DSCI 552 Group Project

Dataset

The dataset consists of a collection of images about famous (or not so famous) landmarks. The collection is organized into a two-level hierarchy structure. The first level is the categories for the landmarks, and the second level is the individual landmarks. There are 6 categories and the categories are

- Gothic
- Modern
- Mughal
- Neoclassical
- Pagodas
- Pyramids

For each category there are 5 landmarks for a total of 30 landmarks. Each landmark has 14 images.

Tasks

This group project is comprised of two machine learning tasks:

- Category classification: predict the category names of images
- Landmark classification: predict the landmark names of images

The landmarks dataset is too small to train convolutional neural networks (CNNs) from scratch. The resulting network will overfit the data. Instead use **transfer learning** by reusing part of a pre-trained CNN. In transfer learning, instead of training the neural network starting from random weights, the weights for the lower parts of the network are taken from a pre-trained network. Only the higher parts of the network will have to be learned. Chapter 14 of Géron discusses how to apply pre-trained models for transfer learning.

For this group project, the only allowed pretrained networks are **EfficientNetB0** and **VGG16**, which are smaller CNNs. The objective of this restriction is to avoid penalizing groups that do not have access to powerful machines and/or machines with GPUs. Groups are allowed to use Google Colab with GPUs to train the models, but be aware there are resource usage limitations.

Data augmentation is another way to overcome the problem of small datasets. Keras/TensorFlow provides a variety of image manipulation functions (https://www.tensorflow.org/api_docs/python/tf/image) that can be used to generate additional images. Refer to Lecture 9 slides and to Chapter 14 of Géron.

Yet another way to overcome the small dataset problem is experimenting with various ways of combining the models for the two tasks. It is possible to train two distinct models, one for category classification and one for landmark classification. But, would landmark classification benefit from knowing the output of classification classification? Or vice versa?

Code and Model Submission

The details of the submission will be provided later. We are in the process of setting up a Vocareum site that will allow you to run your model against part of the holdout test images.

You are strongly encouraged to use Keras/Tensorflow.

Poster Presentation

The poster presentation will be held on the last day of class. Each group will create a poster describing their group project. The poster should have the following sections:
- Title and group members
- Introduction
- Methods
- Results
- Conclusions/Discussions
- Bibliography

The introduction section provides background information and sets context. Include descriptions of the learning tasks and why they are difficult. The methods section describes the approaches used to improve the performance of the learning model. The results section presents the performance of the learning model and the results of ablation studies, if any. The conclusions/discussions section describe how your approach addresses the challenges of the learning tasks and discuss implications of results and future directions.

Use large fonts for the poster. Most viewers of the poster will be standing three feet away. Include graphics and tables summarizing results. Refer to the poster presentation rubric. Below are a couple of USC pages on poster presentations.
- https://libguides.usc.edu/healthsciences/posters
- https://undergrad.usc.edu/symposium-posters/sample-posters/

FedEx Office in USC Village should have poster boards. You do not need to have posters professionally printed.

Group Report

Each group is required to submit a report describing their project. The sections of the report can be based on sections of the poster, but do add an abstract to the report. The report provides an opportunity to include additional material that did not fit in the poster presentation. The report should not be longer than 5 pages.