

Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Epochs: 10
Gaussian Noise STD: 0.03
Salt-Pepper Noise Amount: 0.01
Train Size: 568
Validation Size: 142
Test Size: 79

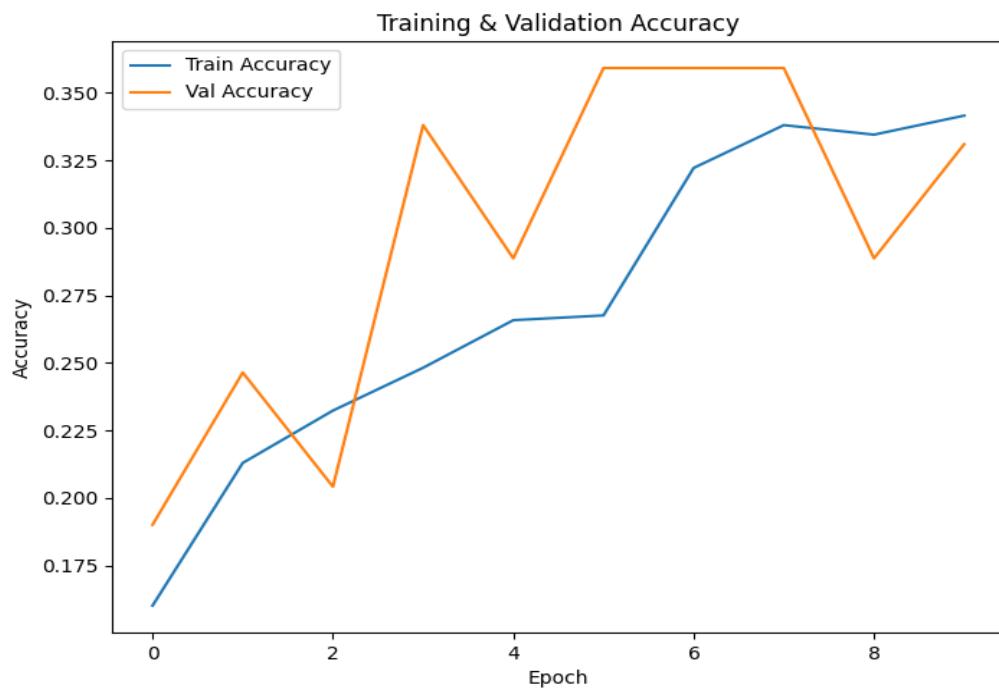
Model Summary:

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

Total params: 33,509,978 (127.83 MB)
Trainable params: 11,169,992 (42.61 MB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 22,339,986 (85.22 MB)

Test Accuracy: 0.3165

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Epochs: 10
Gaussian Noise STD: 0.03
Salt-Pepper Noise Amount: 0.01
Train Size: 568
Validation Size: 142
Test Size: 79

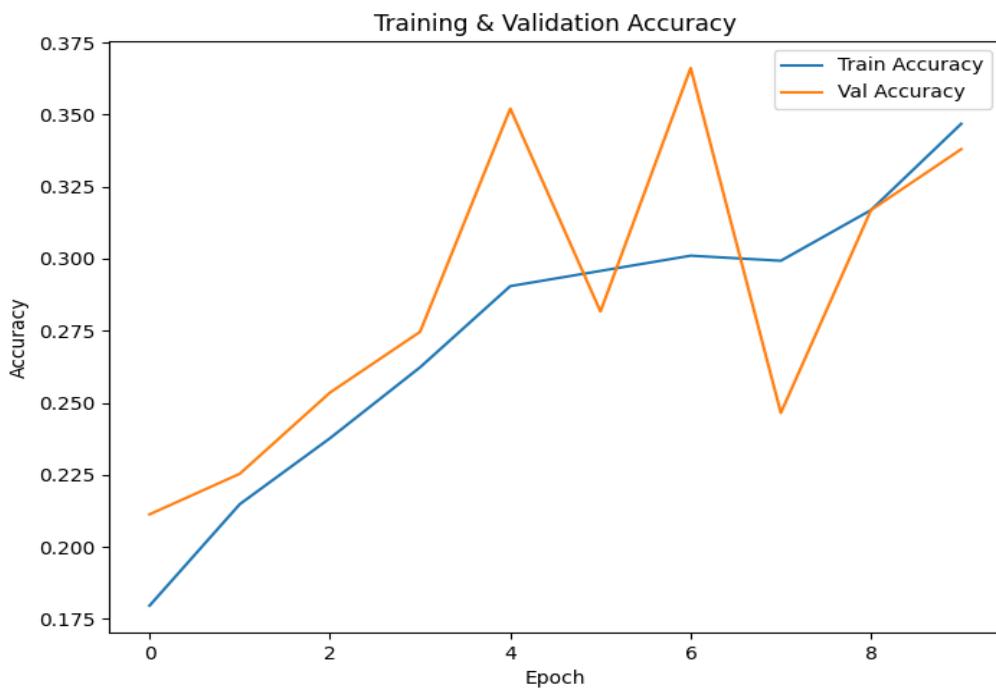
Model Summary:

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

Total params: 33,509,978 (127.83 MB)
Trainable params: 11,169,992 (42.61 MB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 22,339,986 (85.22 MB)

Test Accuracy: 0.2785

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Epochs: 10
Gaussian Noise STD: 0.03
Salt-Pepper Noise Amount: 0.01
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Increased augmentation by adding random brightness

Model Summary:

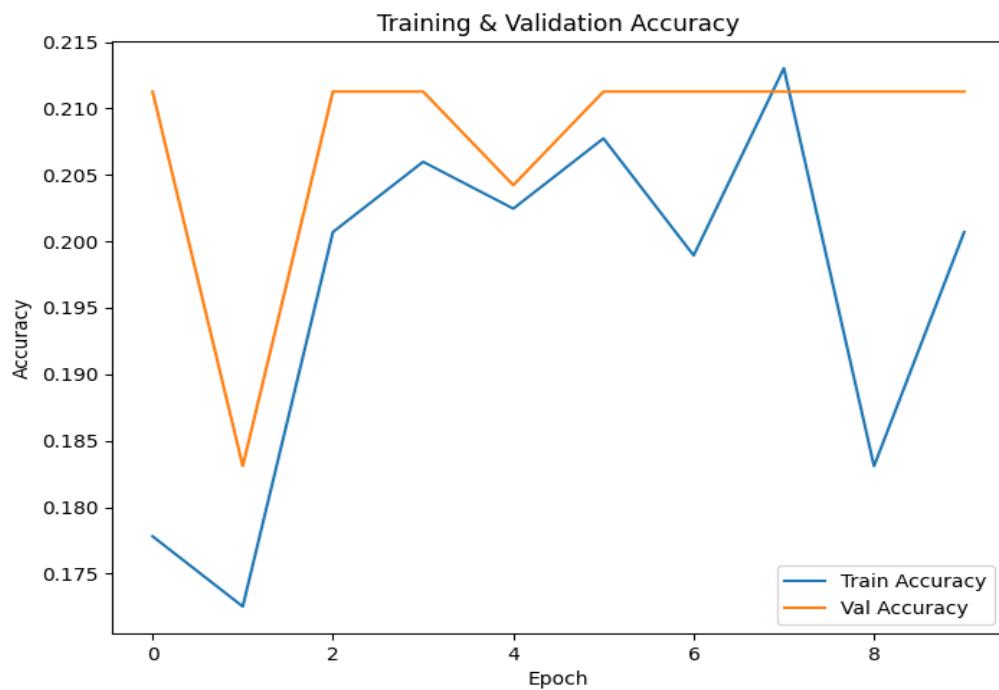
Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

Total params: 33,509,978 (127.83 MB)
Trainable params: 11,169,992 (42.61 MB)
Non-trainable params: 0 (0.00 B)

Optimizer params: 22,339,986 (85.22 MB)

Test Accuracy: 0.2152

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: np.float64(1.3653846153846154), 1: np.float64(0.5867768595041323), 2: np.float64(1.3148148148149), 3: np.float64(0.64545454545455), 4: np.float64(1.1639344262295082), 5: np.float64(1.1451612903225807), 6: np.float64(1.3148148148149), 7: np.float64(1.3148148148149)}

Epochs: 10

Gaussian Noise STD: 0.03

Salt-Pepper Noise Amount: 0.01

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Apply class weights for balancing

Model Summary:

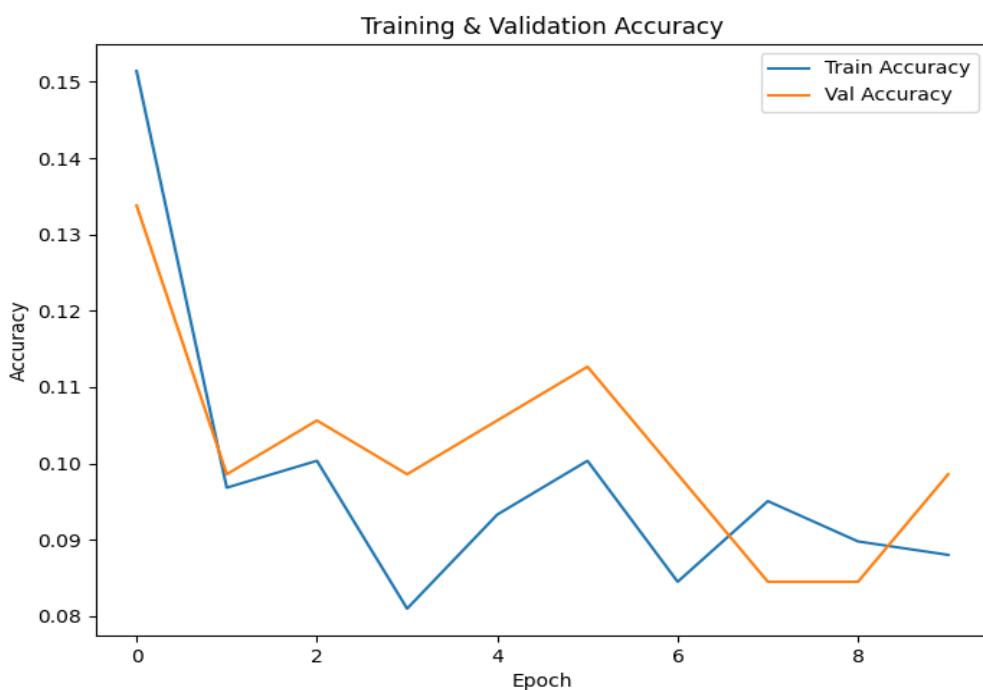
Model: "sequential_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

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Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
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Test Accuracy: 0.1013

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: np.float64(1.3653846153846154), 1: np.float64(0.5867768595041323), 2: np.float64(1.3148148148149), 3: np.float64(0.64545454545455), 4: np.float64(1.1639344262295082), 5: np.float64(1.1451612903225807), 6: np.float64(1.3148148148149), 7: np.float64(1.3148148148149)}

Epochs: 10

Gaussian Noise STD: 0.03

Salt-Pepper Noise Amount: 0.01

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Applied real random brightness augmentation

Model Summary:

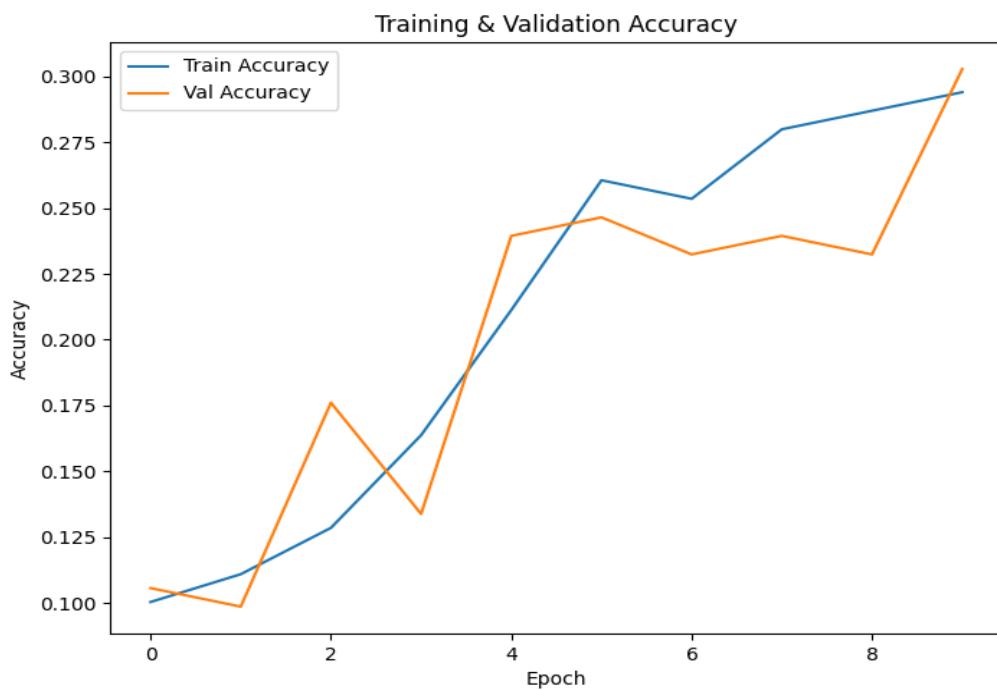
Model: "sequential_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

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Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
```

Test Accuracy: 0.3544

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: np.float64(1.3653846153846154), 1: np.float64(0.5867768595041323), 2: np.float64(1.3148148148149), 3: np.float64(0.64545454545455), 4: np.float64(1.1639344262295082), 5: np.float64(1.1451612903225807), 6: np.float64(1.3148148148149), 7: np.float64(1.3148148148149)}

Epochs: 10

Gaussian Noise STD: 0.03

Salt-Pepper Noise Amount: 0.01

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Applied real random translation augmentation

Model Summary:

Model: "sequential_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

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[  
Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
```

Test Accuracy: 0.2532

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Epochs: 10

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

Gaussian Noise STD: 0.03

Salt-Pepper Noise Amount: 0.01

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Reduced random translation augmentation to 5%

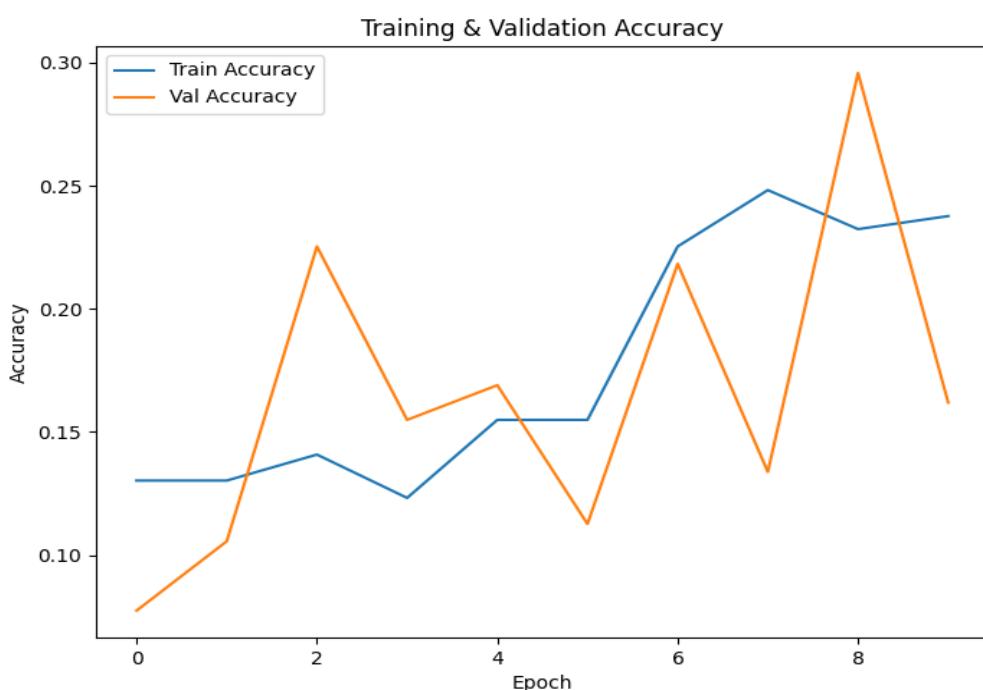
Model Summary:

