Model Development Phase Template

Date	10 July 2024
Team ID	SWTID1720158677
Project Title	SportSpecs: Unraveling Athletic Prowess With Advanced Transfer Learning For Sports
Maximum Marks	10 Marks

Model Selection Report

In the model selection report for future deep learning and computer vision projects, various architectures, such as CNNs or RNNs, will be evaluated. Factors such as performance, complexity, and computational requirements will be considered to determine the most suitable model for the task at hand.

Model Selection Report:

Model	Description
Model 1 (VGG16)	VGG16 is a convolutional neural network (CNN) architecture developed by the Visual Geometry Group at the University of Oxford. It consists of 16 layers, including 13 convolutional layers and 3 fully connected layers1. Here are some key points: **Architecture:** The model uses small 3x3 convolution filters, which helps in capturing fine details in images. It also includes max-pooling layers to reduce the spatial dimensions. **Performance:** VGG16 is known for its simplicity and effectiveness, achieving high accuracy on various image classification tasks1. **Application:** In your project, VGG16 can be used as a base model for transfer learning. You can fine-tune the pre-trained VGG16 model on your

	sports dataset to classify images into the seven sports categories. **Convolutional Layers:** VGG16 has 13 convolutional layers, all using 3x3 filters with a stride of 1 and padding to preserve spatial resolution. These small filters help in capturing fine details and patterns in the images. **Max-Pooling Layers:** There are 5 max-pooling layers, each with a 2x2 filter and a stride of 2. These layers reduce the spatial dimensions of the feature maps, which helps in reducing the computational load and controlling overfitting. **Fully Connected Layers:** The network ends with 3 fully connected layers. The first two have 4096 neurons each, and the final layer has 1000 neurons (for the original ImageNet classification). For your project, this final layer will be replaced to match the number of sports categories (7 in your case). **Pre-trained Weights:** VGG16 is often used with pre-trained weights from the ImageNet dataset, which contains millions of images across 1000 classes. These weights serve as a good starting point for transfer learning. **Fine-Tuning:** In your project, you will replace the final fully connected layer with a new layer that has 7 output neurons (one for each sport). You will then fine-tune the model on your sports dataset. This involves training the model on your data while keeping the earlier layers fixed or allowing slight adjustments.
Model 2 (VGG19)	VGG19 is a deeper variant of the VGG architecture, consisting of 19 layers (16 convolutional layers and 3 fully connected layers)2. Here are some key points: **Architecture:** Similar to VGG16, VGG19 uses 3x3 convolution filters but has three additional convolutional layers, making it slightly more complex and capable of capturing more detailed features2. **Performance:** VGG19 generally performs slightly better than VGG16 on complex image classification tasks due to its increased depth2. **Application:** Like VGG16, VGG19 can also be used for transfer learning in your project. The additional layers might help in achieving higher accuracy, especially if your dataset is large and diverse. **Convolutional Layers:** VGG19 has 16 convolutional layers, all using 3x3 filters with a stride of 1 and padding to maintain spatial resolution. The additional layers compared to VGG16 allow VGG19 to capture more

	complex features and patterns in the images. **Max-Pooling Layers:** There are 5 max-pooling layers, each with a 2x2 filter and a stride of 2. These layers help in reducing the spatial dimensions of the feature maps, which is crucial for managing computational load and preventing overfitting. **Fully Connected Layers:** The network concludes with 3 fully connected layers. The first two have 4096 neurons each, and the final layer has 1000 neurons (for the original ImageNet classification). For your project, this final layer will be replaced to match the number of sports categories (7 in your case). **Pre-trained Weights:** VGG19 is often used with pre-trained weights from the ImageNet dataset, which contains millions of images across 1000 classes. These weights provide a strong starting point for transfer learning. **Fine-Tuning:** In your project, you will replace the final fully connected layer with a new layer that has 7 output neurons (one for each sport). You will then fine-tune the model on your sports dataset. This involves training the model on your data while keeping the earlier layers fixed or allowing slight adjustments.
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