Model Development Phase Template

Date	9 July 2024
Team ID	SWTID1720043892
Project Title	WCE Curated Colon Disease Using Deep Learning
Maximum Marks	5 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
Resnet	ResNet-50 is a deep convolutional neural network with 50 layers that uses residual connections to efficiently train very deep networks by mitigating the vanishing gradient problem. Its architecture includes convolutional layers, batch normalization, and ReLU activations, organized into residual blocks, enhancing feature extraction and overall performance. ResNet-50 achieves state-of-the-art results in image recognition tasks and is widely used for transfer learning, making it ideal for complex computer vision tasks like object detection and segmentation
Vgg16	Vgg16 is a deep convolutional neural network with 16 layers, including 13 convolutional and 3 fully connected layers. It uses small 3x3 convolutional

	filters and max-pooling layers to capture complex features while maintaining simplicity and uniform architecture. VGG16 is known for its strong performance in image classification tasks and is frequently used for transfer learning. Its straightforward design and robust feature extraction capabilities make it suitable for various image processing applications
EfficientNet- B1	EfficientNet-B1 is part of the EfficientNet family, which is designed to achieve high accuracy with optimized efficiency. EfficientNet-B1 uses the compound scaling method to balance the depth, width, and r esolution of the network, resulting in a model that performs well while requiring fewer computational resources. This version of EfficientNet has fewer parameters and FLOPs compared to many other deep learning models, making it suitable for applications where both accuracy and efficiency are important, such as mobile and edge devices. EfficientNet-B1 is particularly effective for image classification tasks and is known for its excellent performance on benchmarks with reduced computational cost.
Inception V3	InceptionV3 is a deep convolutional neural network architecture that builds upon the original Inception model (GoogLeNet). It employs a series of Inception modules, which consist of parallel convolutional layers with different filter sizes, allowing the network to capture multi-scale features efficiently. InceptionV3 introduces additional improvements such as factorized convolutions, batch normalization, and label smoothing, enhancing both performance and computational efficiency. This architecture achieves high accuracy on image classification tasks with a relatively lower number of parameters and FLOPs compared to other models. InceptionV3 is well-suited for applications that require robust feature extraction and efficient computation, making it a popular choice for various computer vision tasks.

Final accuracy -

Resnet50-

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200/200 [==============================] - 65s 326ms/step - loss: 0.7488 - accuracy: 0.7163 - val_loss: 1.0955 - val_accuracy: 0.6550
Epoch 3/50
200/200 [==============================] - ETA: 0s - loss: 0.6118 - accuracy: 0.7703
Epoch 3: val_loss improved from 1.09554 to 0.98545, saving model to /content/model/resnet50_model.h5
200/200 [==============================] - 65s 324ms/step - loss: 0.6118 - accuracy: 0.7703 - val_loss: 0.9854 - val_accuracy: 0.6787
Epoch 4/50
200/200 [==============================] - ETA: 0s - loss: 0.5867 - accuracy: 0.7806
Epoch 4: val_loss improved from 0.98545 to 0.83357, saving model to /content/model/resnet50_model.h5
200/200 [==============================] - 64s 321ms/step - loss: 0.5867 - accuracy: 0.7806 - val_loss: 0.8336 - val_accuracy: 0.7287
Epoch 5/50
200/200 [==============================] - ETA: 0s - loss: 0.5337 - accuracy: 0.8047
Epoch 5: val_loss did not improve from 0.83357
200/200 [==============================] - 64s 322ms/step - loss: 0.5337 - accuracy: 0.8047 - val_loss: 1.0135 - val_accuracy: 0.6750
Epoch 6/50
200/200 [==============================] - ETA: 0s - loss: 0.5069 - accuracy: 0.8188
Epoch 6: val_loss improved from 0.83357 to 0.55329, saving model to /content/model/resnet50_model.h5
200/200 [==============================] - 68s 340ms/step - loss: 0.5069 - accuracy: 0.8188 - val_loss: 0.5533 - val_accuracy: 0.7987
Epoch 7/50
200/200 [==============================] - ETA: 0s - loss: 0.4397 - accuracy: 0.8413
Epoch 7: val_loss did not improve from 0.55329
...
200/200 [==============================] - ETA: 0s - loss: 0.5068 - accuracy: 0.8528
Epoch 11: val_loss did not improve from 0.55329
200/200 [==============================] - 65s 323ms/step - loss: 0.5068 - accuracy: 0.8528 - val_loss: 0.7815 - val_accuracy: 0.8100
Model saved at: /content/model/resnet50_model.h5
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Vgg16-

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200/200 [==============================] - ETA: 0s - loss: 0.0296 - accuracy: 0.9900
Epoch 5: val_loss did not improve from 0.20602
200/200 [==============================] - 65s 325ms/step - loss: 0.0296 - accuracy: 0.9900 - val_loss: 1.2455 - val_accuracy: 0.7700
Epoch 6/50
200/200 [==============================] - ETA: 0s - loss: 0.0275 - accuracy: 0.9897
Epoch 6: val_loss did not improve from 0.20602
200/200 [==============================] - 64s 320ms/step - loss: 0.0275 - accuracy: 0.9897 - val_loss: 0.3648 - val_accuracy: 0.8712
Epoch 7/50
200/200 [==============================] - ETA: 0s - loss: 0.0292 - accuracy: 0.9891
Epoch 7: val_loss did not improve from 0.20602
200/200 [==============================] - 64s 318ms/step - loss: 0.0292 - accuracy: 0.9891 - val_loss: 1.0586 - val_accuracy: 0.7788
Epoch 8/50
200/200 [==============================] - ETA: 0s - loss: 0.0220 - accuracy: 0.9925
Epoch 8: val_loss did not improve from 0.20602
200/200 [==============================] - 69s 345ms/step - loss: 0.0220 - accuracy: 0.9925 - val_loss: 1.0403 - val_accuracy: 0.7912
Model saved at: /content/model/vgg16_model.h5
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Inception V3-

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Epoch 4/50
200/200 [==============================] - ETA: 0s - loss: 0.2561 - accuracy: 0.9181
Epoch 4: val_loss did not improve from 0.59138
200/200 [==============================] - 69s 342ms/step - loss: 0.2561 - accuracy: 0.9181 - val_loss: 0.6276 - val_accuracy: 0.7412
Epoch 5/50
200/200 [==============================] - ETA: 0s - loss: 0.5895 - accuracy: 0.8800
Epoch 5: val_loss did not improve from 0.59138
200/200 [==============================] - 72s 362ms/step - loss: 0.5895 - accuracy: 0.8800 - val_loss: 1.0470 - val_accuracy: 0.7500
Epoch 6/50
200/200 [==============================] - ETA: 0s - loss: 0.5622 - accuracy: 0.8800
Epoch 6: val_loss did not improve from 0.59138
200/200 [==============================] - 68s 341ms/step - loss: 0.5622 - accuracy: 0.8800 - val_loss: 1.4380 - val_accuracy: 0.7400
Model saved at: /content/model/InceptionV3_model.h5
```

Final Accuracy table-

Model	Train accuracy	Validation accuracy
Resnet 50	85.28%	81.00%
Vgg16	99.25%	79.12%
Inception v3	88.00%	74.00%

Model selected for web deployment of the project is Vgg16

As Vgg16 has train accuracy of 99.25% which is highest when compared to resnet50's train accuracy 85.28% and inception V3's train accuracy is 88.00%