BVB Campus, Vidyanagar, Hubballi – 580031, Karnataka, INDIA.

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Project report on

Holiday Season Related Image Classification

Submitted

in partial fulfillment of the requirements for the award of the degree of

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IN

COMPUTER SCIENCE AND ENGINEERING

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CERTIFICATE

This is to certify that project entitled "Holiday season related image classification" is a bonafied work carried out by the student team Vandana Hegde 01FE18BCS247, Yamini Joshi 01FE18BCS265, Cheemarla Pranathi 01FE18BCS272, Vishal Narasapur 01FE18BCS260, in partial fulfillment of the completion of 5th semester B.E. course during the year 2020 – 2021. The project report has been approved as it satisfies the academic requirement with respect to the project work prescribed for the above said course.

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ABSTRACT

This project is on image based multi-class classification.The images are to be classified based on elements present within the picture such as: Airplane, Snowman, Candle, Jacket, Christmas tree and more miscellaneous decors or holiday season elements. The proposed framework uses Deep Convolutional Neural Network (DCNN) that is based on ResNet-50 architecture. The ResNet-50 model is imitated and the pre-trained weights are imported.

Keywords : *multi-class classification,Holiday elements, Deep Convolutional Neural Network (DCNN), ResNet-50.*

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Chapter 1

INTRODUCTION

A basic image multi-class classifier for holiday seasonal images helps us classify multiple objects present within an image such as airplanes, candles, jackets, snowmen and more miscellaneous holiday elements. The basic structure behind the classifier is the Deep Convolutional Neural Network (DCNN) which uses the framework/architecture ResNet-50 that helps in classifying the holiday seasonal images. Basically Transfer learning is a research problem in machine learning that focuses on storing knowledge gained while solving the problem and applying it to a different but related problem.

1.1 Motivation

Image classification is perhaps the most important part of digital image analysis. The objective of image classification is to identify and portray, as a unique gray level (or color), the features occurring in an image in terms of the object or type of land cover these features actually represent on the ground. The intent of the classification process is to categorize all pixels in a digital image into one of several land cover classes

1.2 Literature Review / Survey

In [1] paper, they proposed a deep convolutional neural network architecture codenamed Inception.The main hallmark of this architecture is the improved utilization of the computing resources inside the network. This was achieved by a carefully crafted design that allows for increasing the depth and width of the network while keeping the computational budget constant.The main idea of the Inception architecture is based on finding out how an optimal local sparse structure in a convolutional vision network can be approximated and covered by readily available dense components. The architecture is a combination of all those layers which have convolution layer with different filter sizes with their output filter banks concatenated into a single output vector forming the input of the next stage.In [2] paper, they presented a residual learning framework to ease the training of networks that are substantially deeper than those used previously. In ResNet, they used skip connections which allows to take the activation from

one layer and suddenly feed it to the another layer even much deeper in neural network. Residual blocks allows to build much deeper neural network. The fundamental breakthrough with ResNet was it allowed us to train extremely deep neural networks with 150+layers successfully.

1.3 Problem Statement

To create a solution using deep learning to discern whether a post is holiday-related in an effort to better monetize the social media platform.

1.4 Problem Analysis

The major steps of image classification includes determination of a suitable classification system, selection of training samples, image pre processing, feature extraction, selection of suitable classification, approaches, post classification process.

1.4.1 Application Programming Interface

Various API's have been used in the system to manipulate data, render html and accept user input, some of them include Flask, numpy, pandas, jinja2 and TFlite.

1.4.2 Scope and Constraints

Scope:

plays an important role in remote sensing images and is used for various applications such as environmental change, agriculture, land use/land planning, urban planning, surveillance, geographic mapping, disaster control, and object detection and also it has become a hot research topic in the remote sensing community

1.5 Objectives

- To create an image multi-class classification system.
- To create an API for the image multi-class classification system in order to integrate.

Chapter 2

SYSTEM DESIGN

2.1 Architectural Framework/System Design

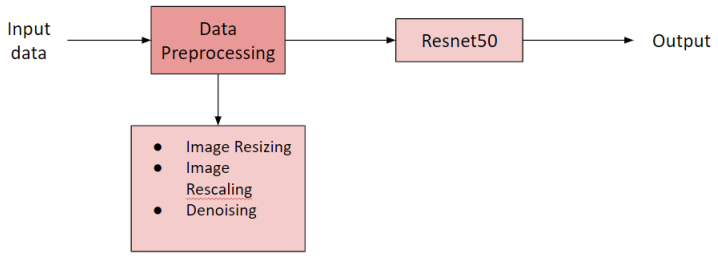

Figure 2.1: Architectural framework of Classification System

Modules of the Framework

1 Data pre-processing:- This step counts in for the resizing, re-scaling and de-noising of the images in the data set.

2 ResNet-50:- The proposed framework uses Deep Convolutional Neural Network (DCNN) that is based on ResNet-50 architecture. The ResNet-50 model is imitated and the pre-trained weights are imported.

2.1.1 Application Programming Interfaces

Pandas:- Pandas is a software library written for the Python programming language for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series.

Numpy:- NumPy is a library for the Python programming language, adding support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays.

TF lite:- TF lite is an open source deep learning framework for on device interface.

Jinja2:- Jinja is a web template engine for the Python programming language. It is used to serve dynamic content to static web pages.

Chapter 3

METHODOLOGY and IMPLEMENTATION

Resnet is a neural network that uses skip connections. It allows to take the activation from one layer and feed into another layer even much deeper than in neural network. ResNet50 is a variant of ResNet model which has 48 Convolution layers along with 1 MaxPool and 1 Average Pool layer.

```
Epoch 1/2
40/40 [==============================] - 8081s 201s/step - loss: 1.1837 - accuracy: 0.5698 - val_loss: 0.4219 - val_accuracy:
0.8734
Epoch 2/2
40/40 [==============================] - 7843s 199s/step - loss: 0.3526 - accuracy: 0.8921 - val_loss: 0.3256 - val_accuracy:
0.8992

Out[28]: <tensorflow.python.keras.callbacks.History at 0x7f886e9635c0>
```

Figure 3.1: Accuracy and output.

Chapter 4

RESULTS

The image multi-class classification model has an accuracy of 0.89 for 6 basic given classes and 0.88 for 8 classes (2 additional customized classes).

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