P6 Workflow 6

Initial Network:

```
Model: "sequential"
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 Layer (type)                    Output Shape                Param #
=================================================================
 rescaling (Rescaling)           (None, 150, 150, 3)               0

 max_pooling2d (MaxPooling2D)    (None, 75, 75, 3)                 0

 conv2d (Conv2D)                 (None, 75, 75, 32)              896

 max_pooling2d_1 (MaxPooling2D)  (None, 37, 37, 32)                0

 conv2d_1 (Conv2D)               (None, 37, 37, 32)            9,248

 max_pooling2d_2 (MaxPooling2D)  (None, 18, 18, 32)                0

 flatten (Flatten)               (None, 3888)                      0

 dense (Dense)                   (None, 32)                  124,448

 dropout_1 (Dropout)             (None, 32)                        0

 dense_1 (Dense)                 (None, 3)                        99

=================================================================
Total params: 148,563 (580.32 KB)
Trainable params: 148,563 (580.32 KB)
Non-trainable params: 0 (0.00 B)
```
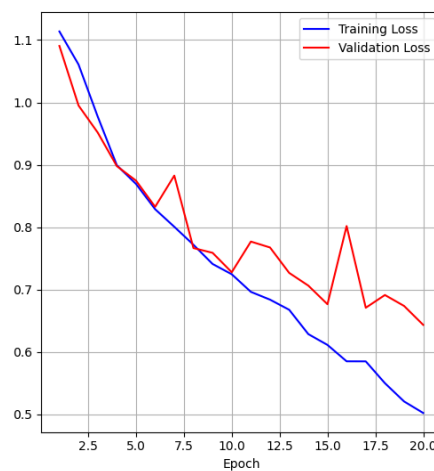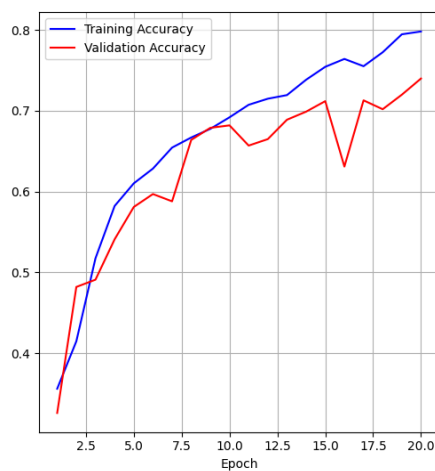

The accuracy and loss of our best-learned model (which was at epoch 15 before overfitting) were 82.44% (0.8244) and 44.92% (0.4492) respectively. The final trained

model at epoch 20 got an accuracy of 76.62% (0.7662) and a loss of 59.79% (0.5979), confirming that overfitting begins after epoch 15.

We optimized our deep learning model by adjusting key hyperparameters to improve accuracy and reduce overfitting. Changes included reducing the second convolutional layer from 48 to 32 filters, adding a dropout layer (0.25) after the third convolutional layer, increasing the dense layer size from 25 to 32, and adding another dropout layer (0.25) after the dense layer. These modifications improved accuracy from 74.92% to 82.44% and reduced loss from 64.06% to 44.92%. The added dropout layers helped prevent overfitting, while the adjustments to convolutional and dense layers balanced model complexity, leading to better generalization.