Landmark Prediction Using Deep Learning

Latha R[1], Nikhileswarans[2]
[1]AssistantProfessor, Dept of Computer Science
[2]Dept of Computer Science
[1, 2] Rathinam College of Arts and Science Coimbatore – 642110

Abstract- *Landmark recognition is a crucial task in the field of computer vision with applications in tourism, navigation, and cultural heritage preservation. This paper presents an approach utilizing a TensorFlow Hub- based deep learning model for landmark classification. The model processes uploaded images, predicts landmarks, and provides geographical locations with map visualization. Our implementation is built using Streamlit, offering an interactive web interface for seamless user interaction. Additionally, the system integrates geolocation retrieval to enhance the user experience by displaying the landmark's precise address and coordinates. The proposed system demonstrates the effectiveness of leveraging deep learning for real- world landmark detection.*

I. INTRODUCTION

Landmark recognition has gained significant traction in artificial intelligence, aiding applications such as automated travel guides and historical site documentation. With advancements in deep learning, models trained on large-scale datasets can efficiently classify landmarks. This paper introduces an interactive web application that enables users to upload an image, predict the landmark, and visualize its location using mapping technologies.

II. METHODOLOGY

Our approach leverages a pre-trained deep learning model from TensorFlow Hub, specifically the landmarks_classifier_as model, to classify landmarks from image inputs. The model takes an image, processes it, and outputs a pre-diction based on its trained dataset. The key steps in the pipeline include:

- **Image Upload & Processing:** Users upload an image, which is resized and normalized for compatibility with the model.
- **Model Prediction:** The TensorFlow Hub model predicts the most probable landmark based on the input.
- **Geolocation Retrieval:** The application integrates the Geopy library to fetch the precise address, latitude, and longitude of the detected landmark
- **Map Visualization:** The recognized landmark is displayed on a map using Streamlit's built-in mapping functionalities.

Implementation

The system is implemented using Streamlit, a Python-based framework for creating interactive web applications. The following key libraries are utilized:

- TensorFlow Hub: For loading the pre-trained landmark classification model.
- PIL (Pillow): For image handling and resizing.
- Geopy: For retrieving geographic information.
- Pandas: For managing landmark label mappings and location data.

The application architecture is structured to process user-uploaded images, pass them through the model, and display relevant location details dynamically.

III. RESULTS AND DISCUSSION

The system successfully predicts landmarks with high accuracy, providing users with useful contextual information. When an image is uploaded, the predicted landmark is displayed along with its geographic coordi- nates. However, limitations include:

- Model performance is constrained by the dataset it was trained on, which primarily covers Asian landmarks.
- Some landmarks may not have geolocation data, affecting the accuracy of address retrieval.
- Images with low quality or obstructions may result in incorrect predictions.

IV. CONCLUSION

This paper presents an interactive application that uses deep learning for landmark recognition and geolo- cation mapping. By leveraging TensorFlow Hub and Streamlit, we provide a user-friendly interface for automated landmark

identification. Future work will focus on expanding the dataset and improving real-time accuracy to enhance user experience.

REFERENCES

[1] Cheeseman, P. (1992). An Artificial Intelligence Approach to Landmark Recognition. *AI Journal*, 15(3), 225-237.
[2] TensorFlow Hub. (2024). Landmark Recognition Model. Retrieved from https://tfhub.dev/google/on_device_vision/classifier/landmarks_classifier_asia_V1/1.
[3] Geopy Documentation. (2024). Retrieved from https://geopy.readthedocs.io/en/stable/.