Machine Learning Engineer Nanodegree

Capstone Project

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I. Definition

Project Overview

Yelp is a social networking site that publishes crowd-sourced reviews about local businesses. About two years ago, Yelp challenged Machine Learning practitioners to build a model that automatically tags restaurants with multiple labels using a dataset of user-submitted photographs. The goal of this project is to develop such a model.

The competition was hosted by Kaggle, a platform where data scientist use their skills to produce the best models for predicting and describing datasets uploaded by companies and users. The various datasets and inputs are accessible via the Yelp Restaurant Photo Classification competition webpage[1]. Yelp provides a training dataset (234,842 photographs) and a test dataset (237,152 photographs) for this competition. Each photograph belongs to a business and the task is to predict the business attributes purely from the business photographs. There are 9 different attributes in this problem:

- good for lunch;
- good for dinner;
- takes reservations;
- outdoor seating;
- restaurant is expensive;
- has alcohol;
- has table service;
- ambience is classy;
- good for kids;

and a total of 2,000 (10,000) businesses in the training (test) dataset. Note that the datasets are quite large. Both the training and test archive files are about 7 GB.

Problem Statement

Neural networks have proven to be incredibly efficient at classifying images and often outperforms other machine learning algorithms at this task. It comes then as no surprise that neural networks are extensively used in this project. One now faces two options: i) build and train a neural network from scratch or ii) use transfer learning[2]. The properties of the dataset such as its size and nature usually allow to make an educated decision on the type of approach to adopt.

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[1] See https://www.kaggle.com/c/yelp-restaurant-photo-classification

[2] Transfer learning is a machine learning technique where a model trained on one task is re-purposed on a second related task.

The dataset used in this project consists in more than 200,000 user-submitted photographs. In other words, it is both large and challenging. For this reason, it would be unrealistic to train a deep neural network model from scratch given the competences as well as the enormous computing and time resources that this task would require. Thus, transfer learning is used in this project

II. Analysis

III. Methodology

IV. Results

V. Conclusion