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

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[  
Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
```

Test Accuracy: 0.1519

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Image S1C. (E)

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Class Weight
Epochs: 10

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

Gaussian Noise STD: 0.03

Salt-Pepper Noise Amount: 0.01

Salt-Pepper No Train Size: 568

Train Size: 568
Validation Size: 142

Validation Size

Comments: Implemented transfer learning with EfficientNetB0

Model Summary

Model: "sequential_1"

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 4,080,317 (15.57 MB)
Trainable params: 10,248 (40.03 KB)
Non-trainable params: 4,049,571 (15.45 MB)
Optimizer params: 20,498 (80.07 KB)

Test Accuracy: 0.1013

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Image S1C. (E)

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Class Weight
Epochs: 20

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

Gaussian Noise STD: 0.05

Salt-Pepper Noise Amount: 0.02

Salt-Pepper No Train Size: 568

Train Size: 568
Validation Size: 143

Validation Size

Comments: Using EfficientNetB0, increased to 20 epochs

Model Summary

Model: "sequential_1"

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 4,080,317 (15.57 MB)
Trainable params: 10,248 (40.03 KB)
Non-trainable params: 4,049,571 (15.45 MB)
Optimizer params: 20,498 (80.07 KB)

Test Accuracy: 0.1139

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Image S1C. (E)

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Class Weight
Epochs: 30

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

Gaussian Noise STD: 0.05

Salt-Pepper Noise Amount: 0.02

Salt-Pepper No
Train Size: 568

Train Size: 568
Validation Size: 143

Validation Size

Comments: Using EfficientNetB0, increased to 30 epochs

Model Summary

Model: "sequential_1"

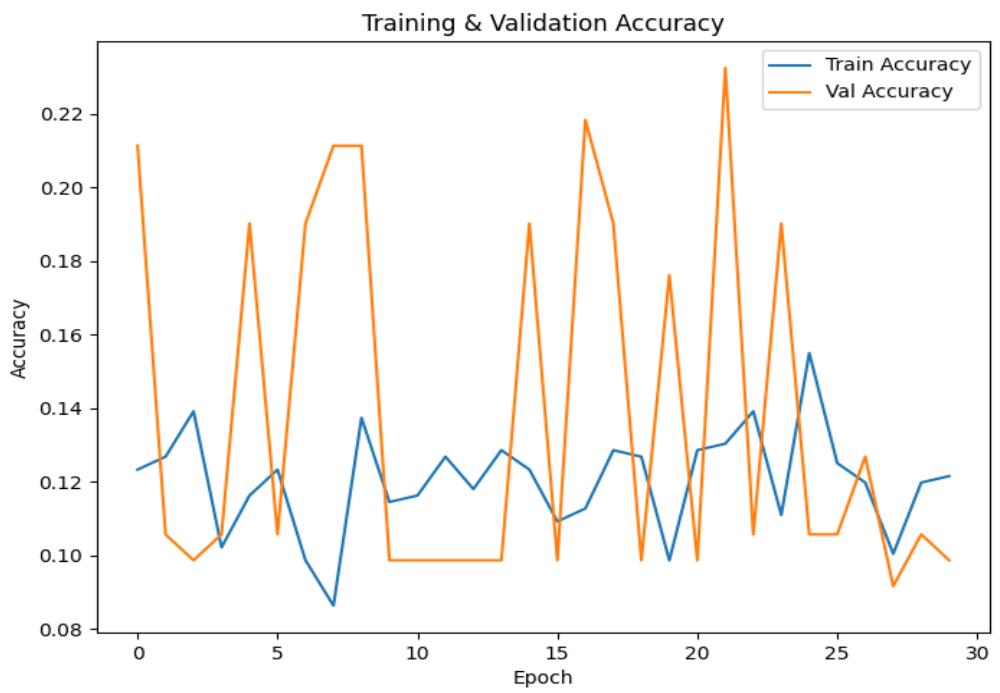
The figure is a horizontal bar chart representing the layers of the "sequential_1" model. Each row corresponds to a layer, with its type, name, output shape, and parameter count displayed. The bars are composed of small black squares, with the length of each bar indicating the size of the layer's parameters or output. A legend at the top defines the symbols: a square for 'Layer (type)', a rectangle for 'Output Shape', and a circle for 'Param #'. The layers listed are: efficientnetb0 (Functional), global_average_pooling2d (GlobalAveragePooling2D), dropout (Dropout), and dense (Dense). The total number of parameters is 4,080,317, and the trainable parameters are 10,248.

Layer (type)	Layer Name	Output Shape	Param #
efficientnetb0 (Functional)	efficientnetb0	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	global_average_pooling2d	(None, 1280)	0
dropout (Dropout)	dropout	(None, 1280)	0
dense (Dense)	dense	(None, 8)	10,248

Total params: 4,080,317 (15.57 MB)
Trainable params: 10,248 (40.03 KB)
Non-trainable params: 4,049,571 (15.45 MB)
Optimizer params: 20,498 (80.07 KB)

Test Accuracy: 0.0886

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Epochs: 30

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.01, 0.01)

Gaussian Noise STD: 0.02

Salt-Pepper Noise Amount: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Using EfficientNetB0, increased to 30 epochs, reduced gaussian

Model Summary:

Model: "sequential_1"

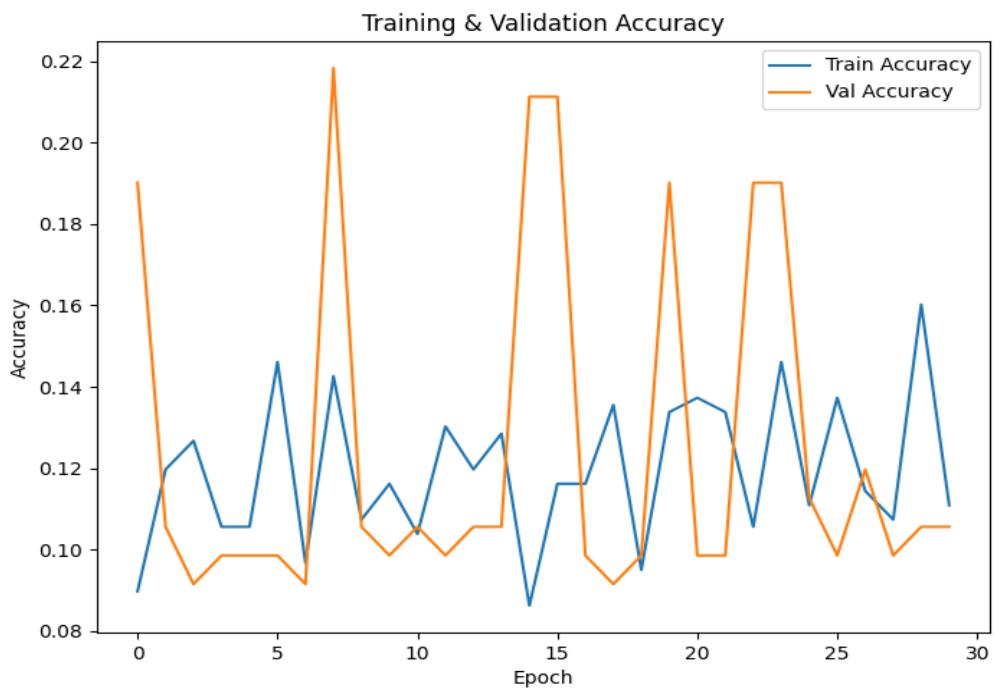
The diagram shows a Keras model summary with the following layers:

- Layer (type): efficientnetb0 (Functional) - Output Shape: (None, 7, 7, 1280) - Param #: 4,049,571
- Layer (type): global_average_pooling2d (GlobalAveragePooling2D) - Output Shape: (None, 1280) - Param #: 0
- Layer (type): dropout (Dropout) - Output Shape: (None, 1280) - Param #: 0
- Layer (type): dense (Dense) - Output Shape: (None, 8) - Param #: 10,248

Total params: 4,080,317 (15.57 MB)
Trainable params: 10,248 (40.03 KB)
Non-trainable params: 4,049,571 (15.45 MB)
Optimizer params: 20,498 (80.07 KB)

Test Accuracy: 0.0759

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

Gaussian Noise STD: 0.05

Salt-Pepper Noise Amount: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

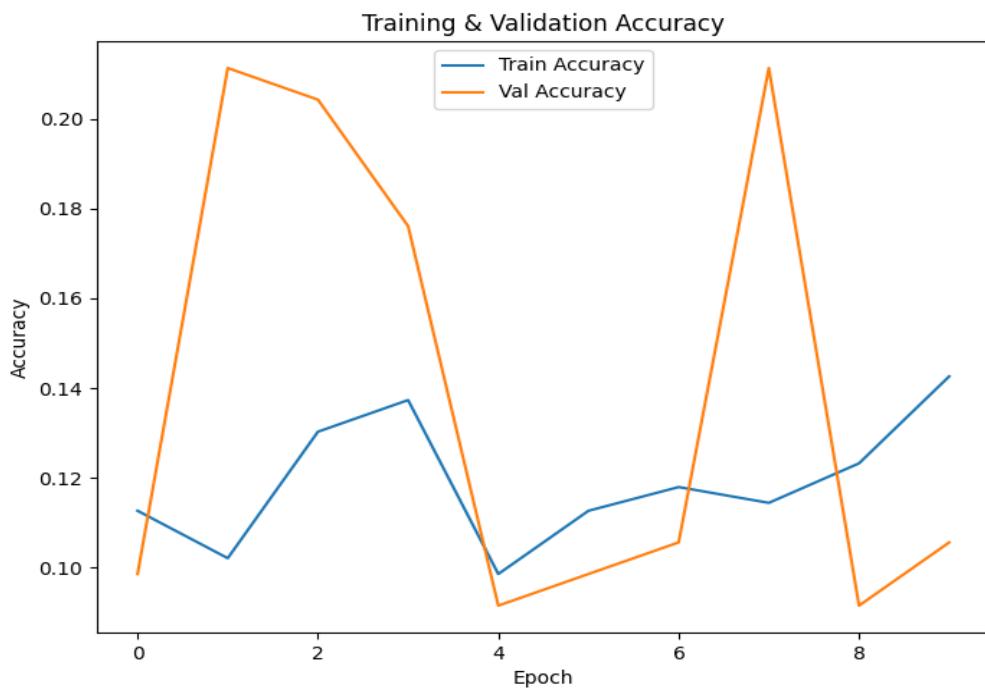
Comments: Using EfficientNetB0, train deeper layers

Model Summary:

Model: "sequential_1"		
Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248
Total params: 12,095,413 (46.14 MB)		
Trainable params: 4,017,796 (15.33 MB)		
Non-trainable params: 42,023 (164.16 KB)		
Optimizer params: 8,035,594 (30.65 MB)		

Test Accuracy: 0.1266

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

Gaussian Noise STD: 0.05

Salt-Pepper Noise Amount: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Using EfficientNetB0, train deeper layers, early stopping

Model Summary:

Model: "sequential_1"		
Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248
Total params: 12,095,413 (46.14 MB)		
Trainable params: 4,017,796 (15.33 MB)		
Non-trainable params: 42,023 (164.16 KB)		
Optimizer params: 8,035,594 (30.65 MB)		

Test Accuracy: 0.2152

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip(none), RandomRotation(0.05 radians), RandomZoom(0.05), RandomContrast(0.05), RandomBrightness(0.05)
Gaussian Noise STD: 0.01
Salt-Pepper Noise Amount: 0.01
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using EfficientNetB0, train deeper layers, early stopping, reduced aggressive augmentation

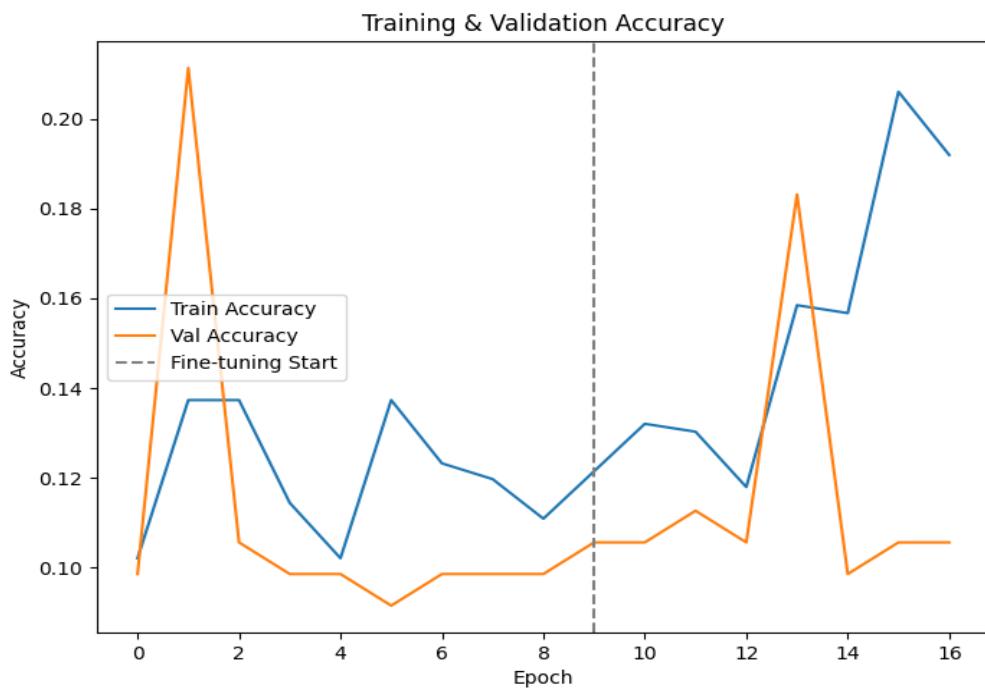
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ efficientnetb0 (Functional)   ■ (None, 7, 7, 1280) ■ 4,049,571 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)    ■ 0 ■
■ (GlobalAveragePooling2D)
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)    ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

Total params: 12,095,413 (46.14 MB)
Trainable params: 4,017,796 (15.33 MB)
Non-trainable params: 42,023 (164.16 KB)
Optimizer params: 8,035,594 (30.65 MB)
```

Test Accuracy: 0.1139

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Image 3.26. (E)

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Base Epoch Epochs: 30

Data Augmentation: RandomFlip(none), RandomRotation(0.05 radians), RandomZoom(0.05), RandomContrast(0.05), RandomBrightness(0.05)

Gaussian Noise STD: 0.0

Salt-Pepper Noise Amount: 0.0

Salt-I epper No.
Train Size: 568

Train Size: 368

Test Size: 79

Comments: Using

Comments: Using E paper

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Model Summary:

Model: sequential_1

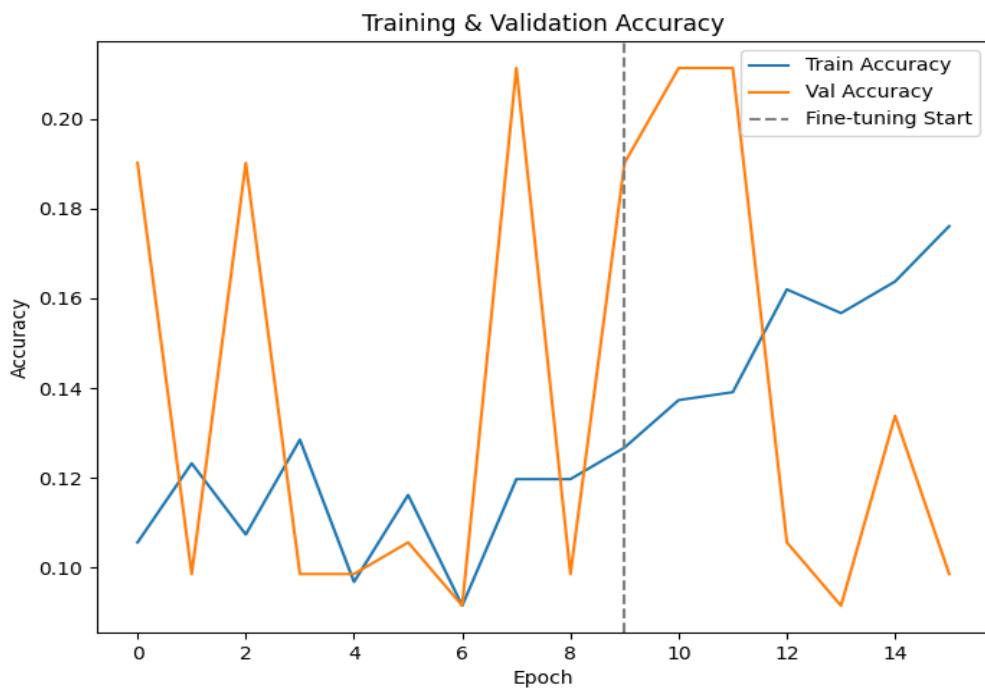
The diagram shows a Keras model summary with the following layers:

- Layer (type): efficientnetb0 (Functional)
- Output Shape: (None, 7, 7, 1280)
- Param #: 4,049,571
- Layer (type): global_average_pooling2d (GlobalAveragePooling2D)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dropout (Dropout)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dense (Dense)
- Output Shape: (None, 8)
- Param #: 10,248

Total params: 12,095,413 (46.14 MB)
Trainable params: 4,017,796 (15.33 MB)
Non-trainable params: 42,023 (164.16 KB)
Optimizer params: 8,035,594 (30.65 MB)

Test Accuracy: 0.2152

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Image 3.26. (E)

Batch 3.2.3. 32

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Class Weights: [1
Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip(none), RandomRotation(0.05 radians), RandomZoom(0.05), RandomContrast(0.05), RandomBrightness(0.05)

Gaussian Noise STD: 0.0

Salt-Pepper Noise Amount: 0.0

Salt-I epper No.
Train Size: 568

Train Size: 368

Valuation Size: 14
Test Size: 79

Comments: I

Comments: Use paper

& pepper

Model Summary:

Model: "sequential_1"

The diagram shows a Keras model summary. It lists layers from top to bottom: efficientnetb0 (Functional), global_average_pooling2d (GlobalAveragePooling2D), dropout (Dropout), and dense (Dense). Each layer is represented by a horizontal bar indicating its type (Functional, GlobalAveragePooling2D, Dropout, Dense) and its output shape (None, 7, 7, 1280; None, 1280; None, 1280; None, 8). The total number of parameters is 4,049,571, with 10,248 trainable parameters.

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 6,782,237 (25.87 MB)
Trainable params: 1,361,208 (5.19 MB)
Non-trainable params: 2,698,611 (10.29 MB)
Optimizer params: 2,722,418 (10.39 MB)

Test Accuracy: 0.0886

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

Gaussian Noise STD: 0.01

Salt-Pepper Noise Amount: 0.01

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Using EfficientNetB0, fine tune only the top 50 layers, increased augmentation

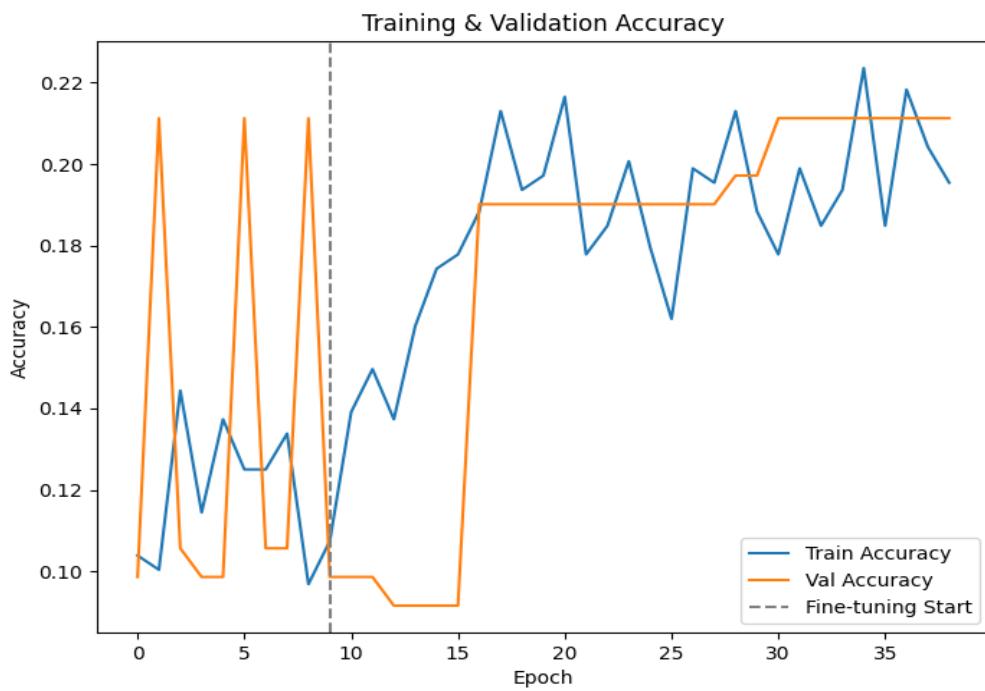
Model Summary:

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 9,134,045 (34.84 MB)
Trainable params: 2,537,112 (9.68 MB)
Non-trainable params: 1,522,707 (5.81 MB)
Optimizer params: 5,074,226 (19.36 MB)

Test Accuracy: 0.2152

Training Accuracy over Epochs:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)
Gaussian Noise STD: 0
Salt-Pepper Noise Amount: 0.0
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using MobileNetV2

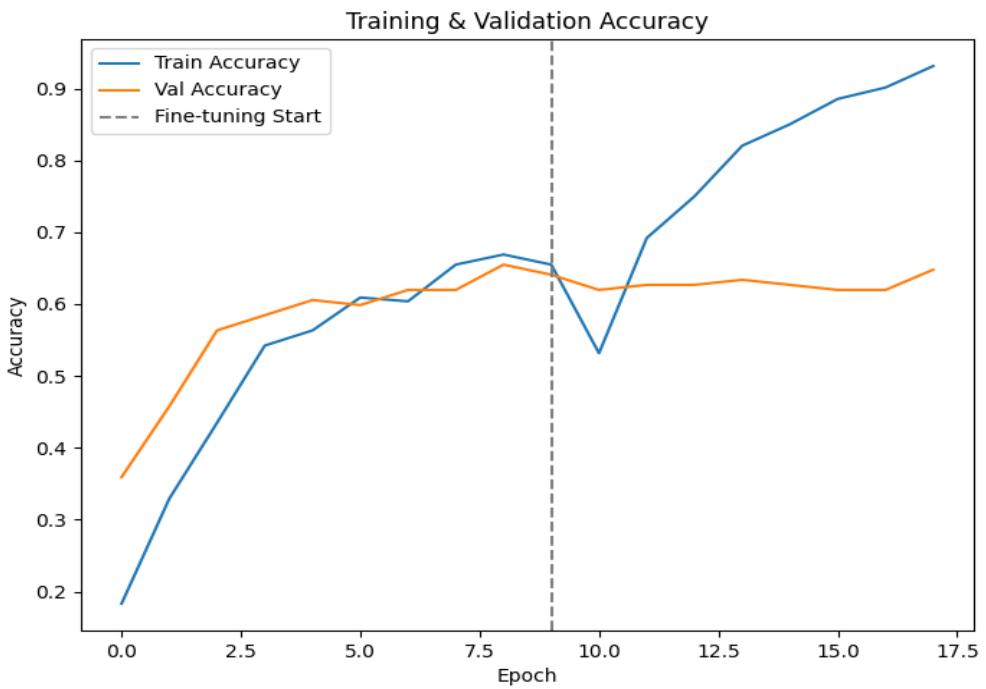
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]

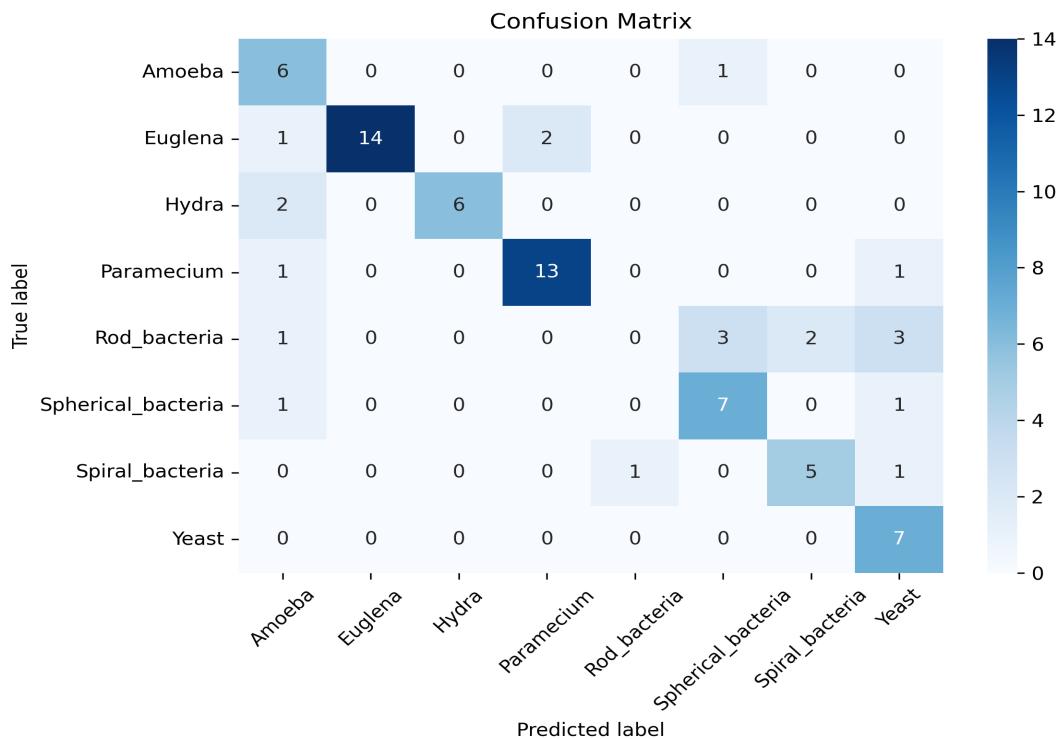
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.7342

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)
Gaussian Noise STD: 0.01
Salt-Pepper Noise Amount: 0.01
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using MobileNetV2, reintroduced salt and pepper + gaussian

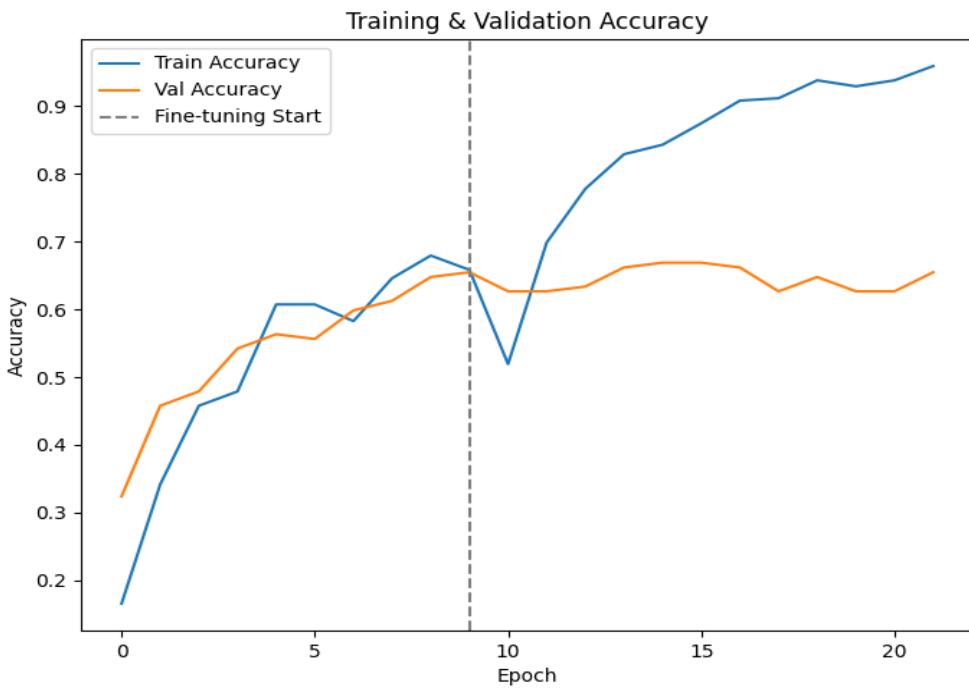
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)      ■ 0 ■
■ (GlobalAveragePooling2D)
[REDACTED]
[REDACTED]
■ dropout (Dropout)          ■ (None, 1280)      ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)             ■ (None, 8)        ■ 10,248 ■
[REDACTED]
[REDACTED]

