Project Title: Identify the Dance Form
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Batch: DL-1

1. Introduction:

This International Dance Day, an event management company organized an evening of Indian classical dance performances to celebrate the rich, eloquent, and elegant art of dance. Post the event, the company planned to create a microsite to promote and raise awareness among the public about these dance forms. However, identifying them from images is a tough nut to crack. You have been appointed as a Machine Learning Engineer for this project. Build an image tagging Deep Learning model that can help the company classify these images into eight categories of Indian classical dance.

2. Model Architecture:

The input to the network is image of dimensions (224, 224, 3). The first two layers have 64 channels of 3*3 filter size and same padding. Then after a max pool layer of stride (2, 2), two layers which have convolution layers of 256 filter size and filter size (3, 3). This followed by a max pooling layer of stride (2, 2) which is same as previous layer. Then there are 2 convolution layers of filter size (3, 3) and 256 filter. After that there are 2 sets of 3 convolution layer and a max pool layer. Each have 512 filters of (3, 3) size with same padding. This image is then passed to the stack of two convolution layers. In these convolution and max pooling layers, the filters we use is of the size 3*3 instead of 11*11 in Alex Net and 7*7 in ZF-Net. In some of the layers, it also uses 1*1 pixel which is used to manipulate the number of input channels. There is a padding of 1-pixel (same padding) done after each convolution layer to prevent the spatial feature of the image.

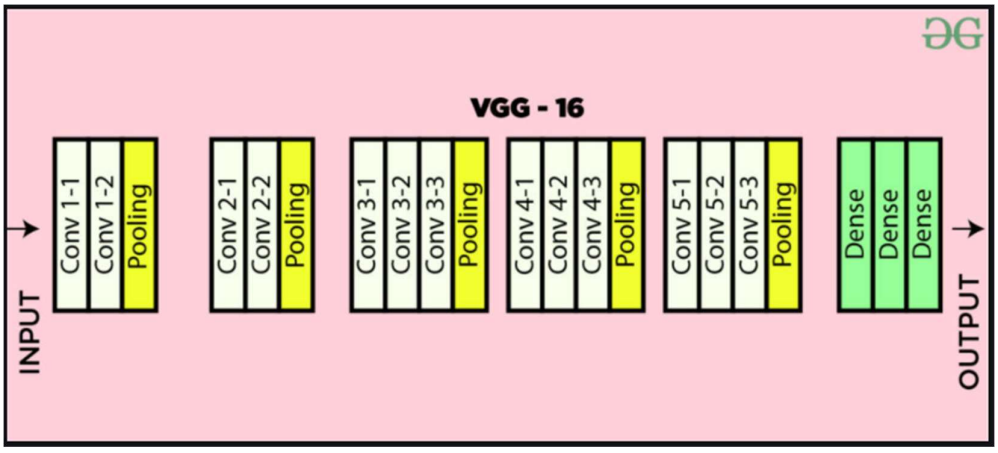

Figure 1: VGG-16 architecture map

After the stack of convolution and max-pooling layer, we got a (7, 7, 512) feature map. We flatten this output to make it a (1, 25088) feature vector. After this there are 3 fully connected layer, the first layer takes input from the last feature vector and outputs a (1, 4096) vector, second layer also outputs a vector of size (1, 4096) but the third layer output a 1000 channels for 1000 classes of ILSVRC challenge, then after the output of 3rd fully connected layer is passed to softmax layer in order to normalize the classification vector. After the output of classification vector top-5 categories for evaluation. All the hidden layers use ReLU as its activation function. ReLU is more computationally efficient because it results in faster learning and it also decreases the likelihood of vanishing gradient problem.

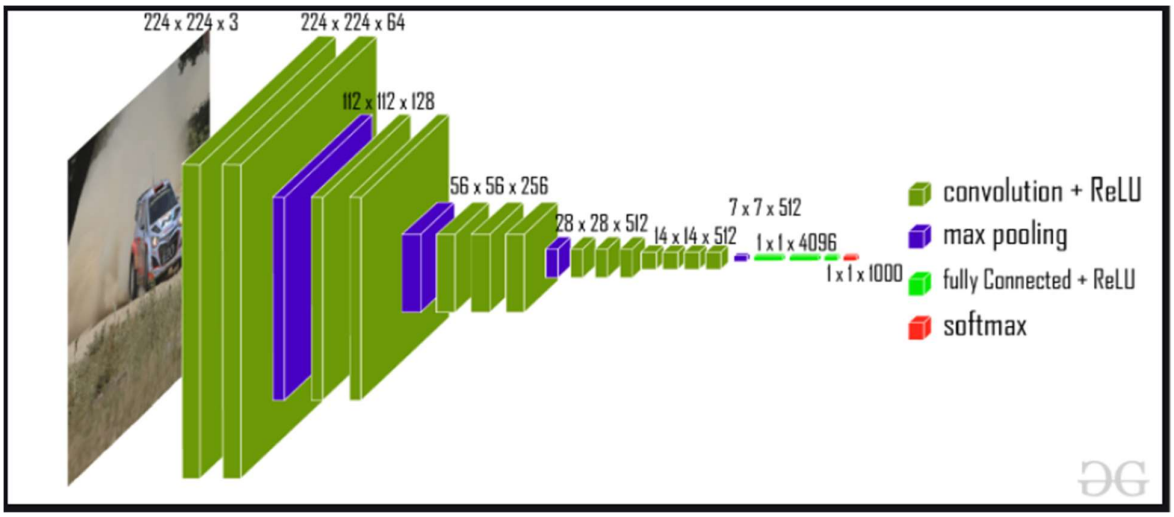

Figure 2: VGG-16 architecture

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Model: "vgg16"
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 Layer (type)                Output Shape              Param #
=================================================================
 input_1 (InputLayer)        [(None, 224, 224, 3)]     0

