

AI Image Classification- KTJ_2020

TM191D64

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TRAINING & TEST RESULT SUMMARY

Problem Statement

Design an algorithm to detect whether a bowler delivery is a Legal or No-Ball delivery using the images of bowlers in action.

Our goal is to measure the probability of an image being a no-ball or not and to make the automated umpiring system and to eliminate the shortcoming of human perception.

Methods / Algorithms

We have deployed a **Convolution Neural Network (CNN)** based classification method with **VGG19** to automatically detect and differentiate foot overstepping no balls from fair balls.

We have used **Transfer learning** algorithms which use the knowledge gained from solving one problem and applying it to another related problem. Transfer learning aims to transfer knowledge from a large dataset known as source domain to a smaller dataset named target domain.

In our model, we have used **5674 images** of size **100 x 100 x 3** as input. Our input dataset contains images collected from google image search and various video clips from live matches.

Some of the techniques used to increase our image dataset are:

1. Randomized Cropping
2. Changing contrast in various proportions
3. Changing brightness
4. Horizontal flipping

The images are manually annotated and contains two classes:

1. No-ball
2. Legal-ball

We have used **Keras and Tensorflow2.0** to build our model and generate results. Our model produces a score for both possible outcomes then each of them is converted to a probability by **Sigmoid** activation function.

How to work with the Model?

1. **Upload** the test data set on google drive.
2. Give the path of the dataset folder on the drive to variable **path**.
3. Give 'y' (correct output of images to be tested) as text file **y.txt**.
4. The model will print **accuracy score, precision, recall and F1 score** for the test data

MODEL SUMMARY

Model: "sequential_2"

Layer (type)	Output Shape	Param #
vgg19 (Model)	(None, 3, 3, 512)	20024384
flatten_2 (Flatten)	(None, 4608)	0
dense_4 (Dense)	(None, 4096)	18878464
dense_5 (Dense)	(None, 1)	4097
Total params: 38,906,945		
Trainable params: 18,882,561		
Non-trainable params: 20,024,384		
None		

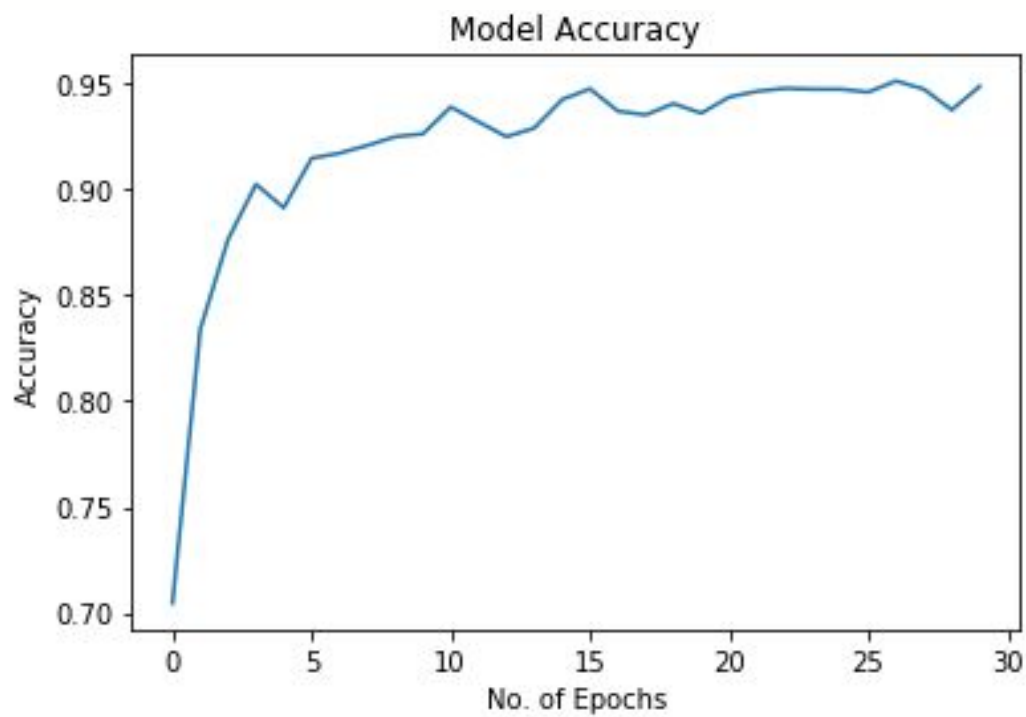
Using this model, we eliminated the shortcoming of Umpire's perception to decide an overstep no-ball.

List of Hyperparamters

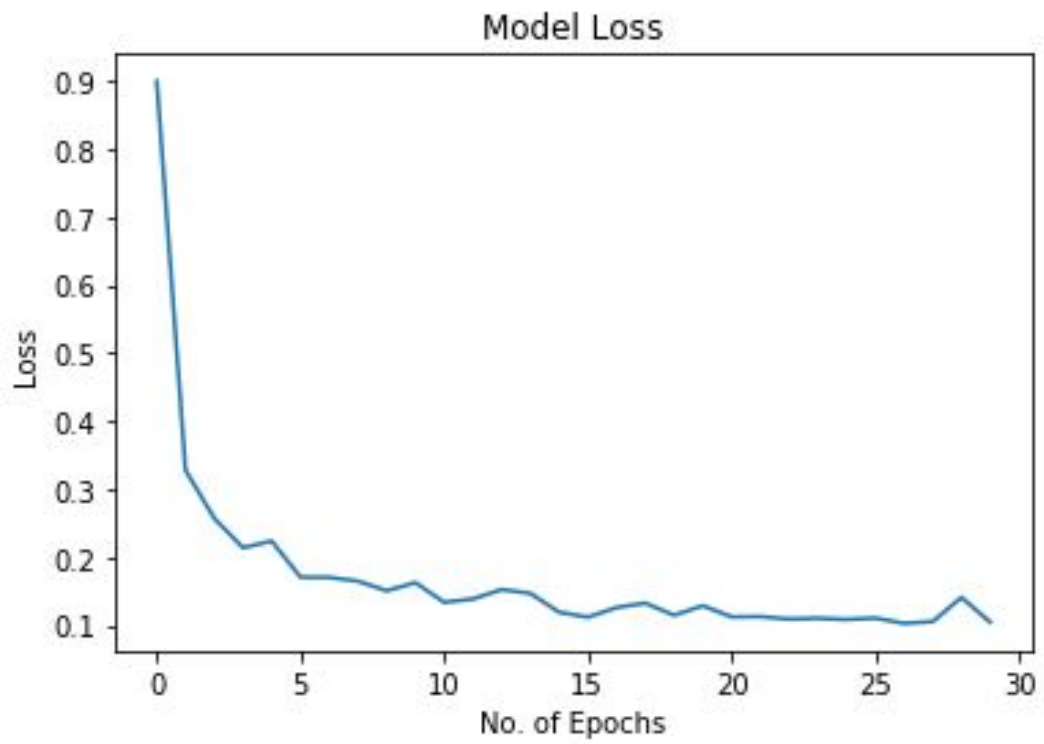
Model used for transfer learning	VGG 19
Number of hidden layers	20
Number of epochs	30
Optimizer	adam
Metrics for evaluation	Accuracy

Evaluation Metrics

- Model Accuracy plot



- Model Loss plot



- Evaluation parameters

Model train accuracy	94.88 %
Model test accuracy	89.45 %
Precision	0.7722
Recall	0.9950
F1 score	0.8696