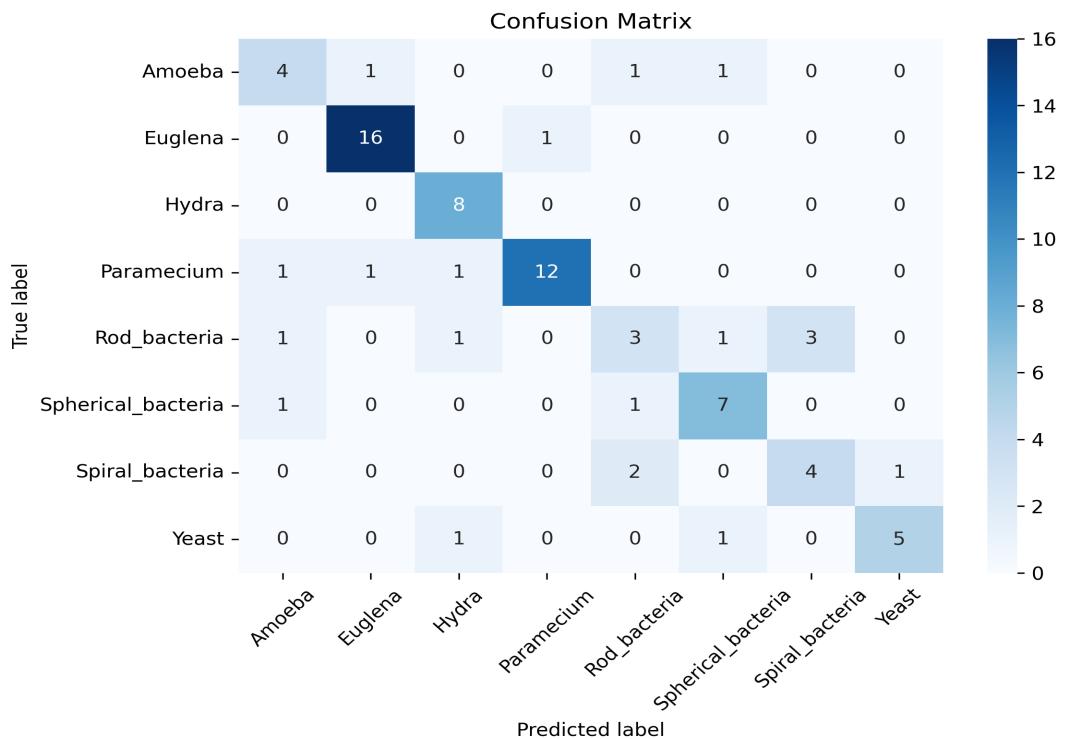
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.7468

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

Gaussian Noise STD: 0.05

Salt-Pepper Noise Amount: 0.05

Train Size: 568

Validation Size: 142

Test Size: 79

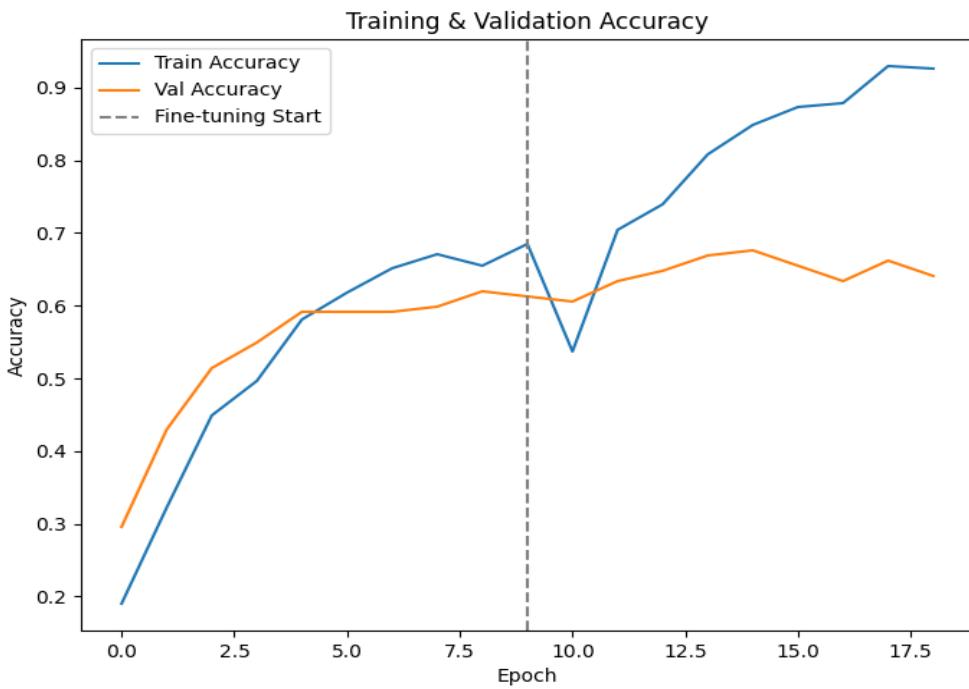
Comments: Using MobileNetV2, increased salt and pepper + gaussian

Model Summary:

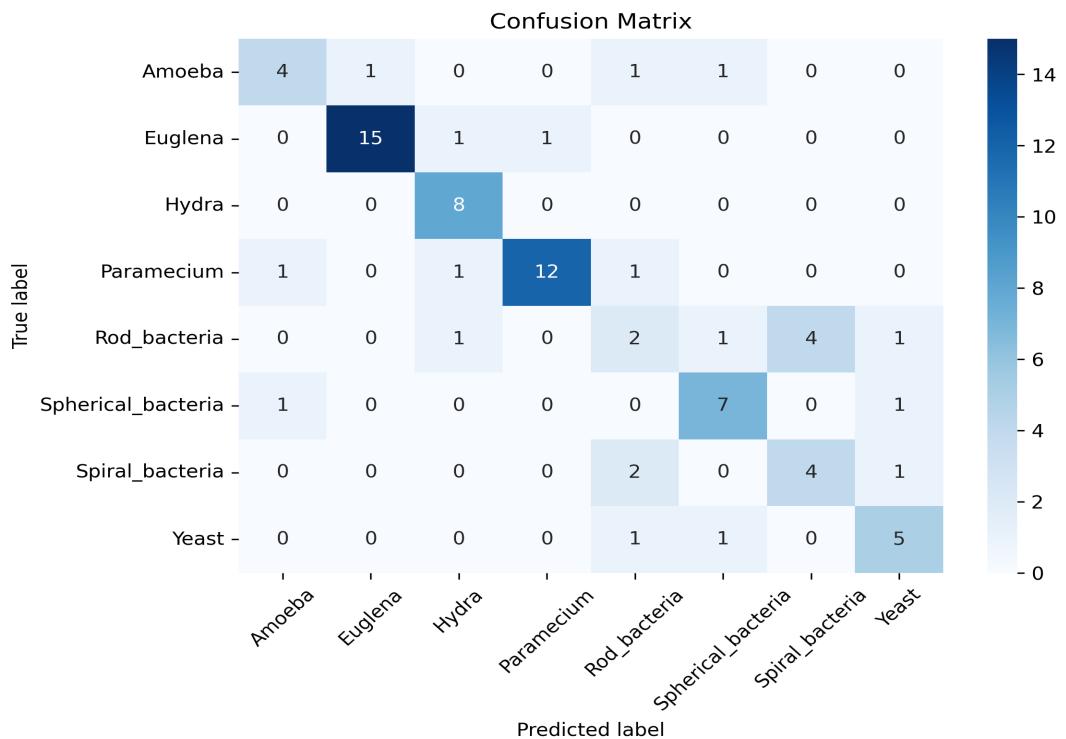
Model: "sequential_1"		
Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248
Total params: 5,998,937 (22.88 MB) Trainable params: 1,865,352 (7.12 MB) Non-trainable params: 402,880 (1.54 MB) Optimizer params: 3,730,705 (14.23 MB)		

Test Accuracy: 0.7215

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})
Gaussian Noise STD: 0.01
Salt-Pepper Noise Amount: 0.01
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using MobileNetV2, reduced salt and pepper + gaussian, increased brightness and contrast

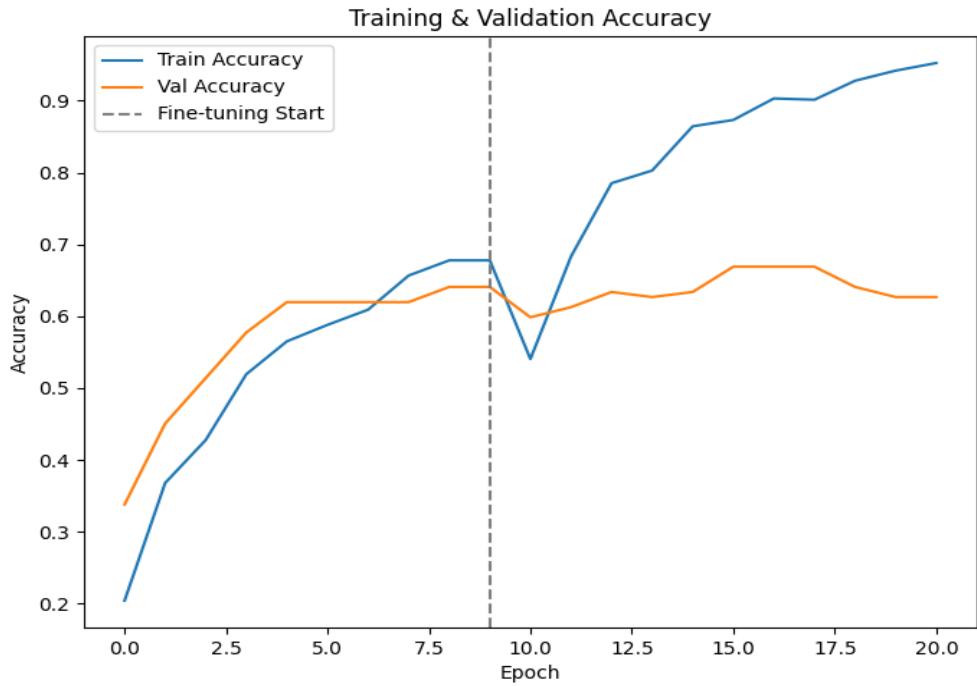
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d ■ (None, 1280) ■ 0 ■
■ (GlobalAveragePooling2D)
[REDACTED]
[REDACTED]
■ dropout (Dropout)       ■ (None, 1280) ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)          ■ (None, 8)    ■ 10,248 ■
[REDACTED]
[REDACTED]

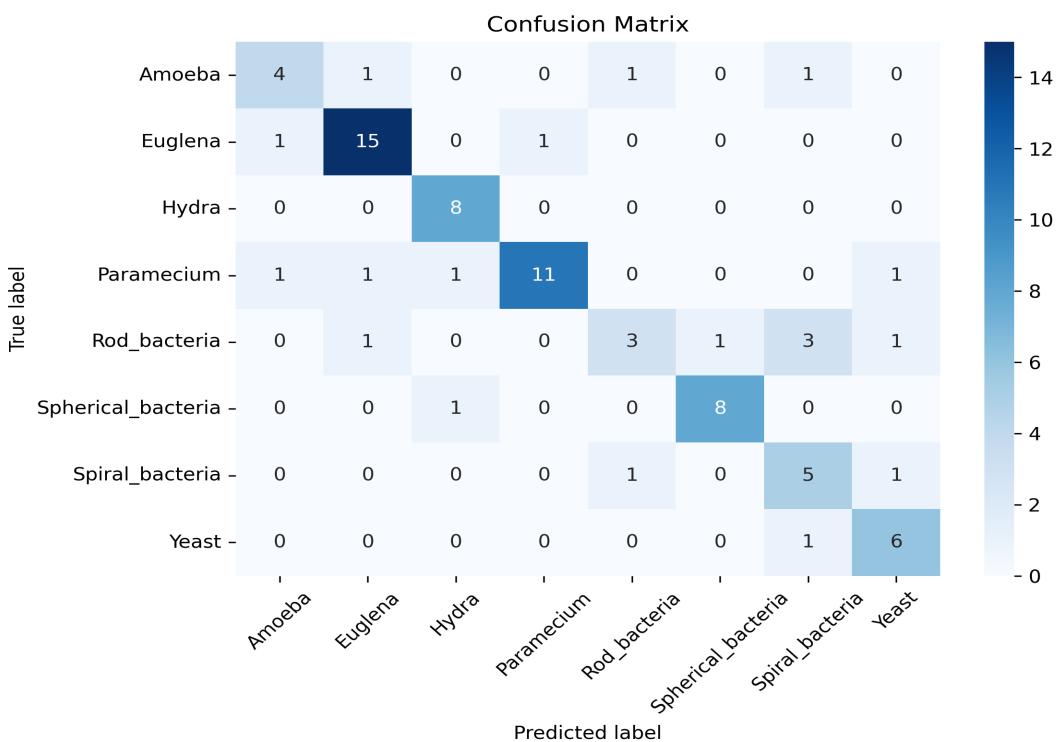
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.7595

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})

Gaussian Noise STD: 0.01

Salt-Pepper Noise Amount: 0.01

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Using MobileNetV2, stronger dropout

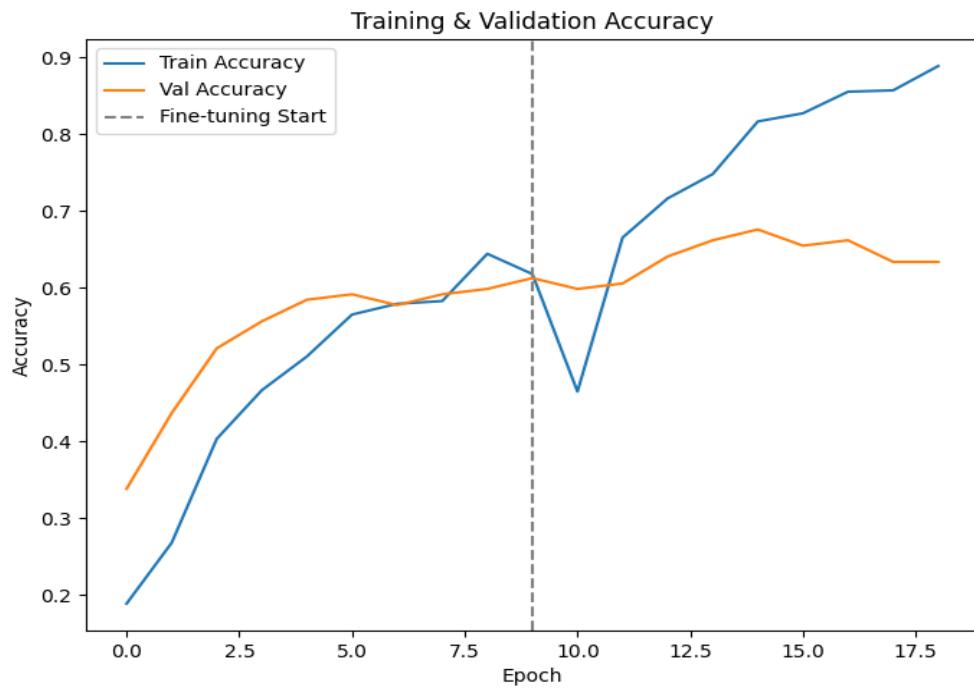
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)  ■ (None, 7, 7, 1280)  ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)      ■ 0 ■
■ (GlobalAveragePooling2D)
[REDACTED]
[REDACTED]
■ dropout (Dropout)          ■ (None, 1280)      ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)            ■ (None, 8)        ■ 10,248 ■
[REDACTED]
[REDACTED]

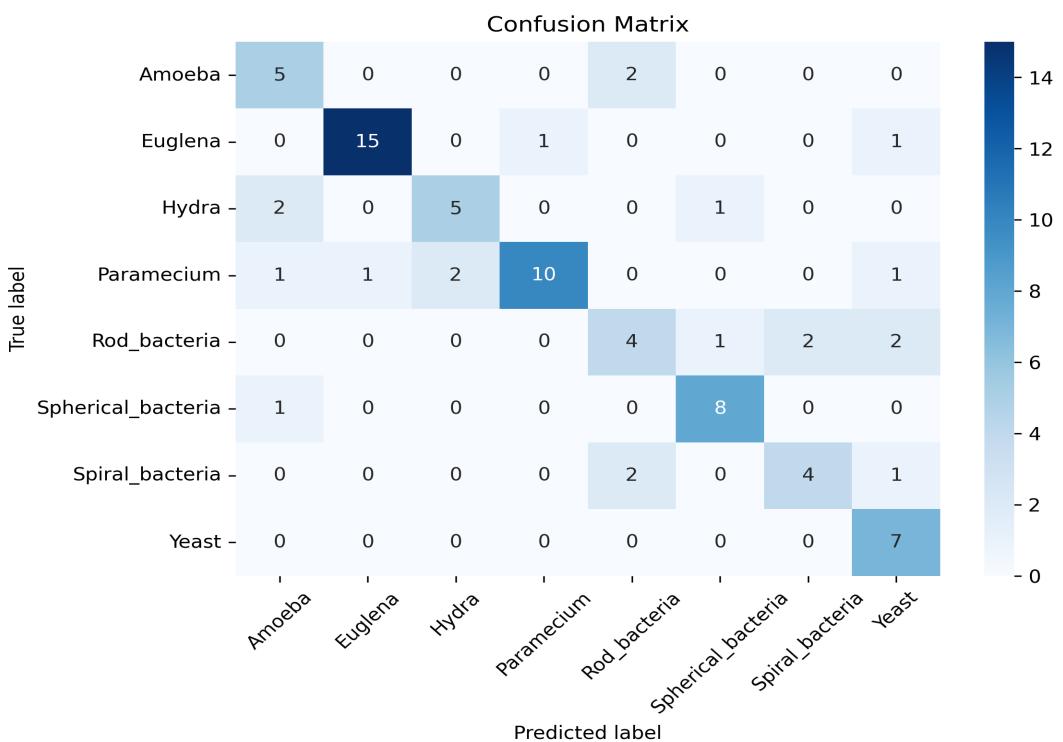
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.7342

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})

Gaussian Noise STD: 0.01

Salt-Pepper Noise Amount: 0.01

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Using MobileNetV2, increased zoom and rotation augmentation

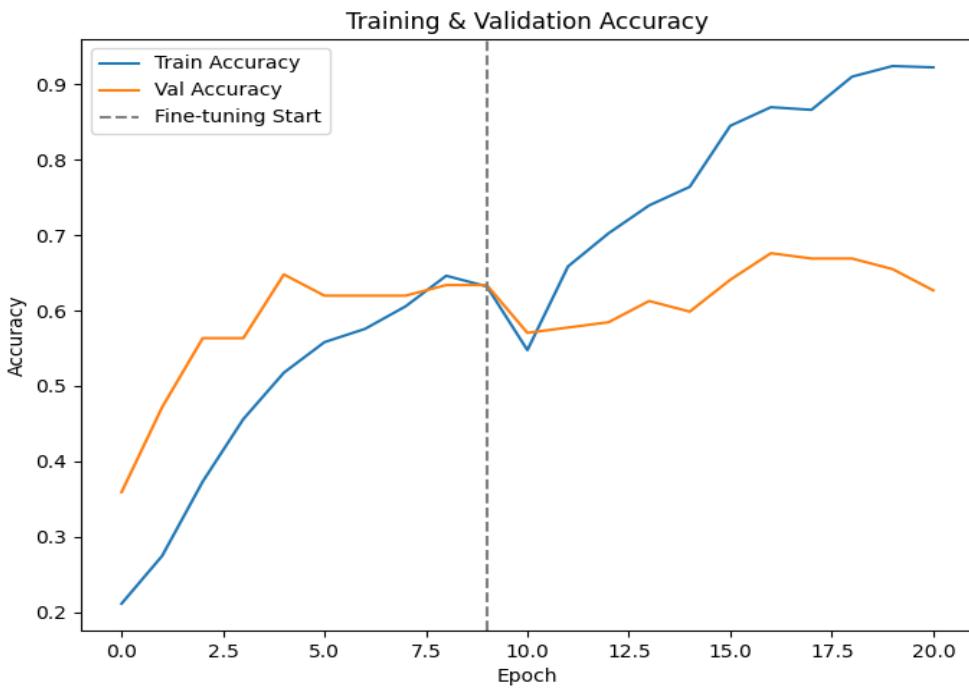
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

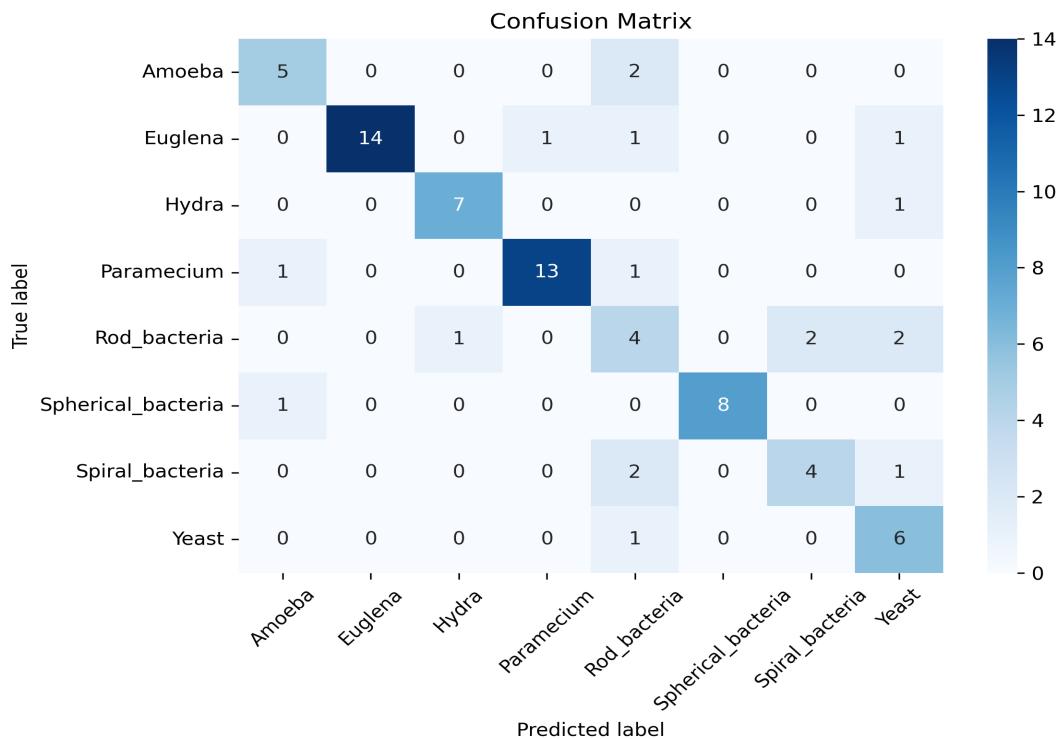
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)

Test Accuracy: 0.7722

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})

Gaussian Noise STD: 0.02

Salt-Pepper Noise Amount: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Comments: Using MobileNetV2, increased all augmentation

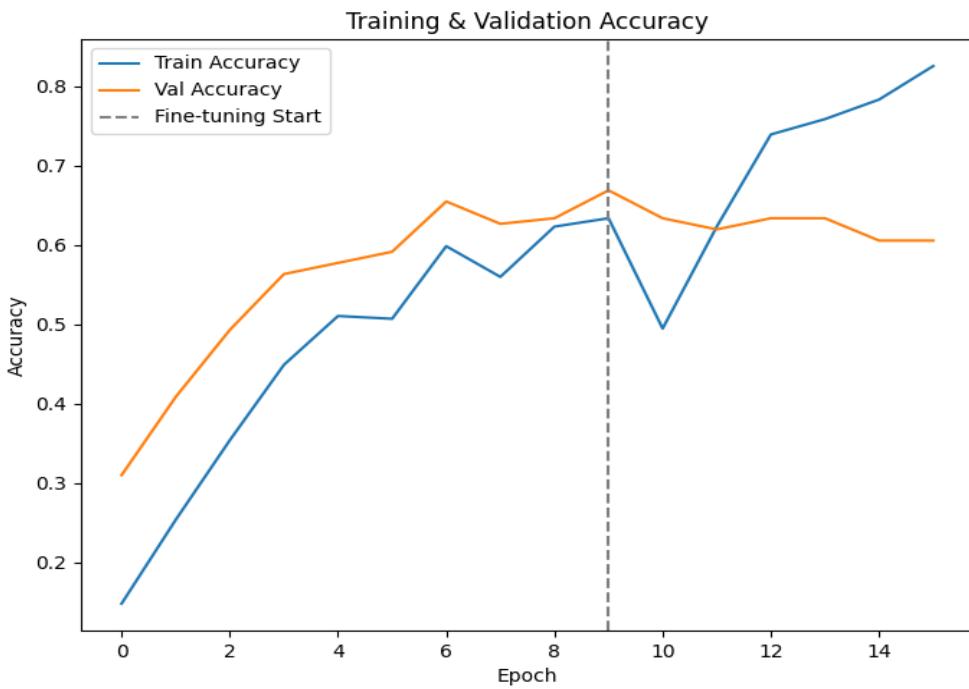
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

