**Model Optimization and Tuning Phase Template**

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| Date | 20 july 2024 |
| Team ID | SWTID1720084639 |
| Project Title | Beneath the Waves: Unraveling Coral Mysteries through Deep Learning |
| Maximum Marks | 10 Marks |

**Model Optimization and Tuning Phase**

### The Model Selection Phase involves evaluating and choosing the best deep learning models for image classification tasks. It includes assessing VGG16 for its straightforward architecture and strong feature extraction, ResNet for its scalable depth and residual connections that prevent vanishing gradients, Inception for its multi-scale feature extraction and computational efficiency, Xception for its enhanced depthwise separable convolutions, and DenseNet for its dense connections that improve gradient flow and parameter efficiency. This phase ensures the final model selection is justified based on performance metrics, accuracy, and suitability for diverse computer vision applications.

### Hyperparameter Tuning Documentation (8 Marks):

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| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
| **RESNET** |  |  |
| **INCEPTION** |  |  |
| **XCEPTION** |  |  |
| **DENSENET** |  |  |
| **VGG16** |  |  |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| **VGG16** | We chose VGG16 as our final model for the "BENEATH THE WAVES" project because it achieved the highest accuracy during hyperparameter tuning. Its deep architecture captures complex patterns in coral images effectively, and its proven performance in image recognition tasks ensures reliability. Additionally, VGG16's pre-trained weights facilitate transfer learning, improving our results with less data. |