 block1_conv1 (Conv2D)       (None, 224, 224, 64)      1792

 block1_conv2 (Conv2D)       (None, 224, 224, 64)      36928

 block1_pool (MaxPooling2D)  (None, 112, 112, 64)      0

 block2_conv1 (Conv2D)       (None, 112, 112, 128)     73856

 block2_conv2 (Conv2D)       (None, 112, 112, 128)     147584

 block2_pool (MaxPooling2D)  (None, 56, 56, 128)       0

 block3_conv1 (Conv2D)       (None, 56, 56, 256)       295168

 block3_conv2 (Conv2D)       (None, 56, 56, 256)       590080

 block3_conv3 (Conv2D)       (None, 56, 56, 256)       590080

 block3_pool (MaxPooling2D)  (None, 28, 28, 256)       0


 block4_conv1 (Conv2D)       (None, 28, 28, 512)       1180160

 block4_conv2 (Conv2D)       (None, 28, 28, 512)       2359808

 block4_conv3 (Conv2D)       (None, 28, 28, 512)       2359808

 block4_pool (MaxPooling2D)  (None, 14, 14, 512)       0

 block5_conv1 (Conv2D)       (None, 14, 14, 512)       2359808

 block5_conv2 (Conv2D)       (None, 14, 14, 512)       2359808

 block5_conv3 (Conv2D)       (None, 14, 14, 512)       2359808

 block5_pool (MaxPooling2D)  (None, 7, 7, 512)         0

 global_max_pooling2d (Globa  (None, 512)              0
 lMaxPooling2D)

=================================================================
Total params: 14,714,688
Trainable params: 14,714,688
Non-trainable params: 0
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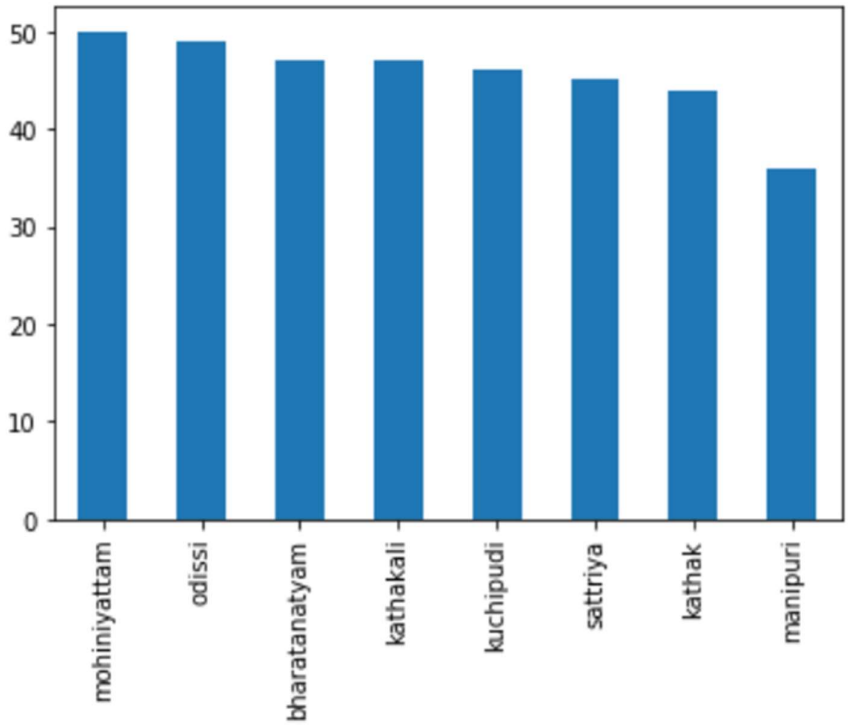
Figure 3: Model Summary

3. Dataset:

The dataset consists of 364 images belonging to 8 categories, namely Manipuri, Bharatanatyam, Odissi, kathakali, kathak, Sattriya, Kuchipudi, and Mohiniyattam. The benefits of practicing this problem by using Machine Learning/Deep Learning techniques are as follows: This challenge will encourage you to apply your Machine Learning skills to build models that classify images into multiple categories This challenge will help you enhance your knowledge of classification actively. It is one of the basic building blocks of Machine Learning and Deep Learning We challenge you to build a model that auto-tags images and classifies them into various categories of Indian classical dance forms.



The data set link is as:

https://www.kaggle.com/singhuday/identifythedanceform

4. Libraries:

Python:

Python is an interpreted high-level general-purpose programming language. It is dynamically-typed and garbage-collected. Python is widely used in multiple domains such as data science, machine learning and deep learning.

TensorFlow:

TensorFlow is an open-source library for machine learning and deep learning. It is mainly used for training and inference of deep neural networks. It was developed by Google Brain Team for internal Google research and production.

NumPy:

NumPy is a Python library used for working with arrays. It was developed by Travis Oliphant in 2005. NumPy provides array object which is 50x faster than traditional Python lists. Matplotlib:

Matplotlib:

It is a comprehensive library for creating static, animated and interactive visualizations with Python.

Pandas:

Pandas is an open-source Python package that is most widely used for data science/data analysis and machine learning tasks. It is built on top of another package named NumPy, which provides support for multi-dimensional arrays.

GitHub Link:

https://github.com/krishPatel12/DL_Project