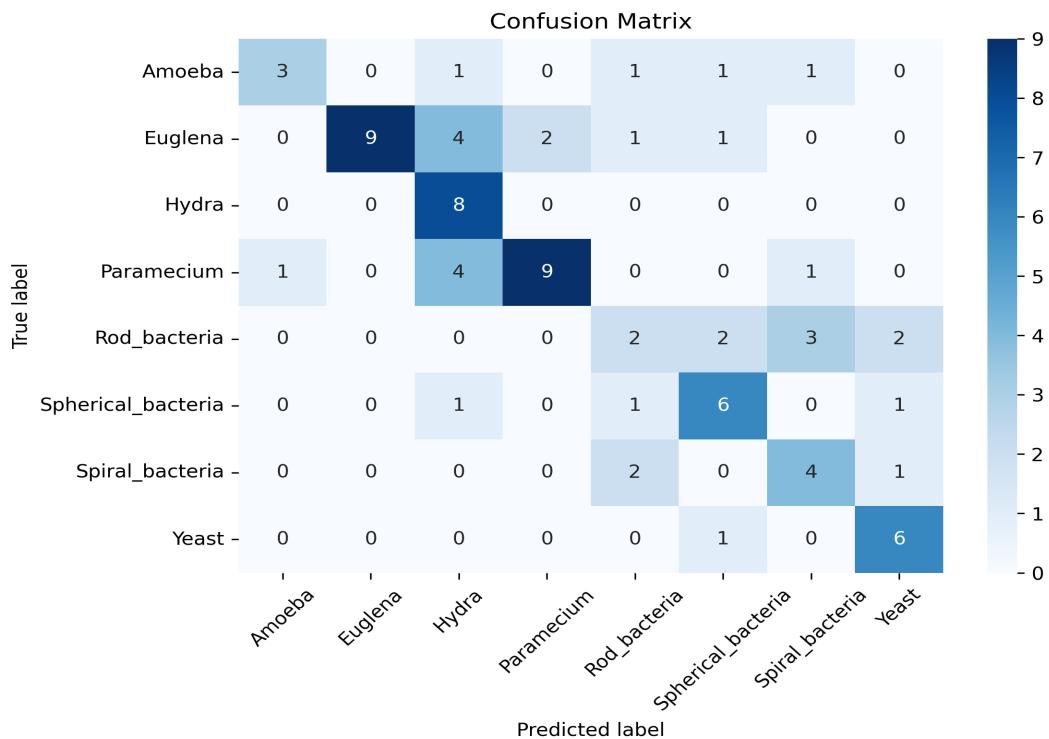
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)

Test Accuracy: 0.5949

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})
Gaussian Noise STD: 0.02
Salt-Pepper Noise Amount: 0.02
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using MobileNetV2, decreased zoom and rotation augmentation

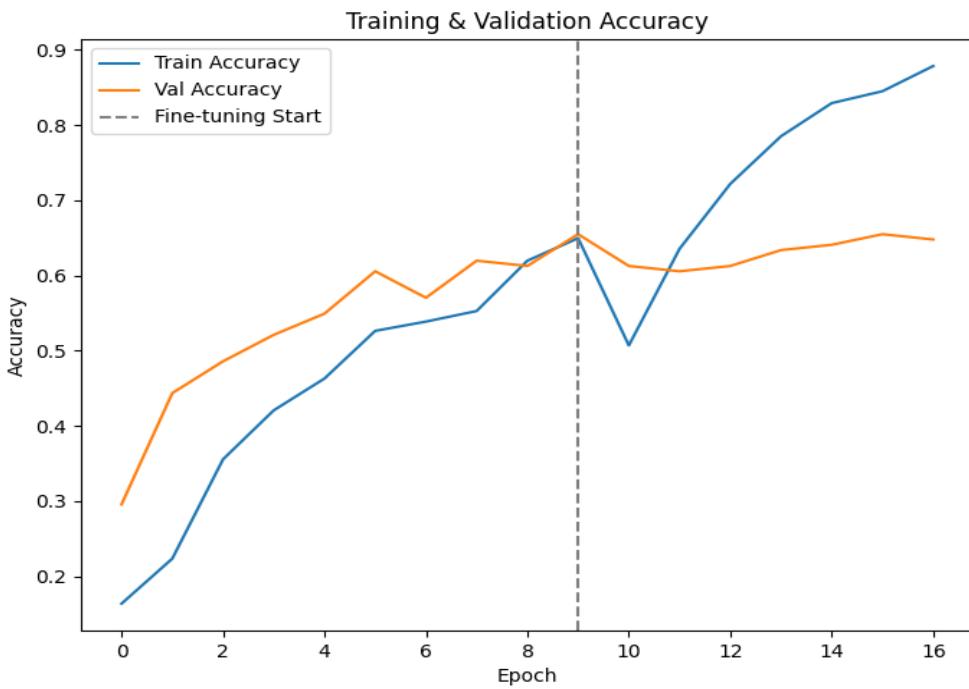
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]

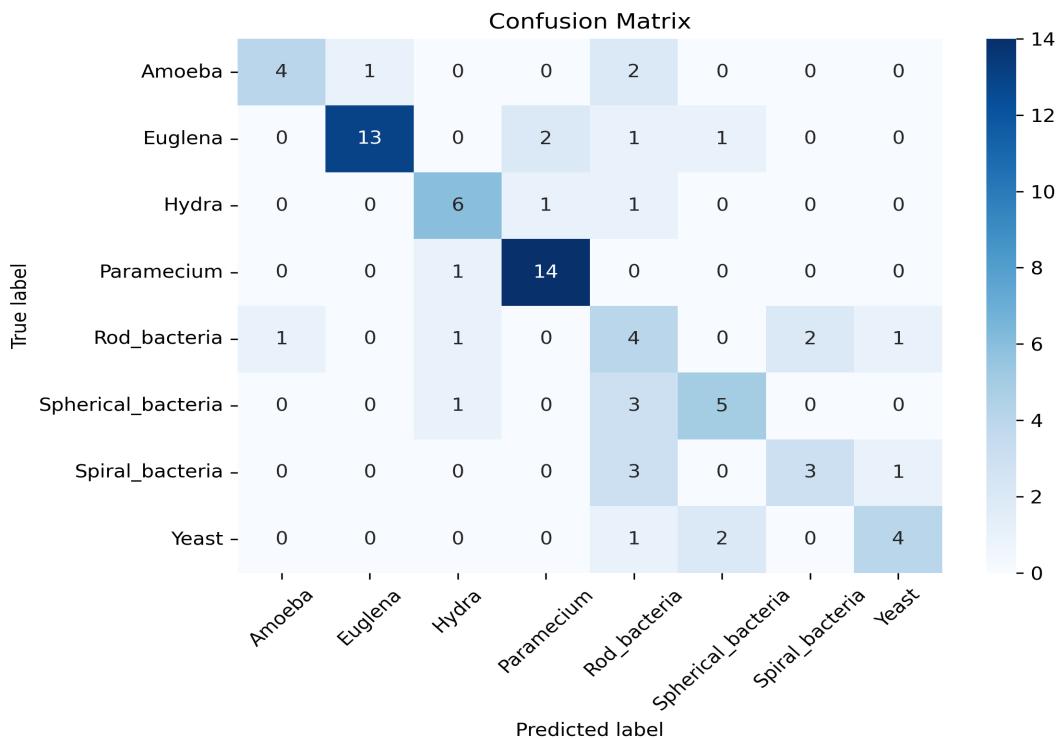
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.6709

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})
Gaussian Noise STD: 0.0
Salt-Pepper Noise Amount: 0.0
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using MobileNetV2, tweaked augmentation and removed gaussian + salt and pepper

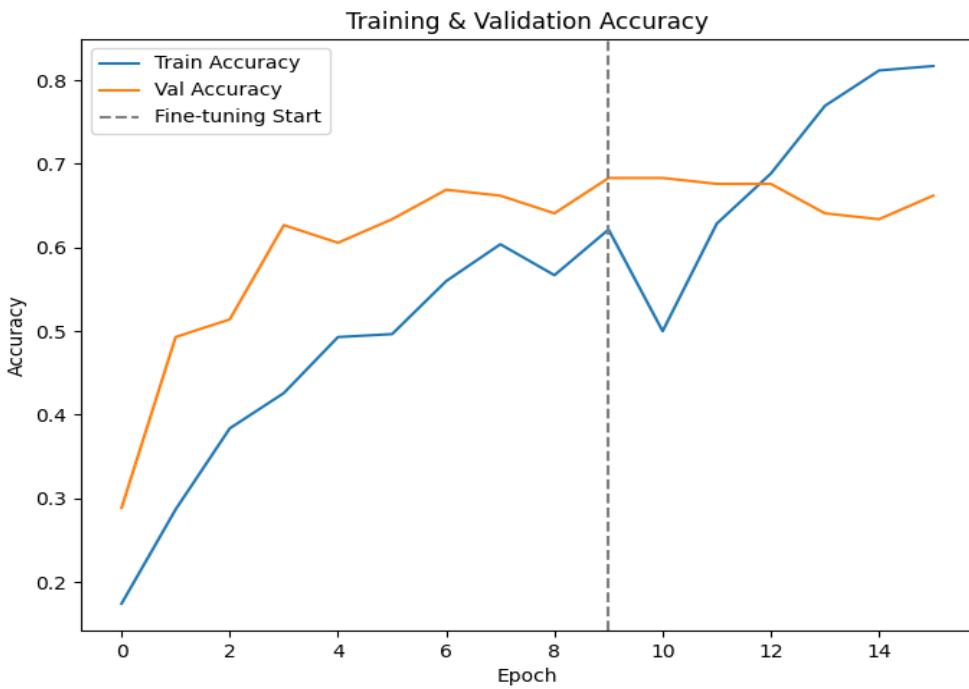
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

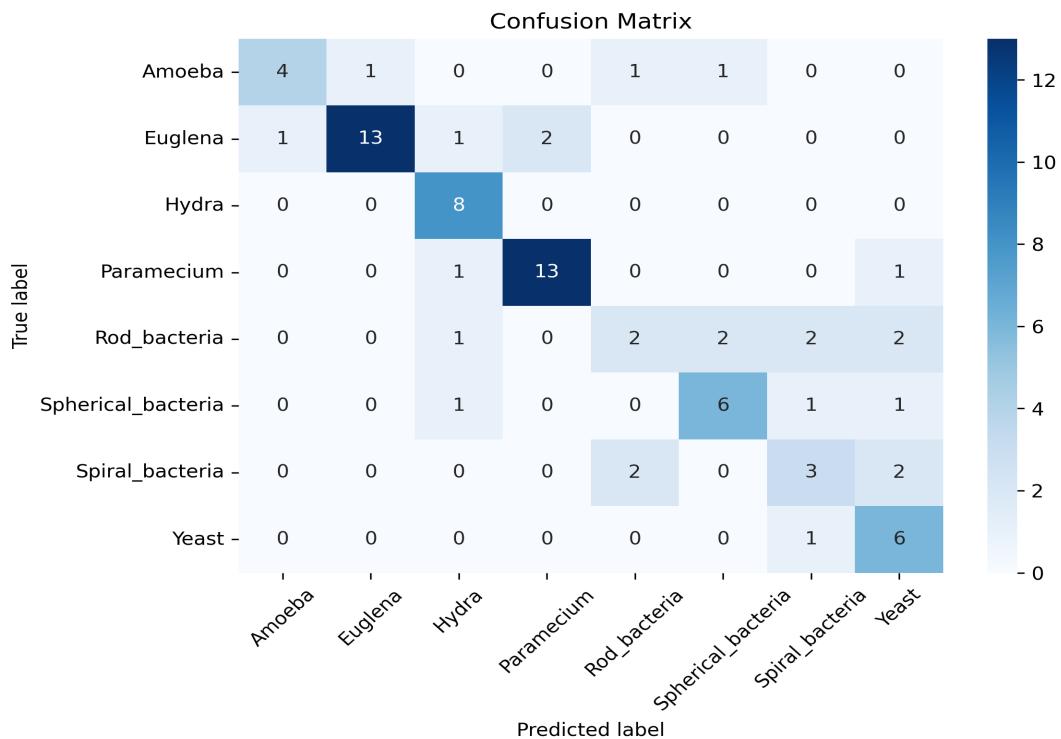
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.6962

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})
Gaussian Noise STD: 0.02
Salt-Pepper Noise Amount: 0.05
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using MobileNetV2, tweaked augmentation and increased gaussian + salt and pepper

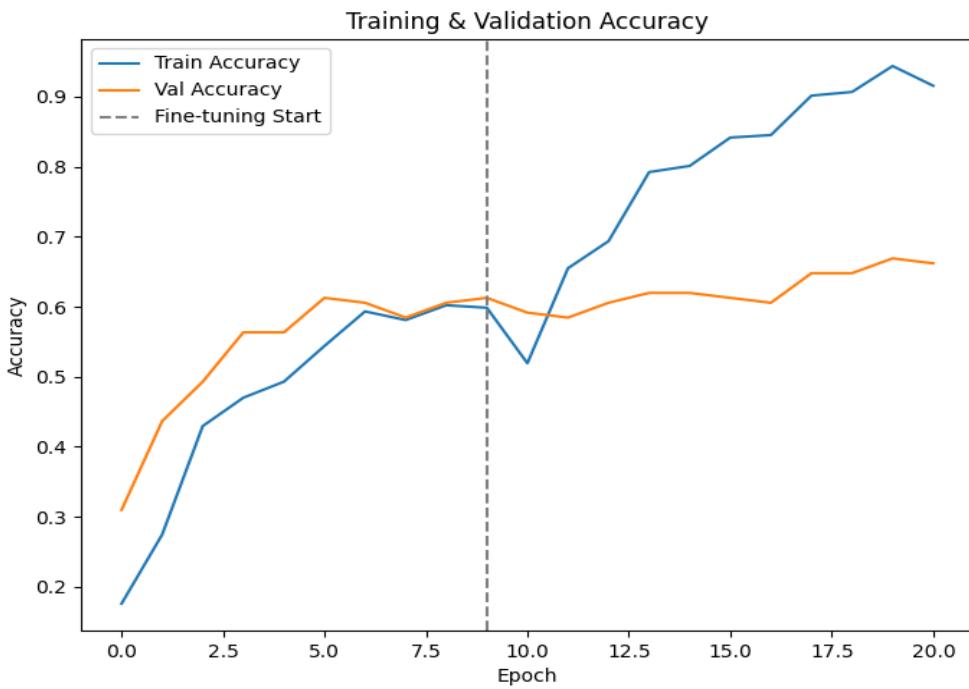
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)    ■ 0 ■
■ (GlobalAveragePooling2D)   ■                         ■
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)    ■ 0 ■
[REDACTED]
■ dense (Dense)           ■ (None, 8)       ■ 10,248 ■
[REDACTED]

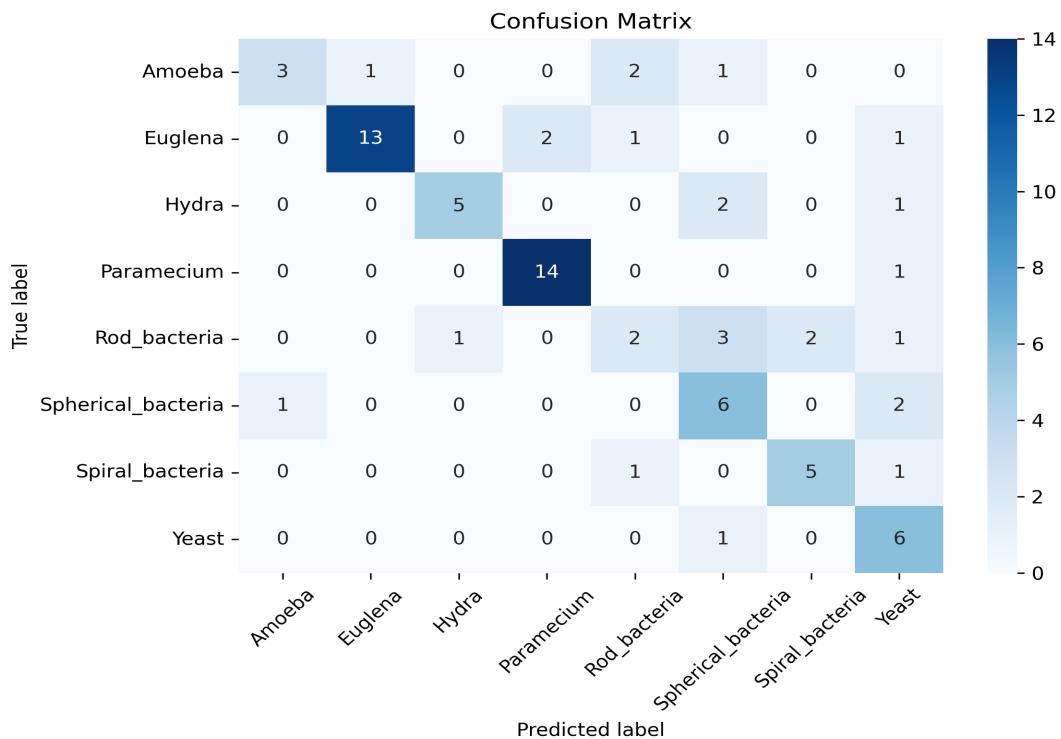
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.6835

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 64
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 10
Epochs: 30
Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})
Gaussian Noise STD: 0.02
Salt-Pepper Noise Amount: 0.05
Train Size: 568
Validation Size: 142
Test Size: 79
Comments: Using MobileNetV2, increased batch size

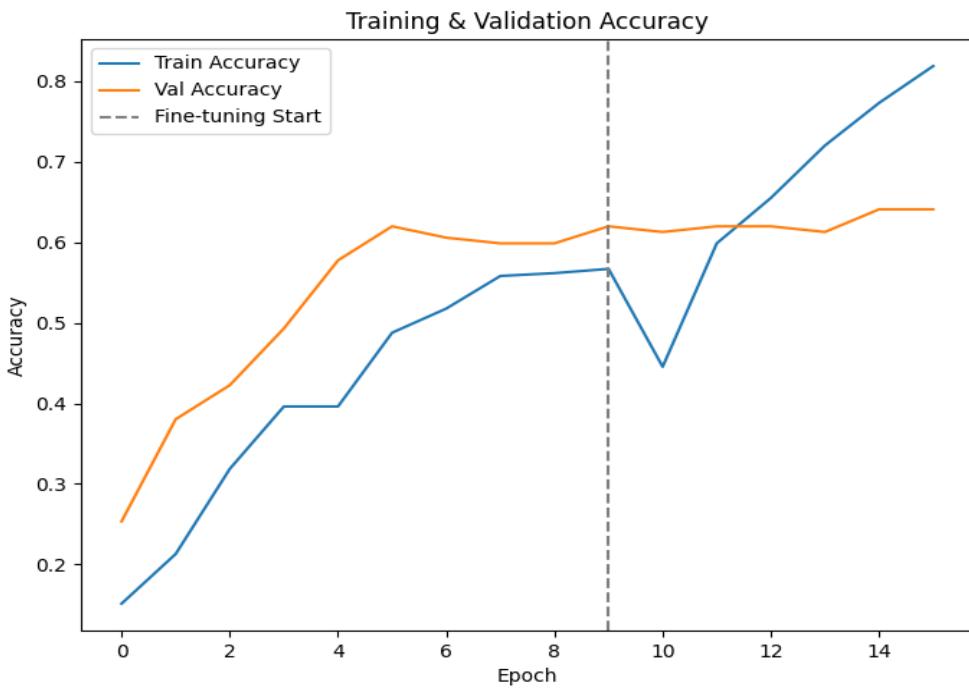
Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)    ■ 0 ■
■ (GlobalAveragePooling2D)   ■                         ■
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)    ■ 0 ■
[REDACTED]
■ dense (Dense)           ■ (None, 8)       ■ 10,248 ■
[REDACTED]

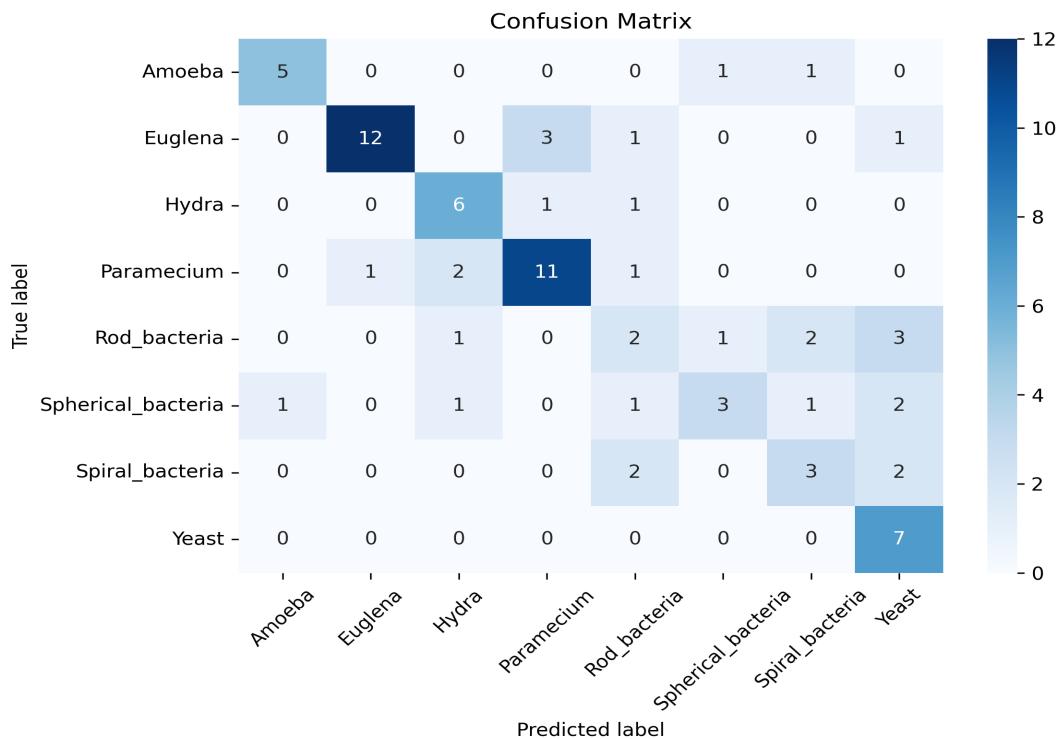
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.6203

