Model Development Phase Template

Date	24 April 2024
Team ID	738171
Project Title	NEURAL NETWORKS AHOY: CUTTING-EDGE SHIP CLASSIFICATION FOR MARITIME MASTERY
Maximum Marks	5 Marks

Model Selection Report

In a model selection report for future deep learning and computer vision projects, Convolutional Neural Networks (CNNs) would be one of the primary architectures evaluated due to their widespread use and effectiveness in image-related tasks. Here's a brief description of CNNs and VGG16 and how factors like performance, complexity, and computational requirements would be considered in the selection process

Model Selection Report:

Model	Description
CNN	**1. Convolutional Neural Networks (CNNs):** ○ CNNs are a class of deep neural networks specifically designed for processing grid-like data, such as images. ○ They consist of convolutional layers that learn spatial hierarchies of features from the input data, along with pooling layers that downsample the spatial dimensions. ○ CNNs have become the standard architecture for tasks like image classification, object detection, and image segmentation due to their ability to automatically learn hierarchical features from raw pixel data. **2. Performance:** ○ Performance refers to the ability of a CNN model to accurately classify or detect objects in images.

	○ Performance metrics such as accuracy, precision, recall, and F1-score are commonly used to evaluate the effectiveness of CNN models on specific tasks. ○ During model selection, various CNN architectures would be trained and evaluated on benchmark datasets to assess their performance across different tasks. **3. Complexity:** ○ Complexity refers to the architectural design and the number of parameters in a CNN model. ○ Deeper architectures with more layers and parameters may have the potential to capture more intricate features from the input data but also increase the risk of overfitting, especially with limited training data. ○ Model complexity also affects interpretability, training time, and computational resources required for training and inference. **4. Computational Requirements:** ○ Computational requirements refer to the amount of computational resources needed for training and inference with CNN models. ○ Deeper and more complex CNN architectures typically require more computational resources, including GPU memory and processing power. ○ Considerations such as training time, inference speed, and deployment constraints are important factors when selecting a CNN model for a specific task.
VGG16	**1. VGG16:** ○ VGG16 is a convolutional neural network architecture proposed by the Visual Geometry Group (VGG) at the University of Oxford. ○ It consists of 16 layers, including 13 convolutional layers and 3 fully connected layers. ○ Each convolutional layer in VGG16 uses 3x3 filters with a stride of 1 and 'same' padding, followed by max-pooling layers after every two convolutional layers. ○ VGG16 gained popularity for its simplicity and effectiveness, especially in image classification tasks, due to its uniform architecture and small 3x3 convolutional filters. **2. Performance:**

	○ Performance refers to the ability of the VGG16 model to accurately classify or detect objects in images. ○ VGG16 has been widely used as a benchmark architecture for image classification tasks, achieving competitive performance on standard datasets such as ImageNet. ○ Performance metrics such as accuracy, precision, recall, and F1-score would be evaluated when comparing VGG16 with other architectures for specific tasks. **3. Complexity:** ○ Complexity in the context of VGG16 refers to the architectural design and the number of parameters in the model. ○ While VGG16 has a relatively simple and uniform architecture compared to some newer architectures, it still contains a large number of parameters, especially in the fully connected layers. ○ The simplicity of the architecture makes it easy to understand and implement but may also limit its ability to capture complex patterns in the data compared to more intricate architectures. **4. Computational Requirements:** ○ Computational requirements for VGG16 depend on factors such as the number of parameters, batch size, and hardware acceleration used during training and inference. ○ Training VGG16 from scratch may require significant computational resources, especially for large-scale datasets. ○ However, pre-trained versions of VGG16 are available, which can be fine-tuned on specific tasks with less computational overhead