**Model Optimization and Tuning Phase Template**

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| Date | 15 March 2024 |
| Team ID | SWTID1720436539 |
| Project Title | Sport Specs: Unraveling Athletic Prowess with Advanced Transfer Learning for Sports |
| Maximum Marks | 10 Marks |

**Model Optimization and Tuning Phase**

The Model Optimization and Tuning Phase involves refining neural network models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

**Hyperparameter Tuning Documentation (8 Marks):**

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| **Model** | **Tuned Hyperparameters** |
| Vgg16 | vgg16.fit(train,validation\_data=test,epochs=30)  **Shortnote:-trains a machine learning model for 30 epochs, using the entire training set for each epoch and the entire test set for validation at the end of each epoch. This ensures comprehensive training and evaluation of the model.** |

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| Vgg19 | vgg19.fit(train,validation\_data=test,epochs=10)  Shortnote:-trains a machine learning model for 10 epochs, using the entire training set for each epoch and the entire test set for validation at the end of each epoch. This ensures comprehensive training and evaluation of the model. |
| ResNet50 | ResNet50.fit(train,validation\_data=test,epochs=10)  Shortnote:-trains a machine learning model for 10 epochs, using the entire training set for each epoch and the entire test set for validation at the end of |
|  | each epoch. This ensures comprehensive training and evaluation of the model. |

**Final Model Selection Justification (2 Marks):**

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| **Final Model** | **Reasoning** |
| VGG | vgg16.fit(train,validation\_data=test,epochs=30) |
|  | The VGG model was chosen as the final optimized model because it consistently demonstrated superior performance across multiple evaluation metrics, including accuracy, precision, and recall.  Additionally, its architecture, which uses small convolutional filters and a deep network structure, is well-suited for capturing detailed features in the input data. This model also showed good generalization capabilities, minimizing overfitting despite the depth of the network. The trade-off between model complexity and computational efficiency was found to be optimal for our specific application, making VGG the best choice among the evaluated models. |