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 16

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Epochs: 30

Data Augmentation: RandomFlip({FLIP}), RandomRotation({ROTATION} radians),
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})

Gaussian Noise STD: 0.02

Salt-Pepper Noise Amount: 0.05

Train Size: 568

Validation Size: 142

Test Size: 79

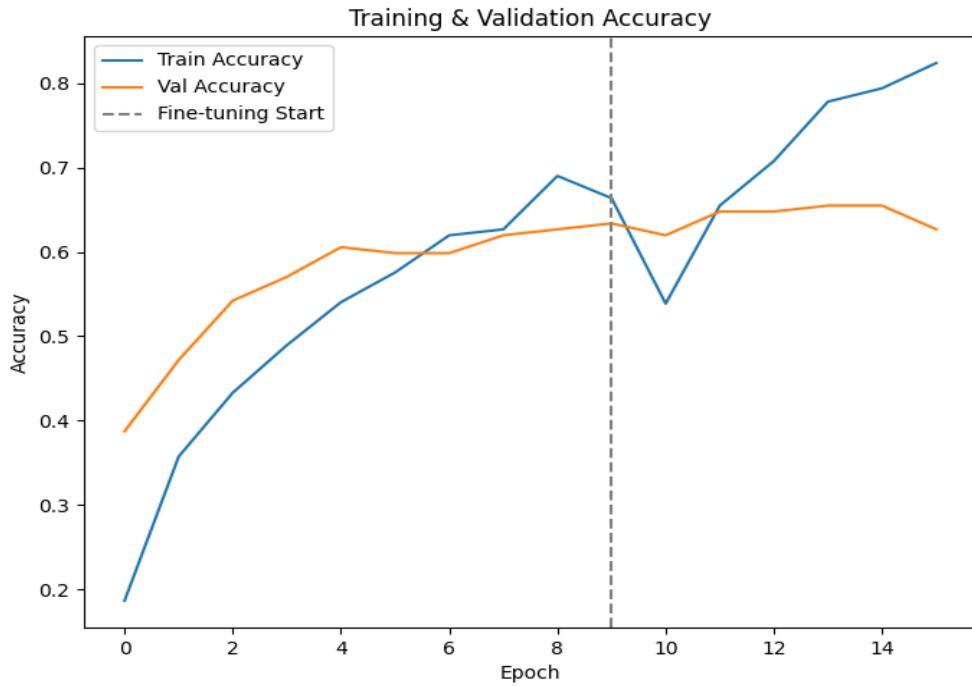
Comments: Using MobileNetV2, reduced batch size

Model Summary:

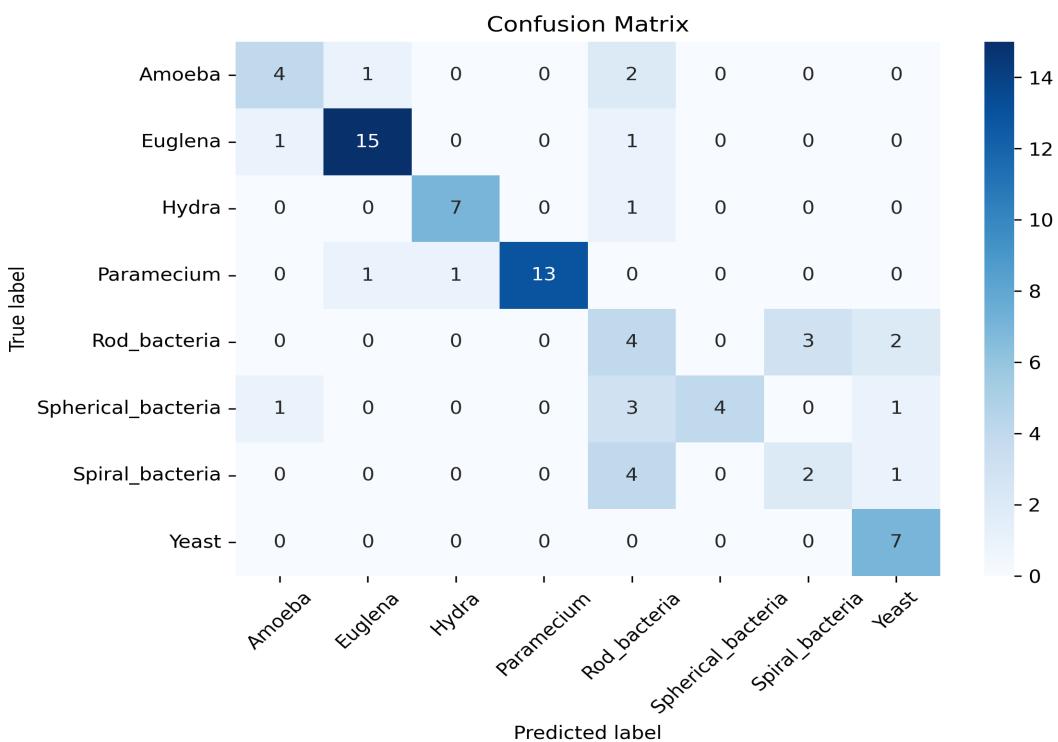
Model: "sequential_1"		
Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248
Total params: 5,998,937 (22.88 MB) Trainable params: 1,865,352 (7.12 MB) Non-trainable params: 402,880 (1.54 MB) Optimizer params: 3,730,705 (14.23 MB)		

Test Accuracy: 0.7089

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, improved data pipeline and added noise to preprocessing

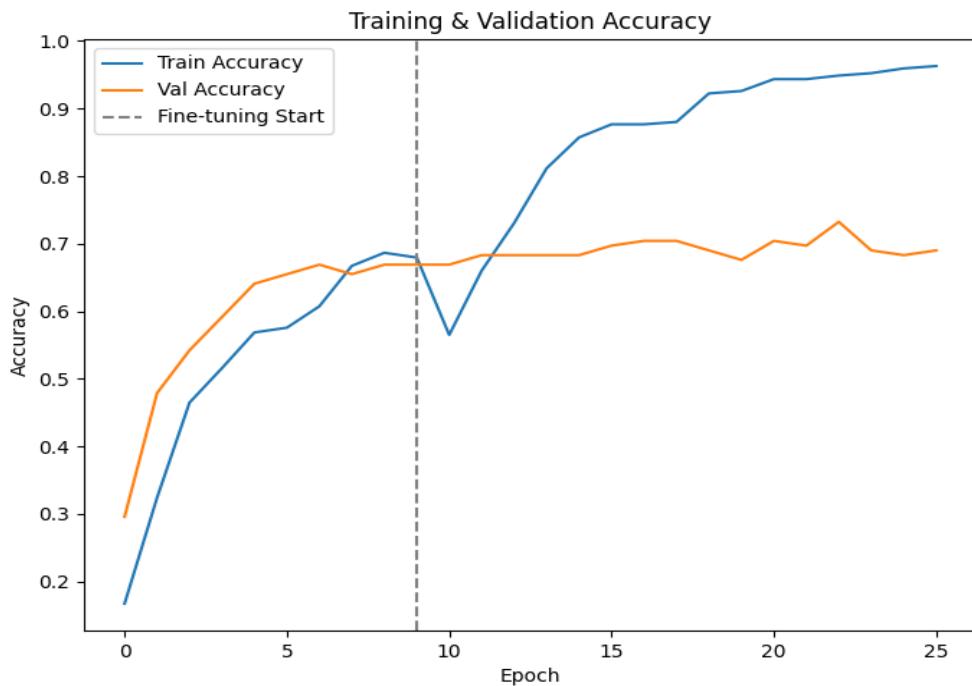
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

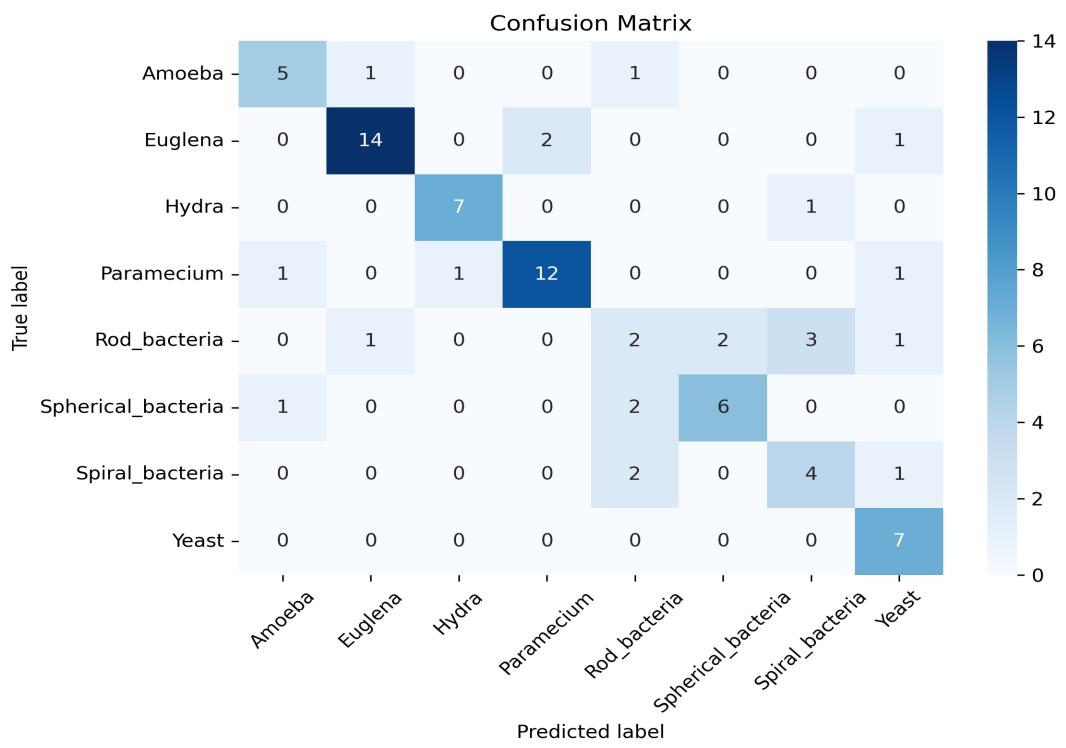
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)

Test Accuracy: 0.7215

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, increased base epochs

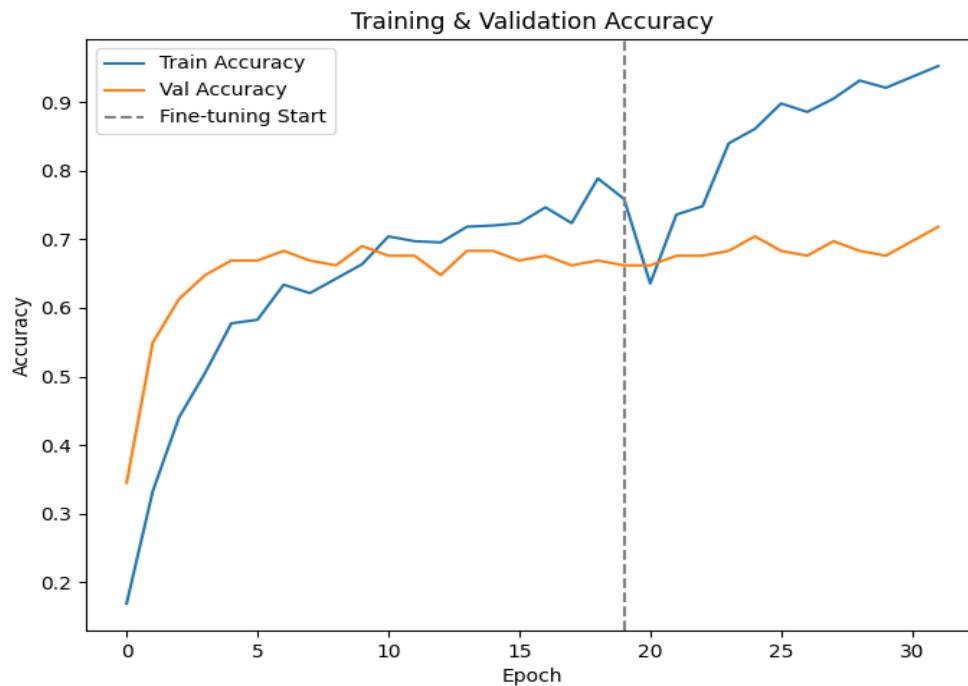
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

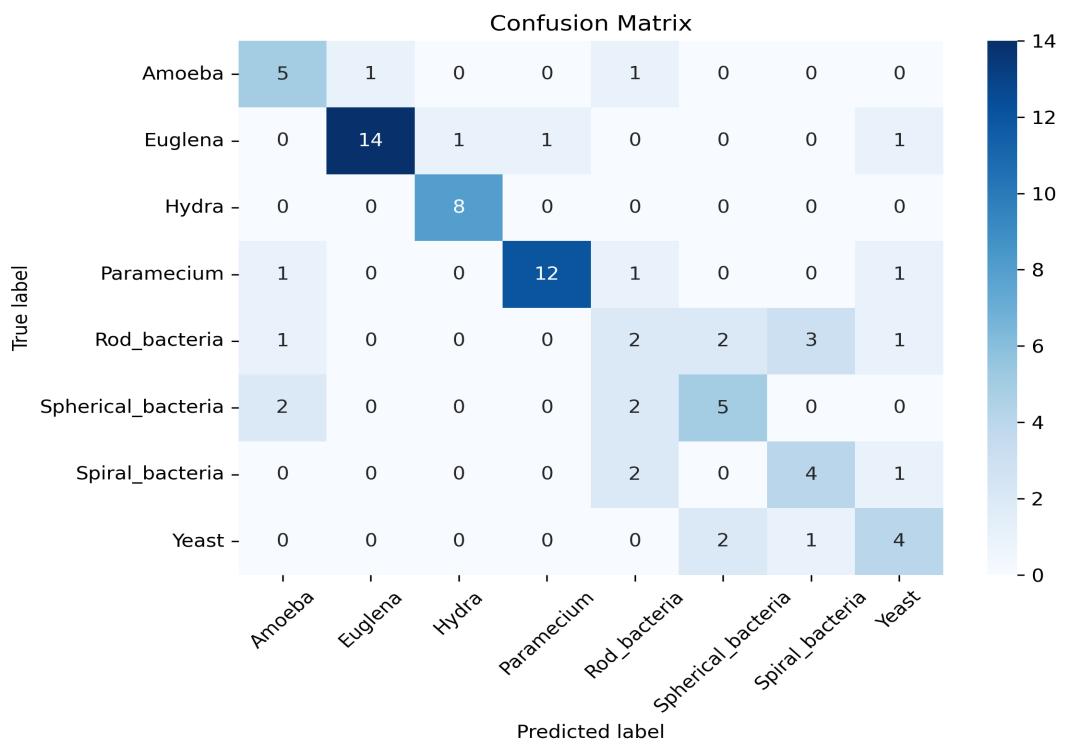
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)

Test Accuracy: 0.6835

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, reduced dropout rate and fine tune layers

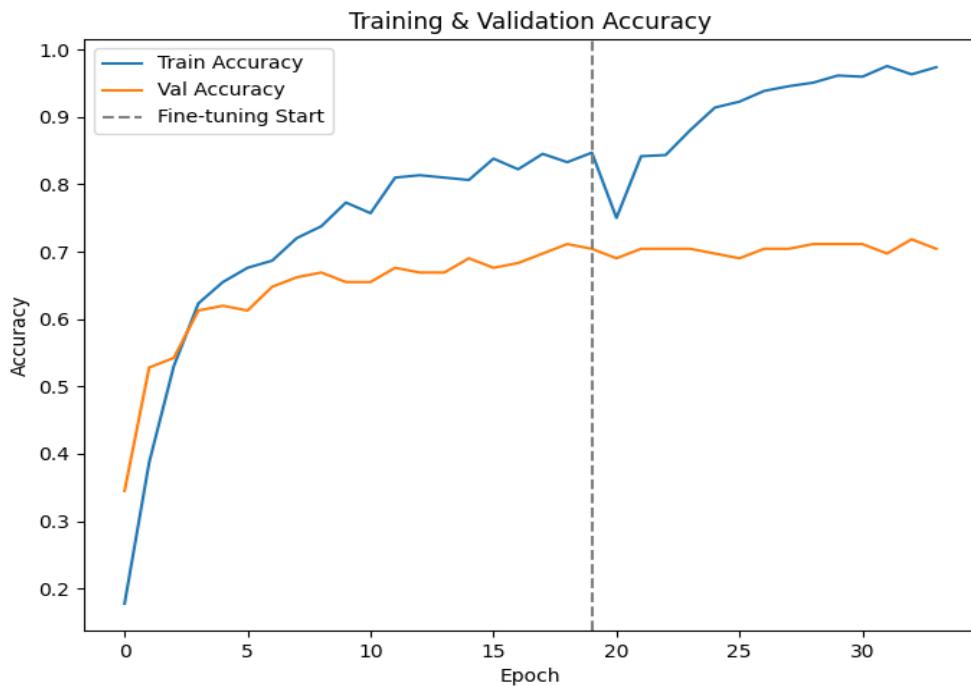
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

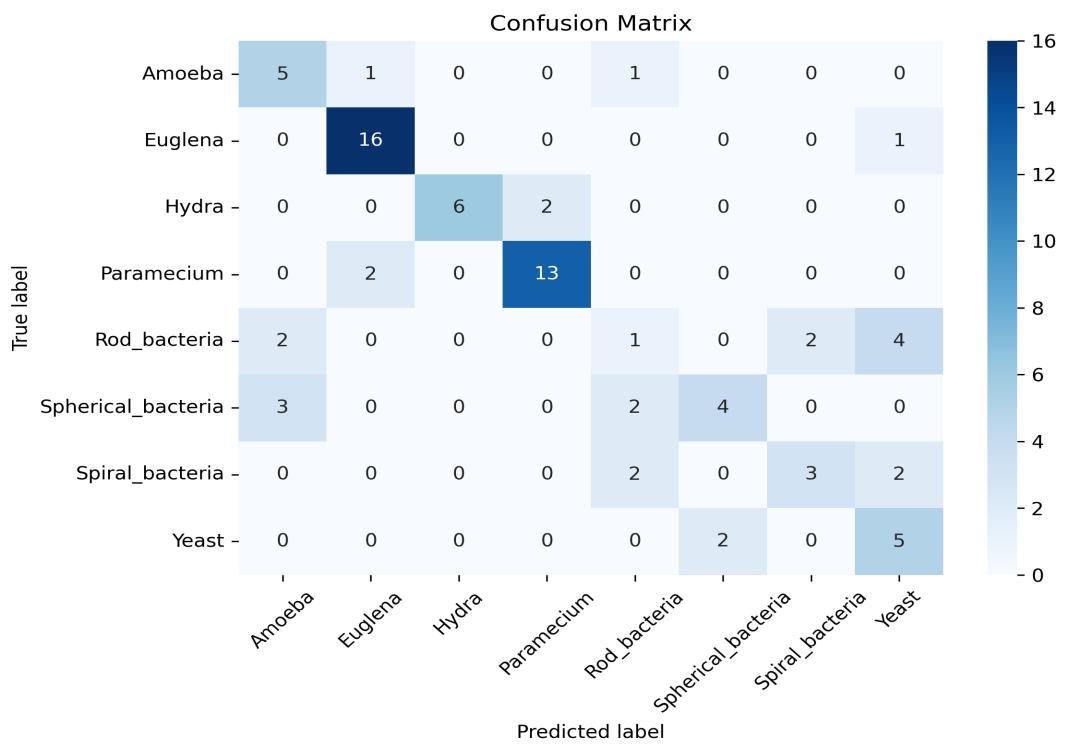
Total params: 4,700,889 (17.93 MB)
Trainable params: 1,216,328 (4.64 MB)
Non-trainable params: 1,051,904 (4.01 MB)
Optimizer params: 2,432,657 (9.28 MB)

Test Accuracy: 0.6709

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, increased dropout rate

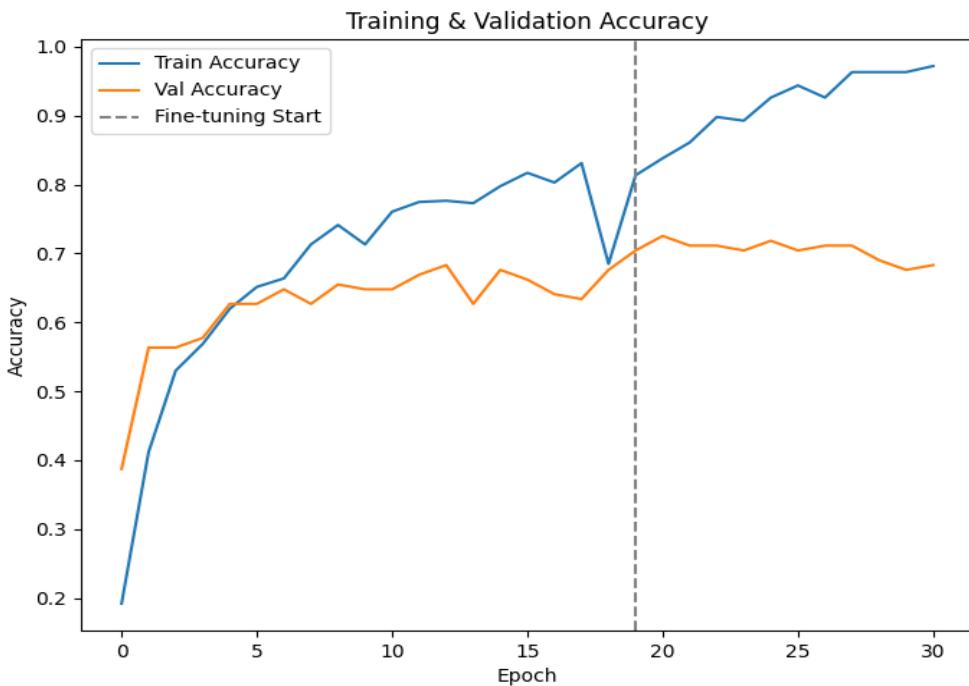
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

