The University of Texas, Arlington

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Instructor

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Project Proposal

Sports Image Classification

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Introduction

As a universal phenomenon, sports provide a huge variety of actions, occurrences, and moments that are ideal candidates for machine learning classification. The world of sports offers a rich tapestry of visual content, ranging from exhilarating on-field action to triumphant celebrations, and from the grace of athletes' movements to the devotion of officials and spectators. Our objective is to develop a system that is accurate and effective at identifying and classifying these events. The construction of an intelligent model that can recognize different sports and sports-related activities inside photographs is the main goal of the Sports Image Classification project. This project seeks to provide a flexible tool for sports fans, broadcasters, and analysts that can distinguish between various sports like *basketball* and *soccer* based on various identifying features such as the detected sports equipment.

Source of Datasets

The dataset for this project is sourced from Kaggle (Sports Image Classification (kaggle.com)).

Data Description

It is that we are provided with a dataset containing images of different sports classes. The dataset is split into a training set and a test set. The training set consists of labeled images belonging to the following sports classes: *cricket, wrestling, tennis, badminton, soccer, swimming & karate*. Each image is associated with a unique image ID and its corresponding class label. The test set contains unlabeled images for which you need to predict the class. The files are:

train.csv - the training.csv file, which includes the image id and its class of columns.

test.csv - the test.csv file contains only image id columns.

Analysis intended to perform

We want to educate our model to comprehend the complex elements and patterns within sports photos by utilizing cutting-edge machine learning approaches, specifically Convolutional Neural Networks (CNNs). Our model will develop reliable predictions as a result of being fed a wide dataset made up of pictures of various sports, participants, and circumstances. This will get us one step closer to automating the classification of sports photos.

Also, we use transfer learning technique. Transfer learning is the process by which we build a model using the patterns of another pretrained model. One benefit of transfer learning is the ability to achieve excellent outcomes with less custom data. Additionally, it saves a lot of time because we can use these pretrained models to get cutting-edge outcomes rather than creating a model from the start.

Here are the some of the steps to be followed while performing the project:

- Having the train.csv and test.csv we can customize the CNN model using transfer learning techniques like VGG16, ResNet, Inception or MobileNet and fine tune to the dataset.
- Also, utilizing a deep learning framework like TensorFlow, implement the model of your choice.
- Next, to define the layers, activation functions, and output layers that make up the model architecture. Create a suitable loss function, optimizer, and evaluation metric for compiling the model.
- Employing batch training, train the model on the training dataset. Metrics on the validation dataset can be used to keep track of training progress.
- To avoid overfitting and preserve the best model checkpoint, implement early stopping.
- Use the test dataset to evaluate the trained model's performance. To gauge the model's efficacy, use evaluation metrics like accuracy, precision, recall, and F1-score.
- To determine which categories the model issues with, create a confusion matrix.
- To maximize performance, adjust hyperparameters like learning rate, batch size, and model architecture.

Conclusion

We are attempting to use data to uncover new dimensions in the sports sector through diligent data collecting, preparation, and the creation of cutting-edge deep learning models. This project, which goes beyond the pixels and algorithms to elevate the fan experience, is a monument to the revolutionary power of data science. It improves sports content management, makes it possible for coaches and analysts to perform precise analysis, and elevates the fan experience overall. By bridging the gap between unprocessed visual data and insightful conclusions, data scientists have ushered sports into an era where technology not only expands our knowledge but also deepens our love for the sport.