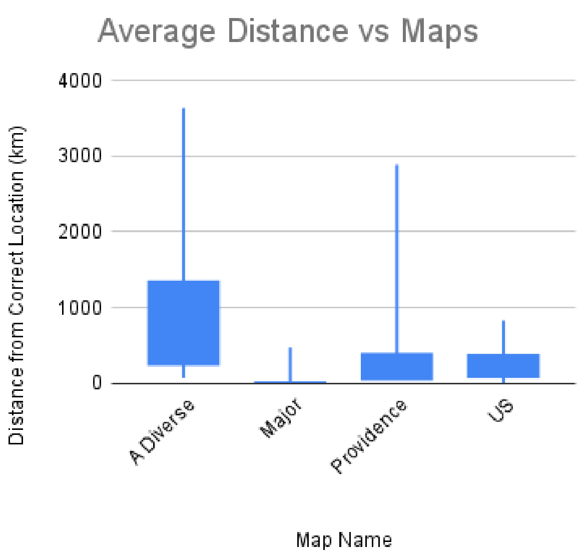

Figure 4. Distribution of distance error (in km) for each map.

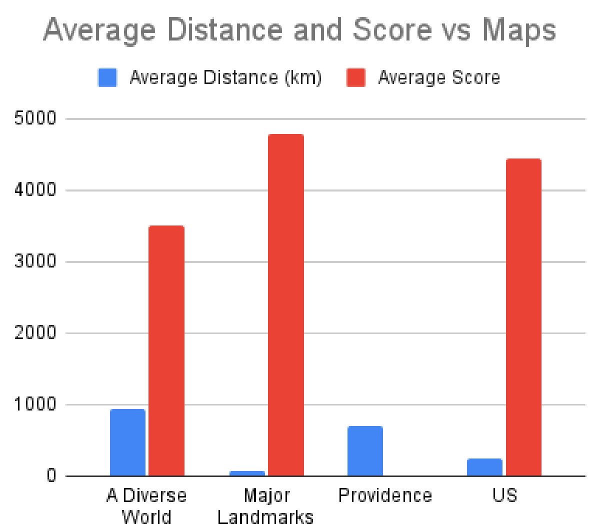

Figure 5. Average distance error (in km) and average GeoGuessr score for each map.