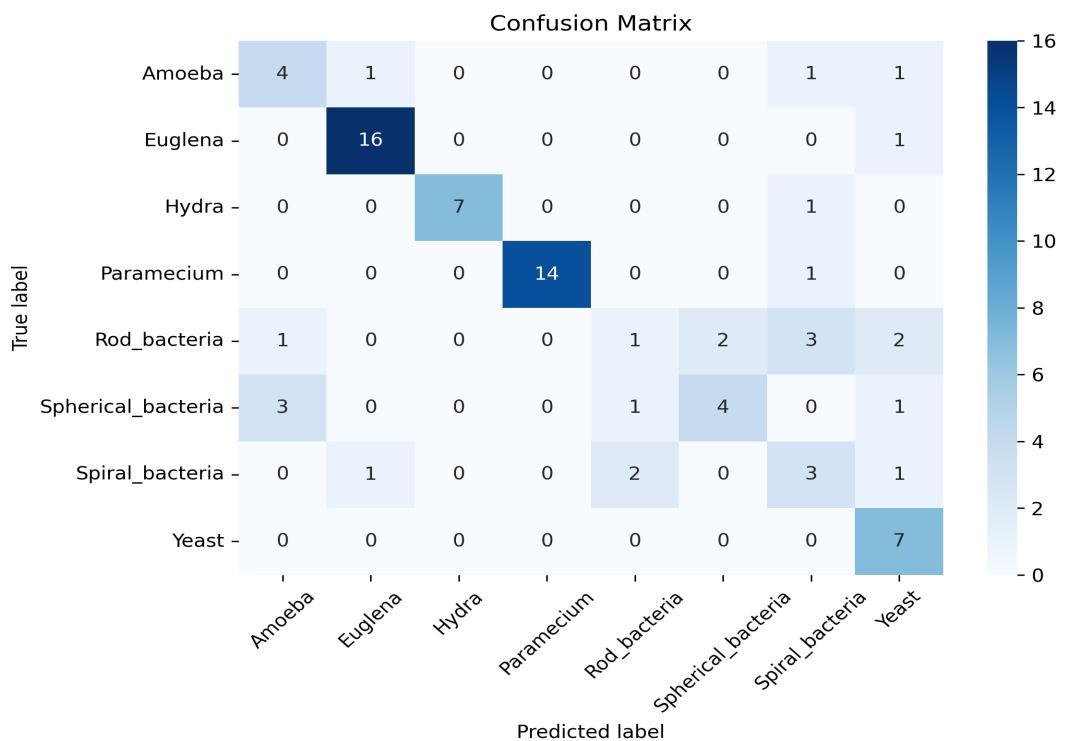
Total params: 4,700,889 (17.93 MB)
Trainable params: 1,216,328 (4.64 MB)
Non-trainable params: 1,051,904 (4.01 MB)
Optimizer params: 2,432,657 (9.28 MB)

Test Accuracy: 0.7089

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, increased dropout rate

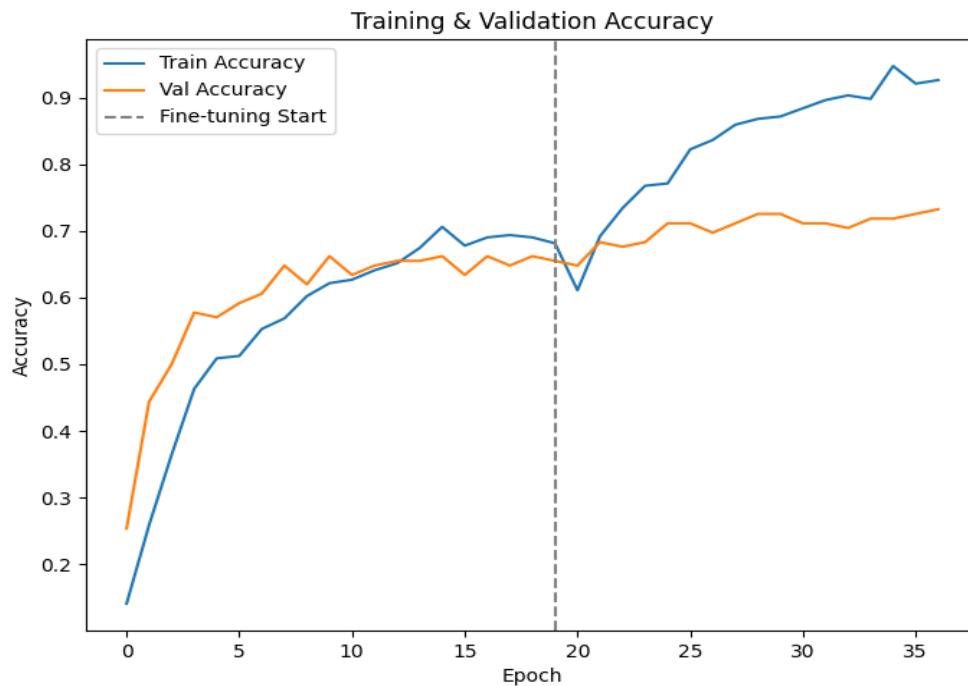
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

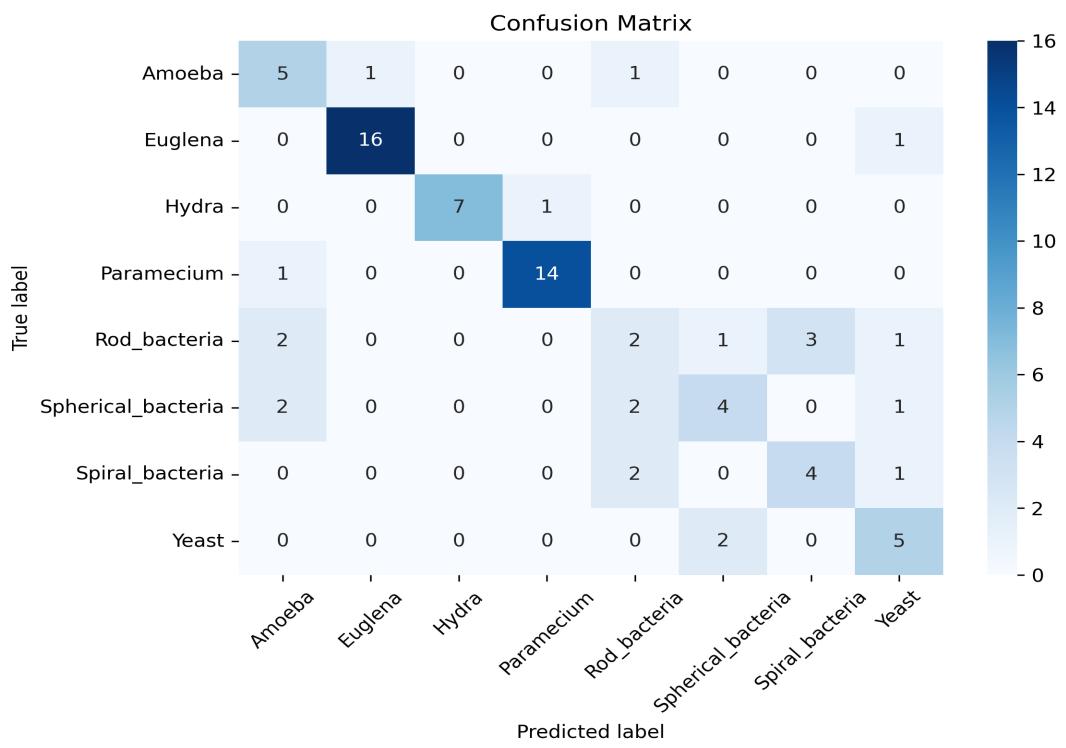
Total params: 4,700,889 (17.93 MB)
Trainable params: 1,216,328 (4.64 MB)
Non-trainable params: 1,051,904 (4.01 MB)
Optimizer params: 2,432,657 (9.28 MB)

Test Accuracy: 0.7215

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, increased dropout rate

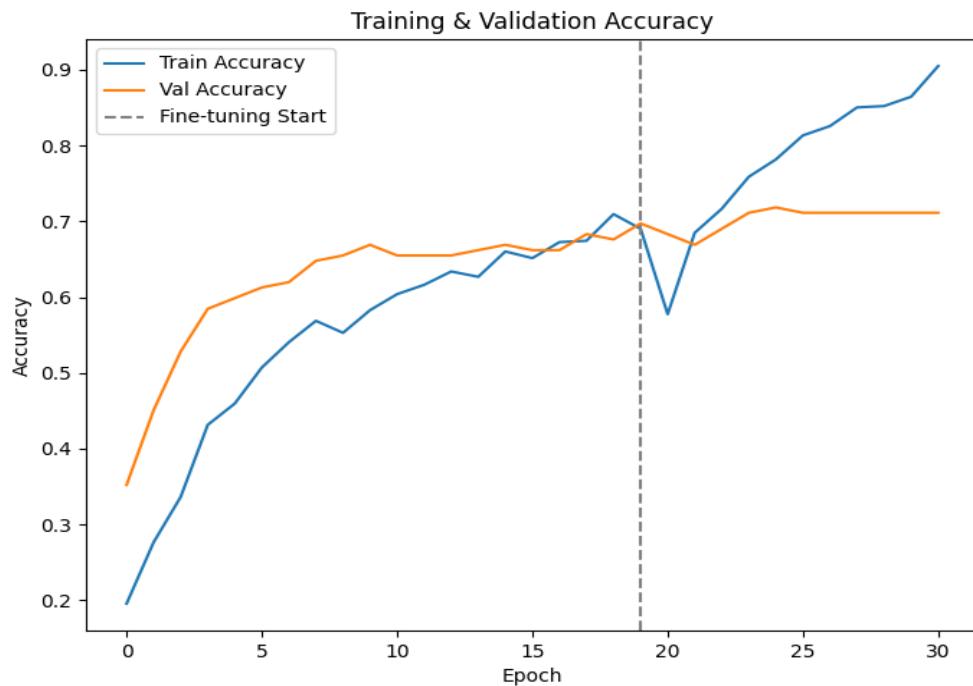
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

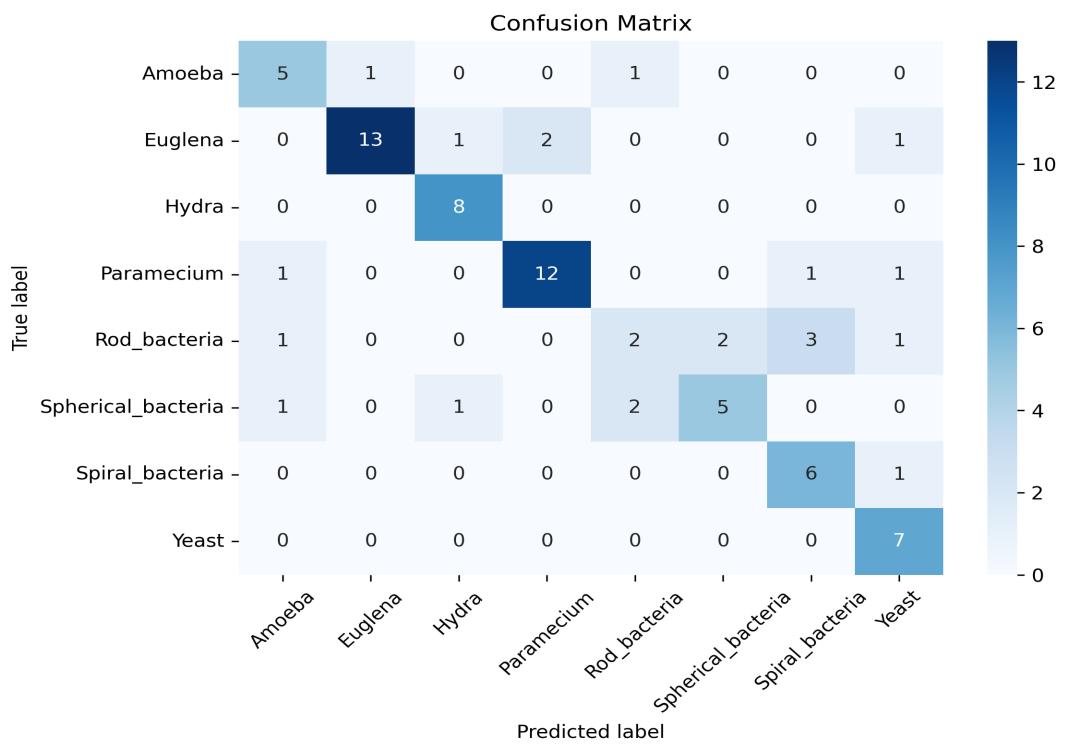
Total params: 4,700,889 (17.93 MB)
Trainable params: 1,216,328 (4.64 MB)
Non-trainable params: 1,051,904 (4.01 MB)
Optimizer params: 2,432,657 (9.28 MB)

Test Accuracy: 0.7342

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.02

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, decrease fine-tuning layers

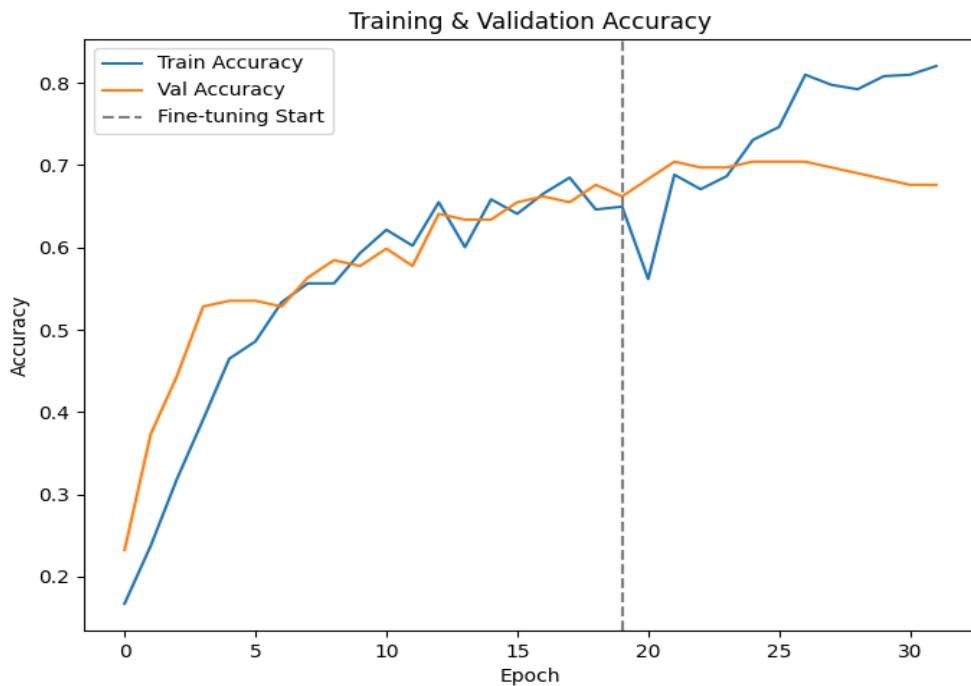
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

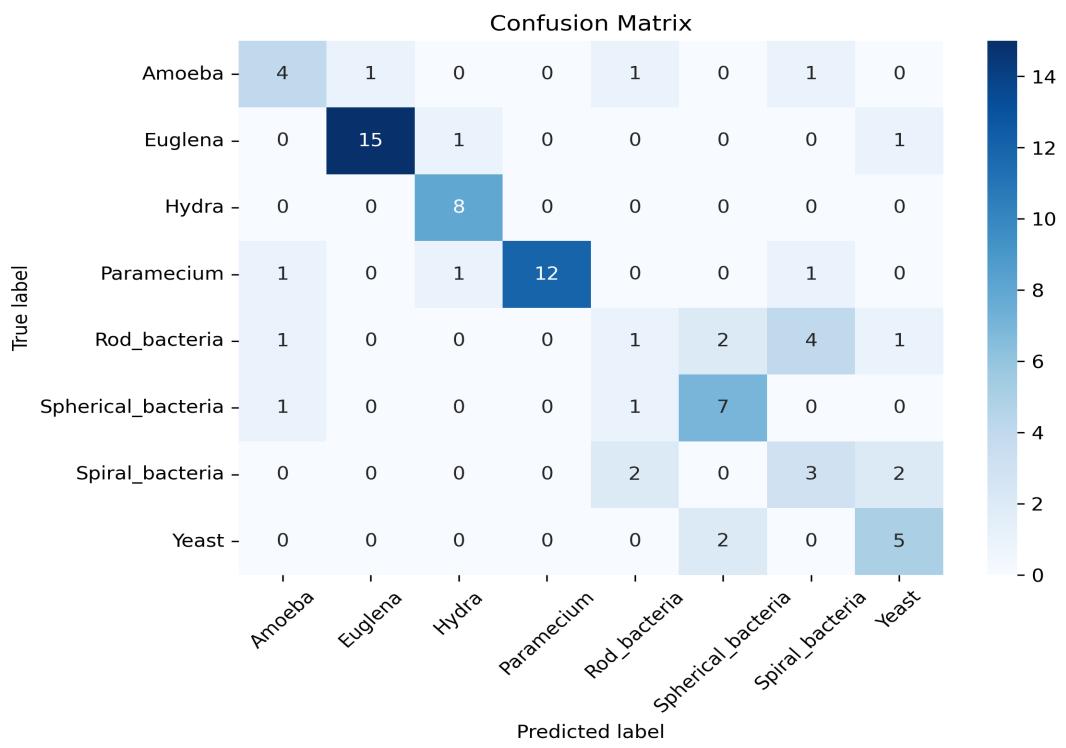
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.6962

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 20
Fine-tune Epochs: 30
Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda
RandomFlip Mode: horizontal
RandomRotation Factor: 0.15
RandomZoom Factor: 0.15
RandomContrast Factor: 0.2
RandomBrightness MaxDelta: 0.2
Gaussian Noise STD: 0.02
Train Size: 568
Validation Size: 142
Test Size: 79
Optimizer (Base): Adam
Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)
Early Stopping Patience: 10
Comments: Using MobileNetV2, decrease dropout

Model Summary:

Model: "sequential"

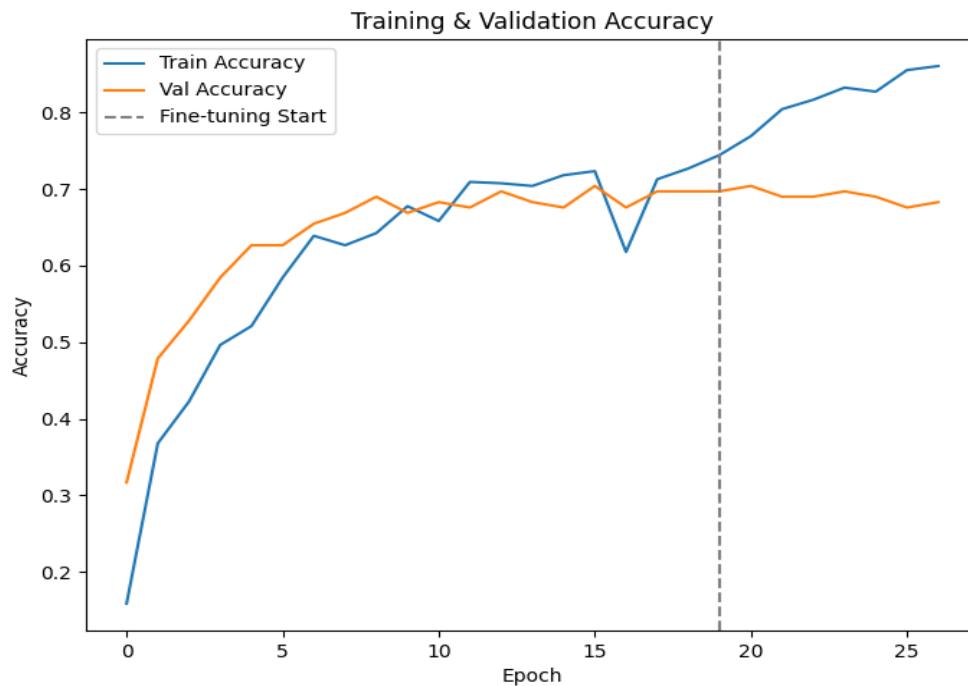
The diagram shows a Keras model summary with the following layers:

- Layer (type): mobilenetv2_1.00_224 (Functional)
- Output Shape: (None, 7, 7, 1280)
- Param #: 2,257,984
- Layer (type): global_average_pooling2d (GlobalAveragePooling2D)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dropout (Dropout)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dense (Dense)
- Output Shape: (None, 8)
- Param #: 10,248

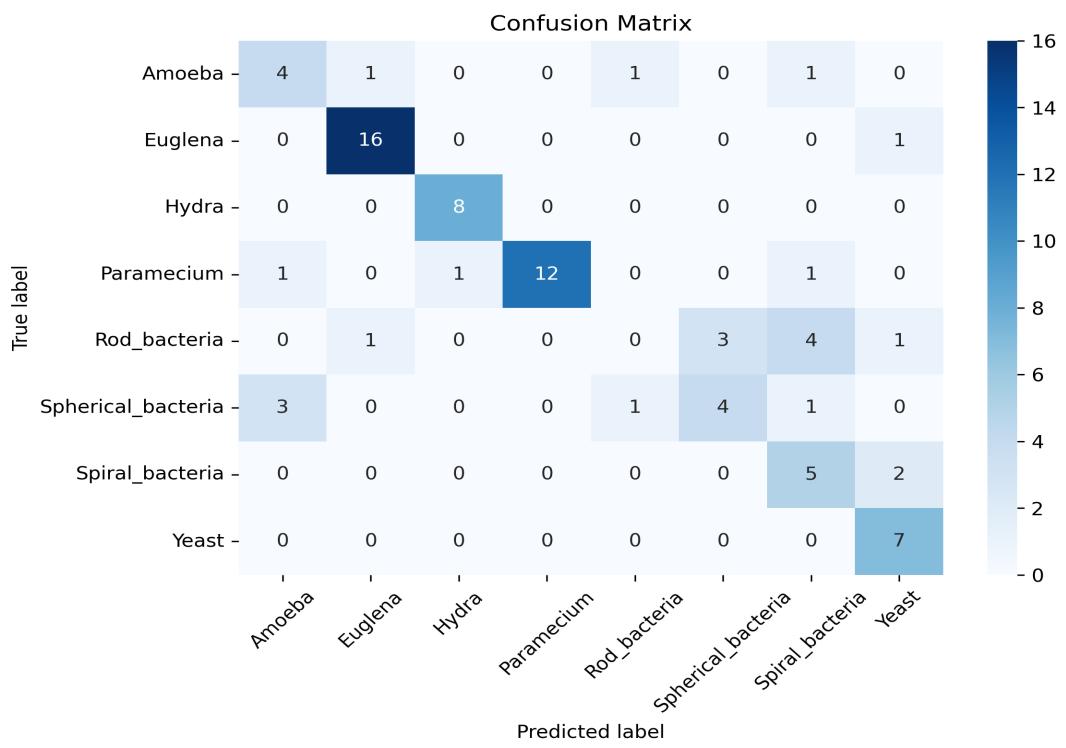
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.7089

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.005

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, reduce gaussian std

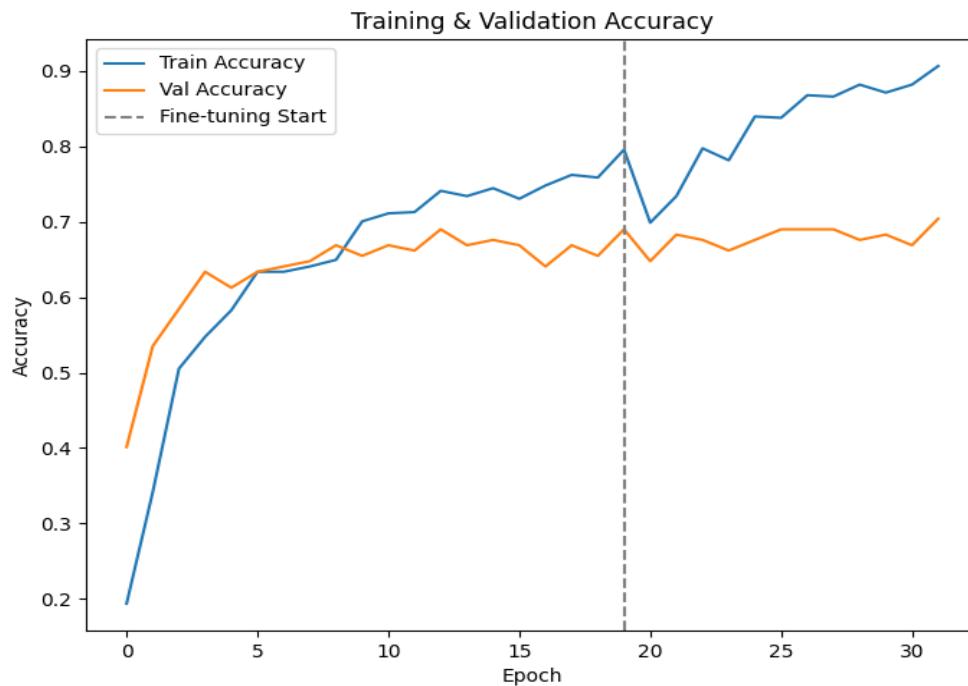
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

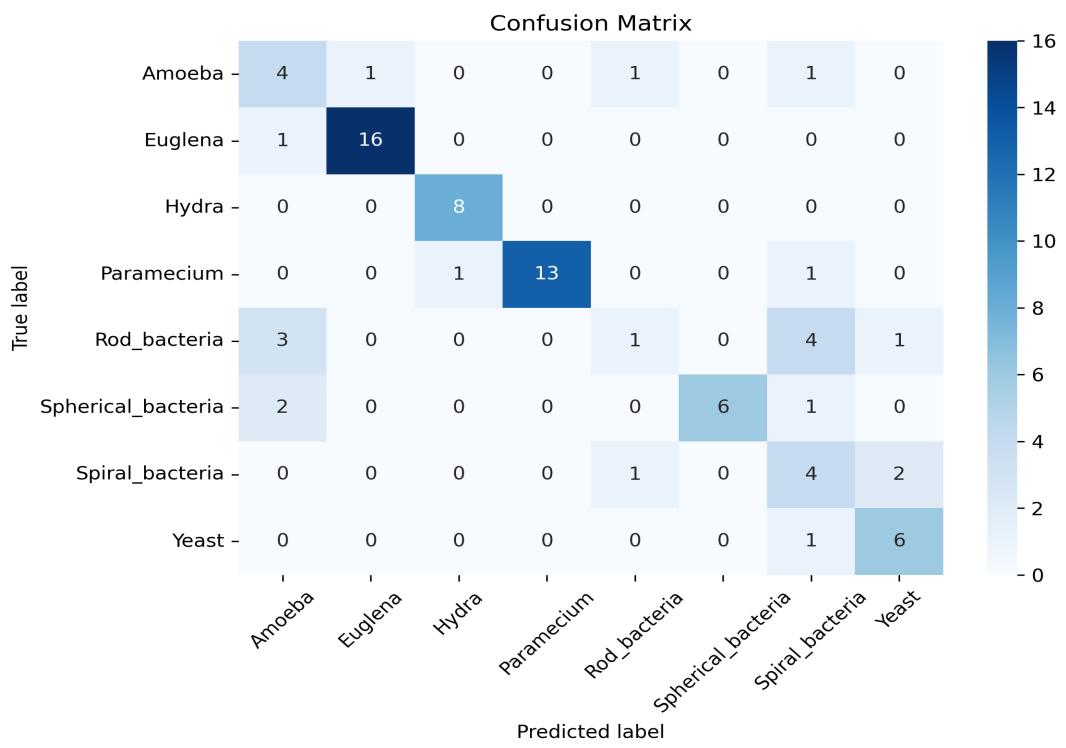
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.7342

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 20
Fine-tune Epochs: 30
Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda
RandomFlip Mode: horizontal
RandomRotation Factor: 0.15
RandomZoom Factor: 0.15
RandomContrast Factor: 0.2
RandomBrightness MaxDelta: 0.2
Gaussian Noise STD: 0.005
Train Size: 568
Validation Size: 142
Test Size: 79
Optimizer (Base): Adam
Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)
Early Stopping Patience: 10
Comments: Using MobileNetV2, reduce gaussian std

Model Summary:

Model: "sequential"

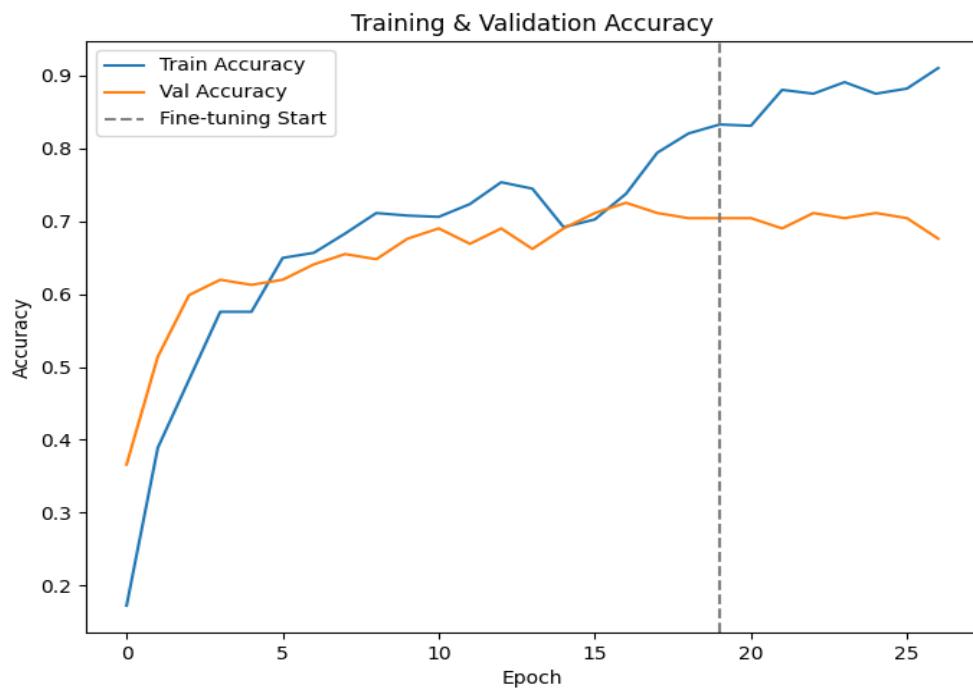
The diagram shows a Keras model summary with the following layers:

- Layer (type): mobilenetv2_1.00_224 (Functional) - Output Shape: (None, 7, 7, 1280) - Param #: 2,257,984
- Layer (type): global_average_pooling2d (GlobalAveragePooling2D) - Output Shape: (None, 1280) - Param #: 0
- Layer (type): dropout (Dropout) - Output Shape: (None, 1280) - Param #: 0
- Layer (type): dense (Dense) - Output Shape: (None, 8) - Param #: 10,248

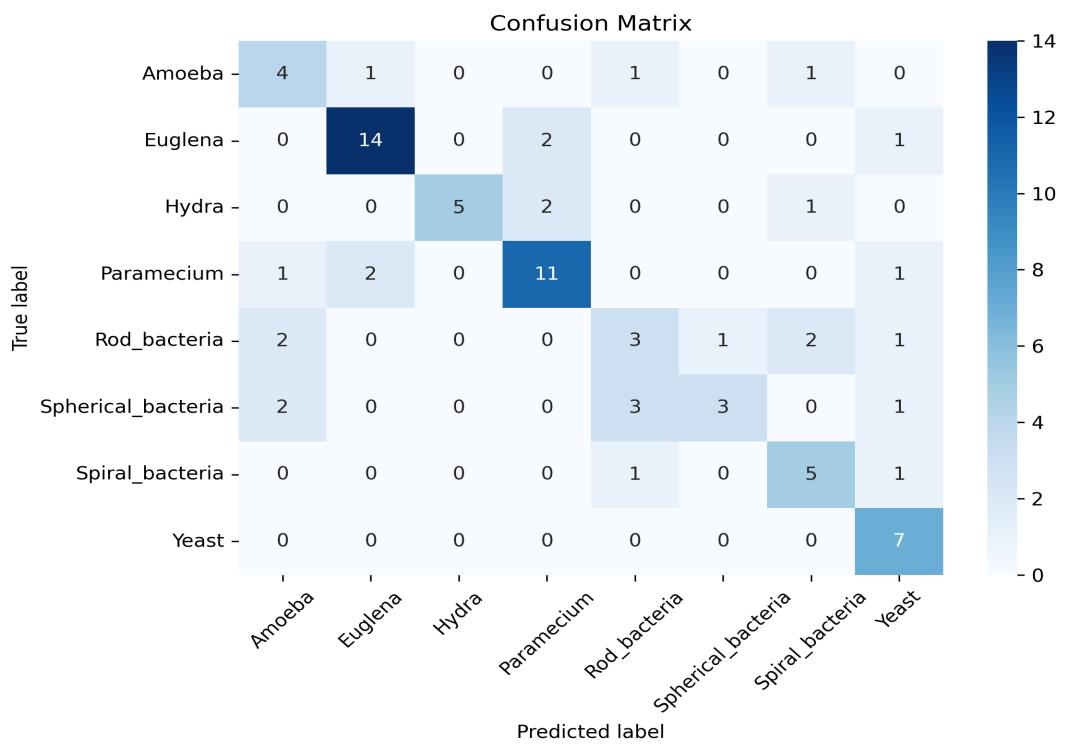
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.6582

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 20
Fine-tune Epochs: 30
Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda
RandomFlip Mode: horizontal
RandomRotation Factor: 0.15
RandomZoom Factor: 0.15
RandomContrast Factor: 0.2
RandomBrightness MaxDelta: 0.2
Gaussian Noise STD: 0.005
Train Size: 568
Validation Size: 142
Test Size: 79
Optimizer (Base): Adam
Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)
Early Stopping Patience: 10
Comments: Using MobileNetV2, reduce gaussian std

Model Summary:

Model: "sequential"

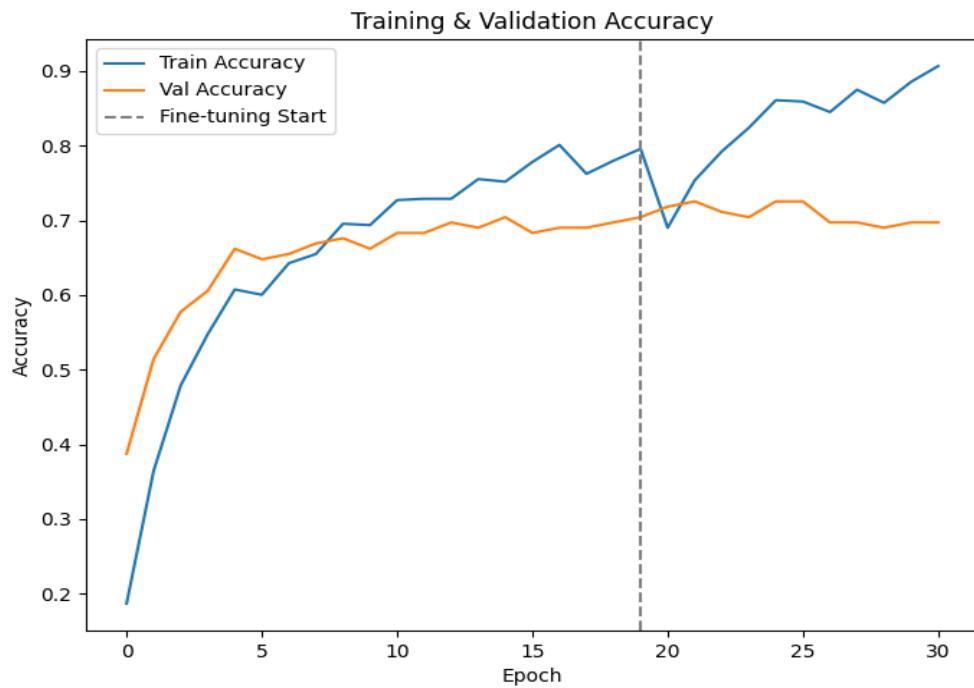
The diagram shows a Keras model summary with the following layers:

- Layer (type): mobilenetv2_1.00_224 (Functional)
- Output Shape: (None, 7, 7, 1280)
- Param #: 2,257,984
- Layer (type): global_average_pooling2d (GlobalAveragePooling2D)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dropout (Dropout)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dense (Dense)
- Output Shape: (None, 8)
- Param #: 10,248

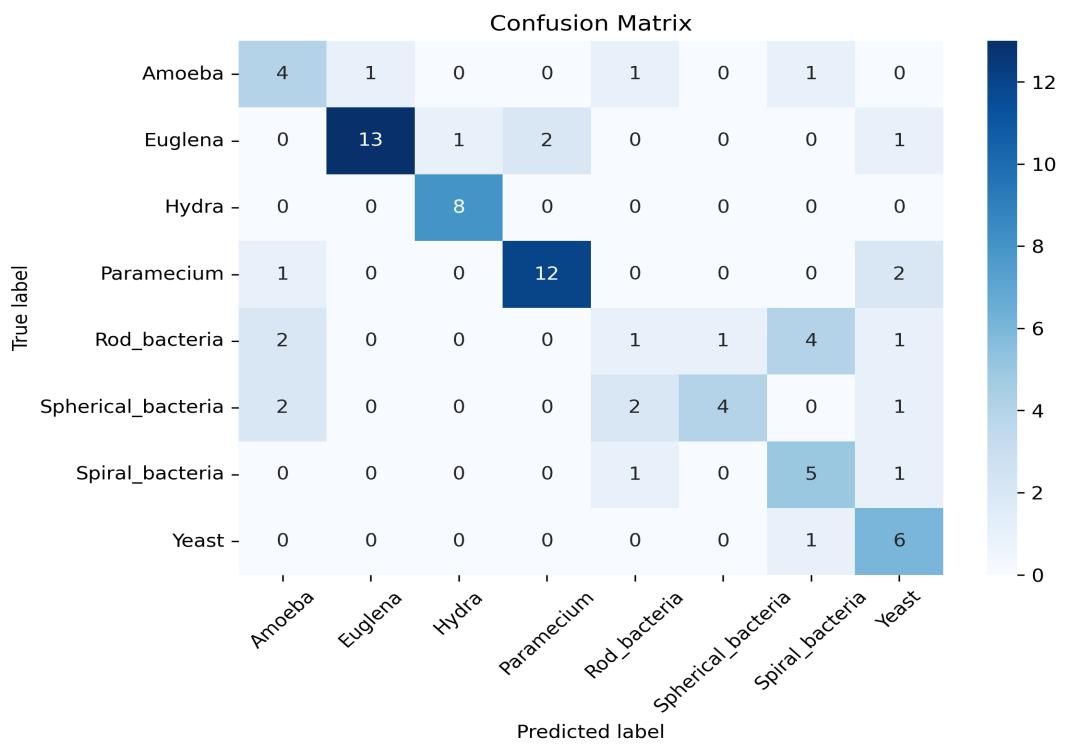
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.6709

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.0

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, reduce gaussian std

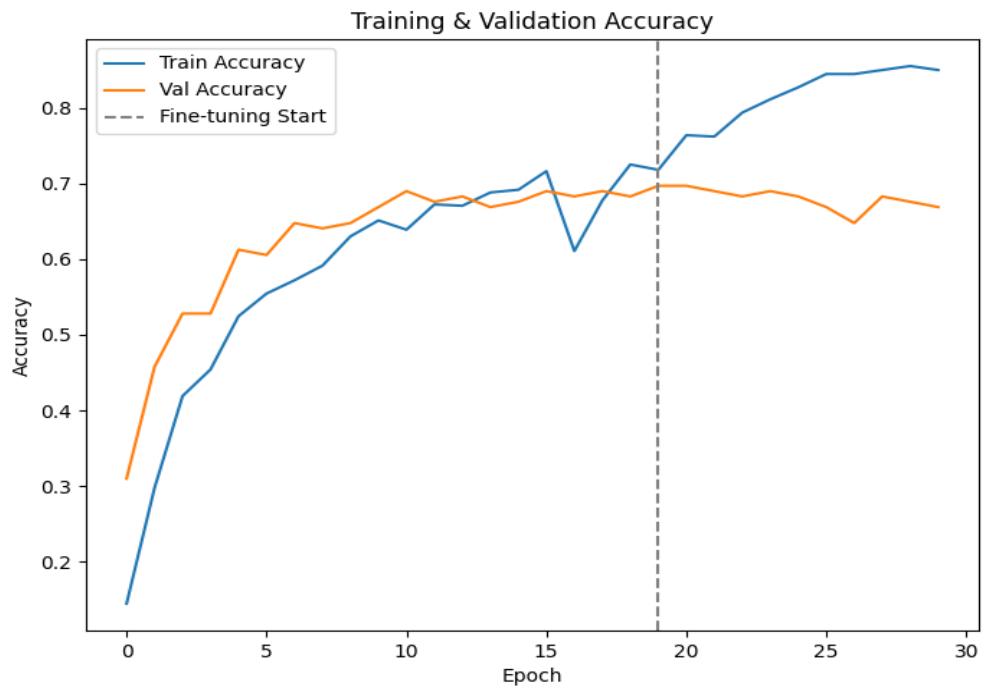
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

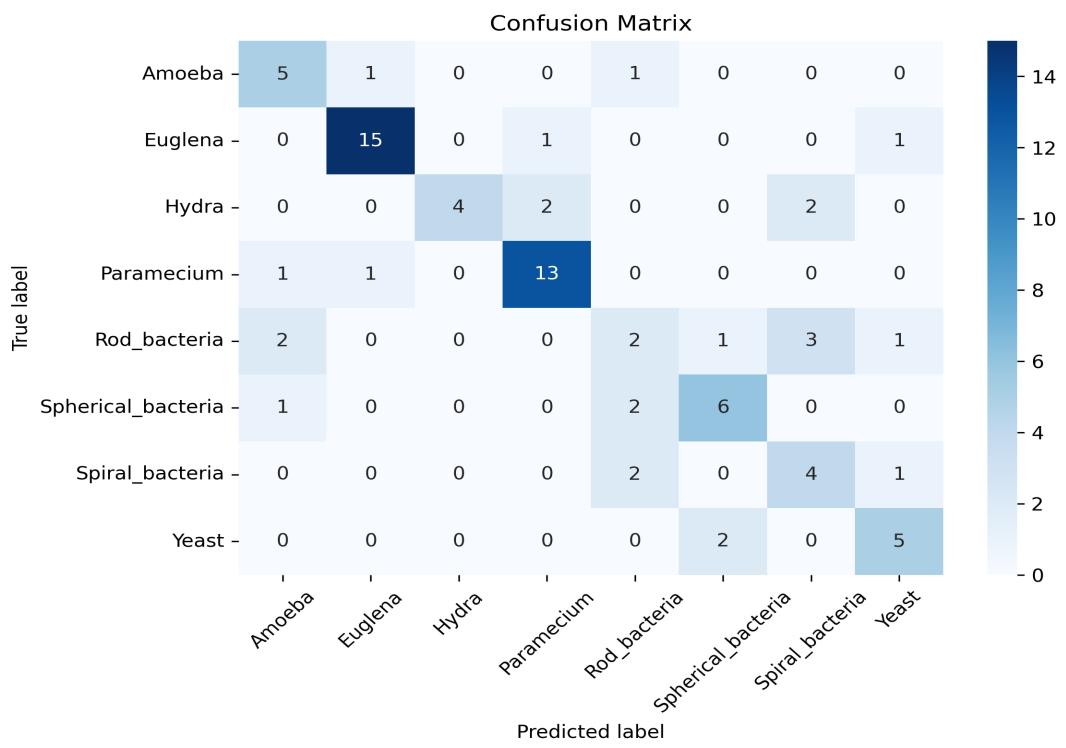
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.6835

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.005

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, reduce gaussian std

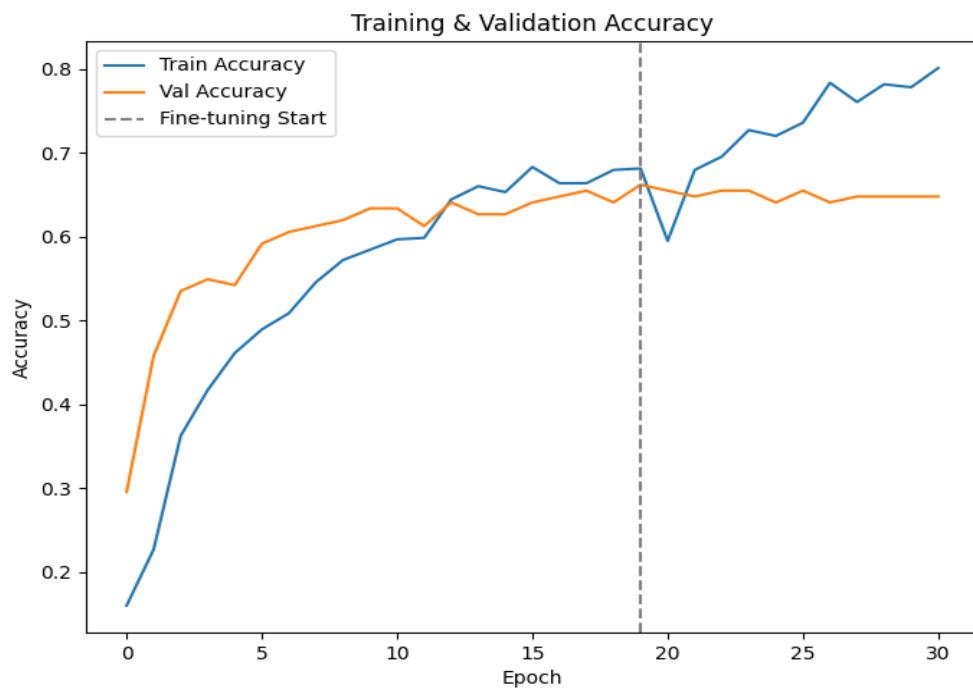
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

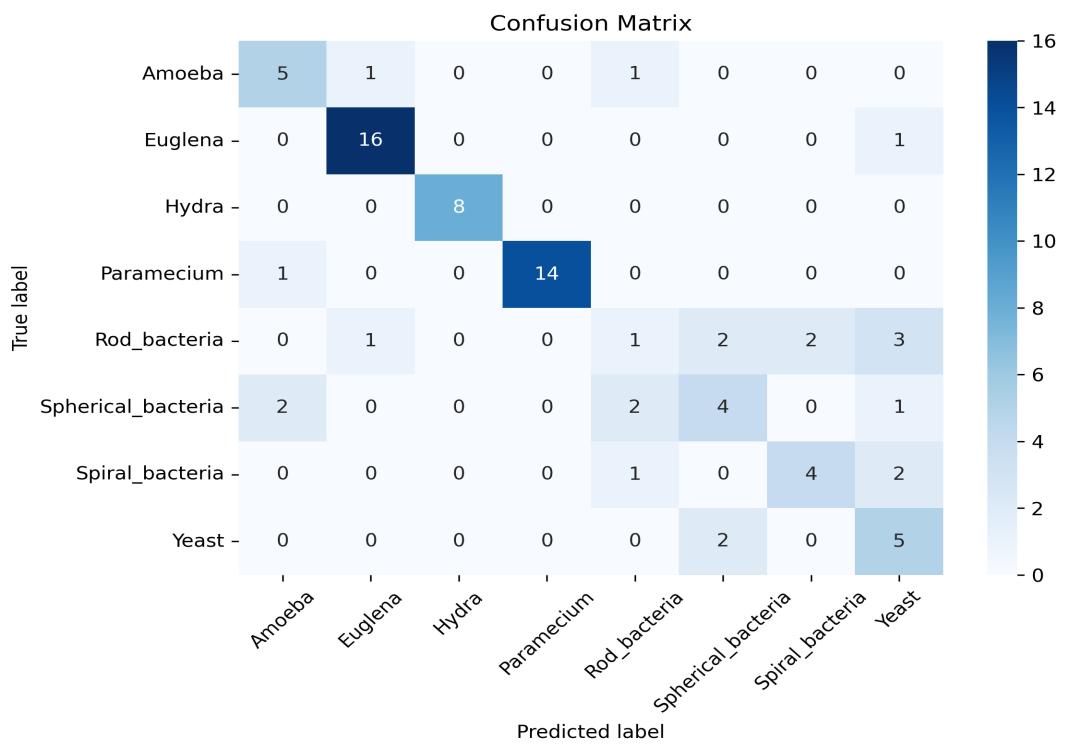
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.7215

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (256, 256)

Batch Size: 32

Number of Classes: 8

Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 20

Fine-tune Epochs: 30

Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda

RandomFlip Mode: horizontal

RandomRotation Factor: 0.15

RandomZoom Factor: 0.15

RandomContrast Factor: 0.2

RandomBrightness MaxDelta: 0.2

Gaussian Noise STD: 0.005

Train Size: 568

Validation Size: 142

Test Size: 79

Optimizer (Base): Adam

Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.96)

Early Stopping Patience: 10

Comments: Using MobileNetV2, increased image input resolution and decreased dropout

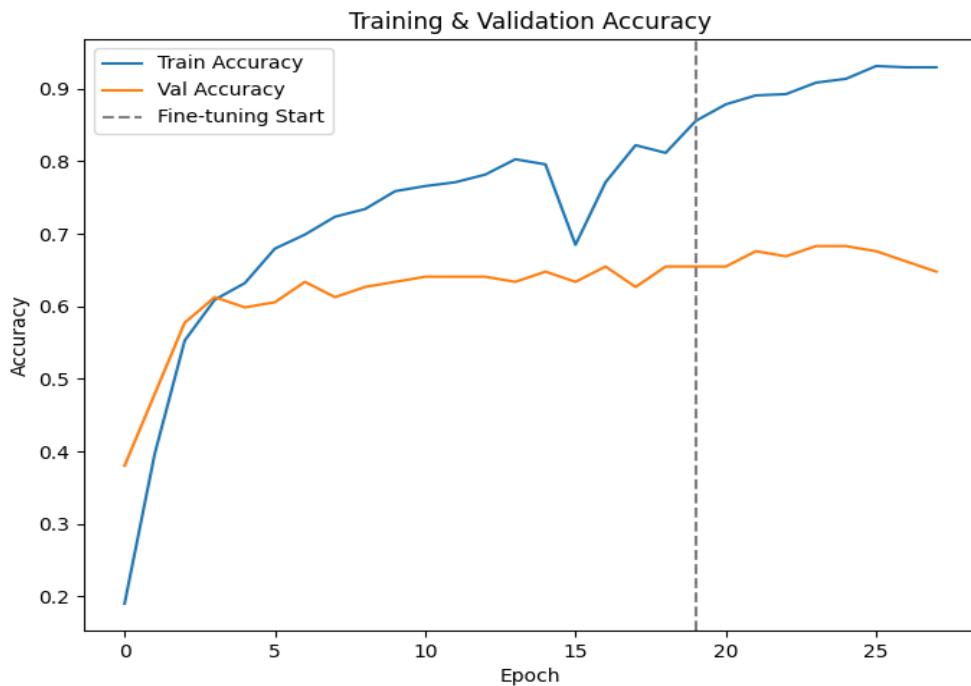
Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 8, 8, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

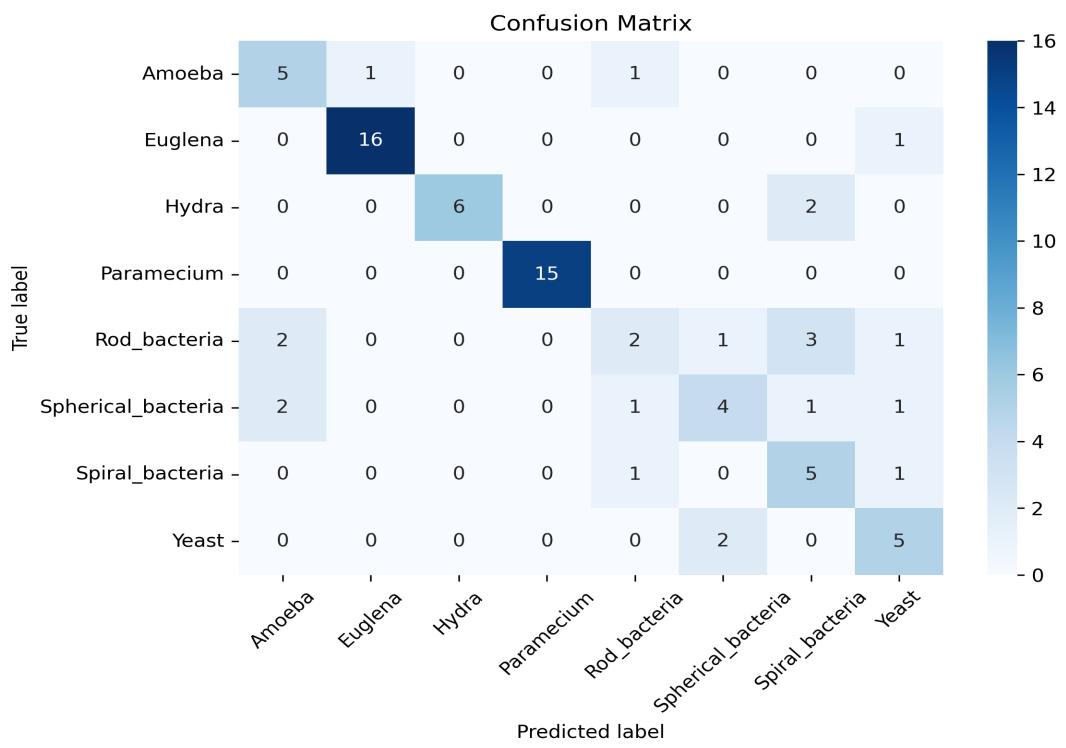
Total params: 3,753,689 (14.32 MB)
Trainable params: 742,728 (2.83 MB)
Non-trainable params: 1,525,504 (5.82 MB)
Optimizer params: 1,485,457 (5.67 MB)

Test Accuracy: 0.7342

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (256, 256)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 20
Fine-tune Epochs: 30
Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda
RandomFlip Mode: horizontal
RandomRotation Factor: 0.15
RandomZoom Factor: 0.15
RandomContrast Factor: 0.2
RandomBrightness MaxDelta: 0.2
Gaussian Noise STD: 0.005
Dropout: 0.5
Train Size: 568
Validation Size: 142
Test Size: 79
Optimizer (Base): Adam
Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.98)
Early Stopping Patience: 10
Comments: Using MobileNetV2, added regularization, increased decay rate and reduced fine tuning layers

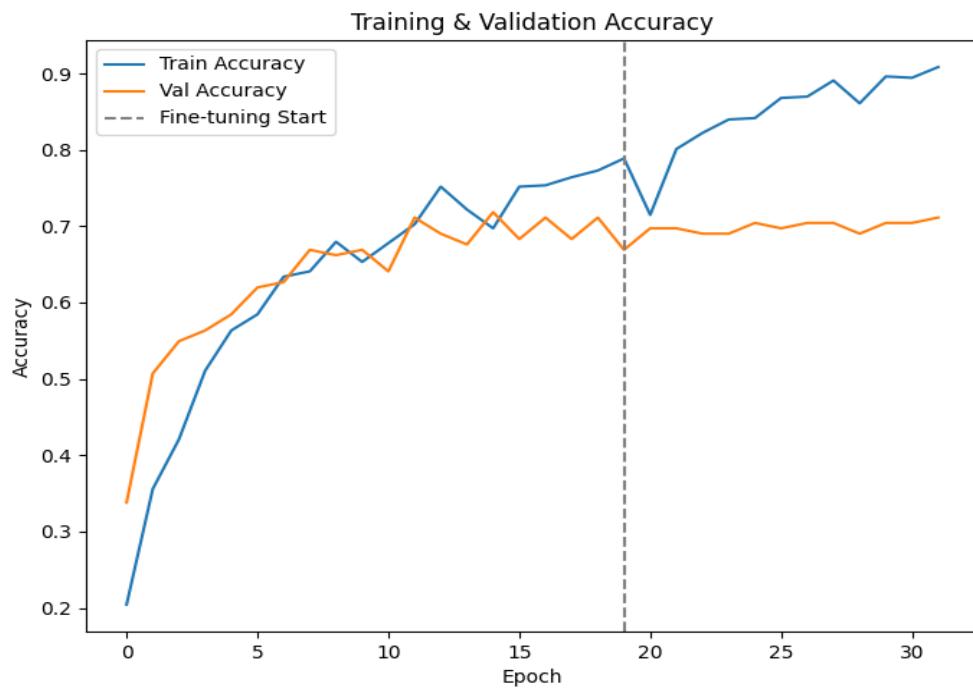
Model Summary:

```
Model: "sequential"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 8, 8, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)      ■ 0 ■
■ (GlobalAveragePooling2D)      ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)          ■ (None, 1280)      ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)             ■ (None, 8)        ■ 10,248 ■
[REDACTED]
[REDACTED]

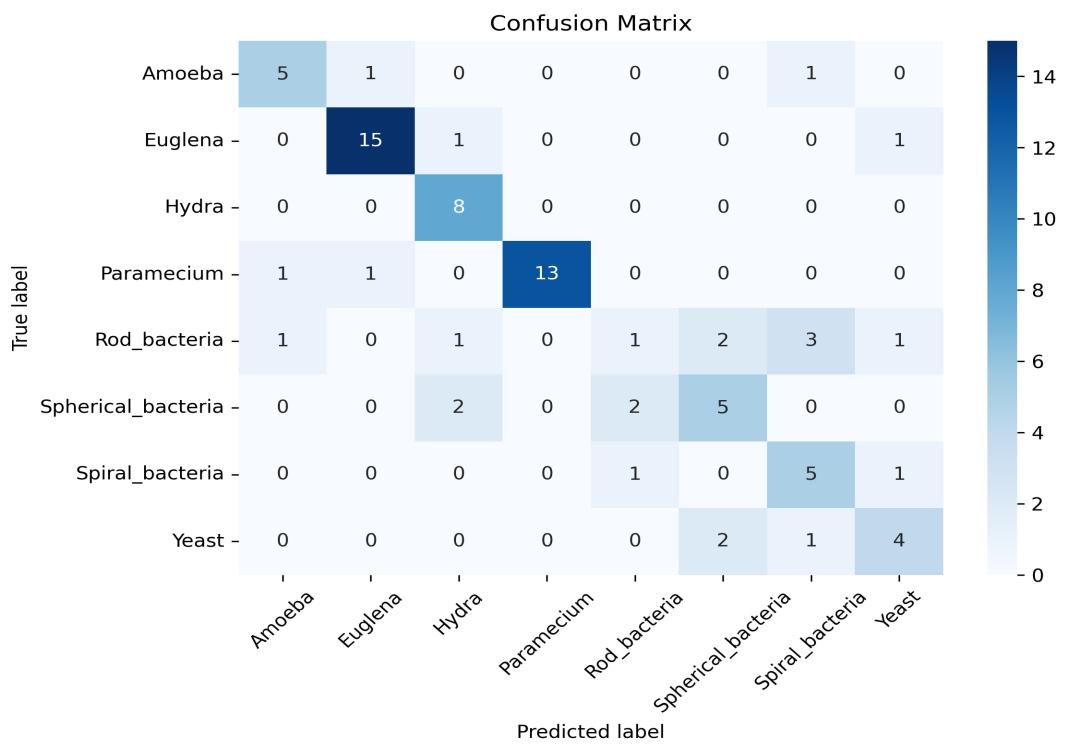
Total params: 3,728,729 (14.22 MB)
Trainable params: 730,248 (2.79 MB)
Non-trainable params: 1,537,984 (5.87 MB)
Optimizer params: 1,460,497 (5.57 MB)
```

Test Accuracy: 0.7089

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 20
Fine-tune Epochs: 30
Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda
RandomFlip Mode: horizontal
RandomRotation Factor: 0.15
RandomZoom Factor: 0.15
RandomContrast Factor: 0.2
RandomBrightness MaxDelta: 0.2
Gaussian Noise STD: 0.005
Dropout: 0.5
Train Size: 568
Validation Size: 142
Test Size: 79
Optimizer (Base): Adam
Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.98)
Early Stopping Patience: 10
Comments: Using MobileNetV2, added regularization, increased decay rate and reduced fine tuning layers

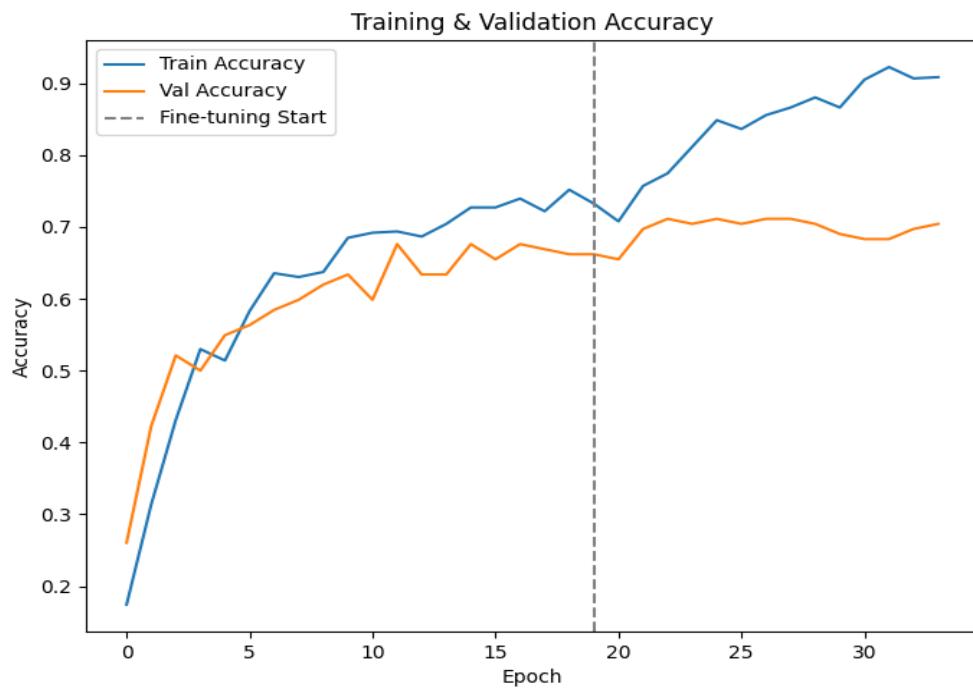
Model Summary:

```
Model: "sequential"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape          ■ Param #
[REDACTED]
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)        ■ 0 ■
■ (GlobalAveragePooling2D)      ■                         ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)           ■ (None, 1280)        ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)              ■ (None, 8)           ■ 10,248 ■
[REDACTED]
[REDACTED]

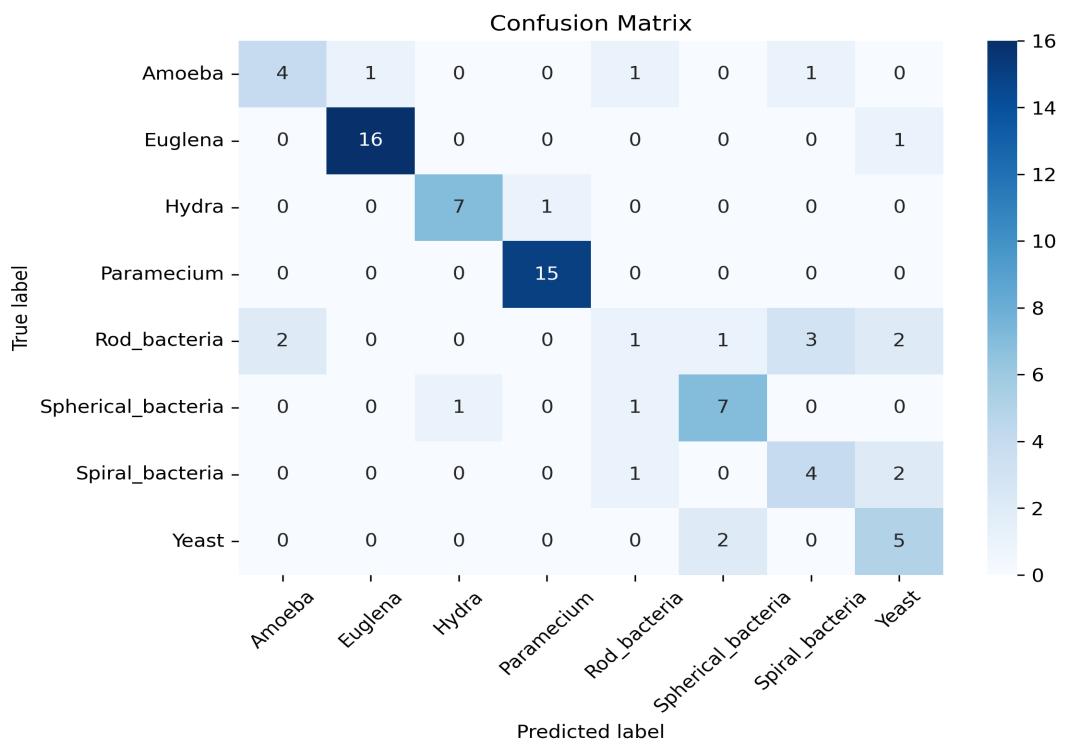
Total params: 3,728,729 (14.22 MB)
Trainable params: 730,248 (2.79 MB)
Non-trainable params: 1,537,984 (5.87 MB)
Optimizer params: 1,460,497 (5.57 MB)
```

Test Accuracy: 0.7468

Training Accuracy over Epochs:



Confusion Matrix:



Model Training Report

Configuration and Parameters:

Image Size: (224, 224)
Batch Size: 32
Number of Classes: 8
Class Weights: {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}
Base Epochs: 20
Fine-tune Epochs: 30
Data Augmentation: random_flip, random_rotation, random_zoom, random_contrast, lambda
RandomFlip Mode: horizontal
RandomRotation Factor: 0.15
RandomZoom Factor: 0.15
RandomContrast Factor: 0.2
RandomBrightness MaxDelta: 0.2
Gaussian Noise STD: 0.005
Dropout: 0.5
Train Size: 568
Validation Size: 142
Test Size: 79
Optimizer (Base): Adam
Optimizer (Fine-tune): Adam with ExponentialDecay(initial_lr=0.0001, decay_rate=0.98)
Early Stopping Patience: 10
Comments: Using MobileNetV2, added regularization, increased decay rate and increased fine tuning layers

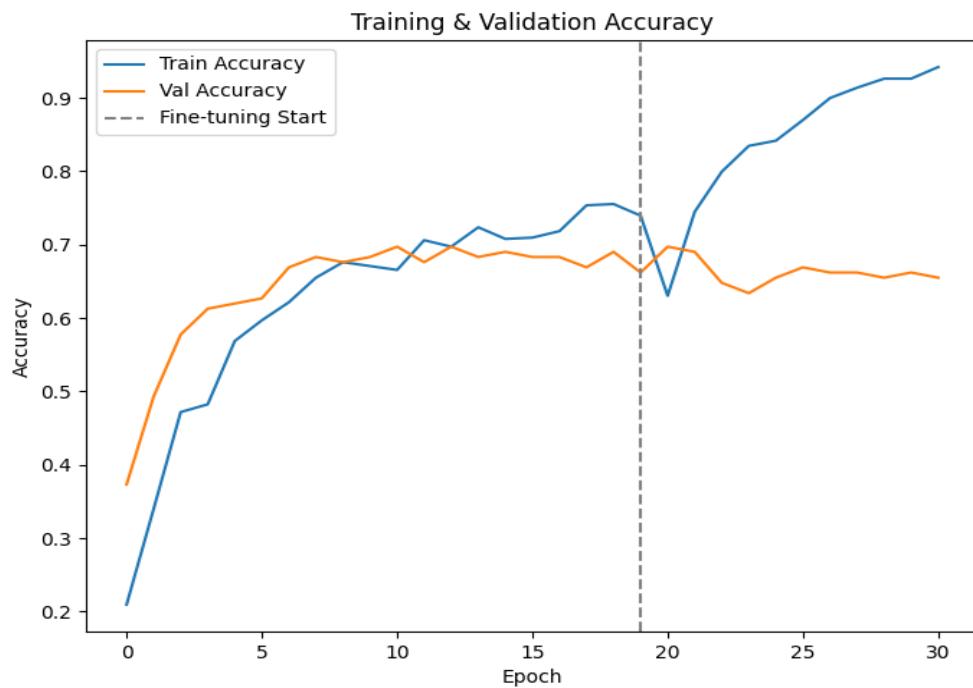
Model Summary:

```
Model: "sequential"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape          ■ Param #
[REDACTED]
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)        ■ 0 ■
■ (GlobalAveragePooling2D)      ■                         ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)           ■ (None, 1280)        ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)              ■ (None, 8)           ■ 10,248 ■
[REDACTED]
[REDACTED]

Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

Test Accuracy: 0.7468

Training Accuracy over Epochs:



Confusion Matrix:

