

Model Optimization and Tuning Phase Template

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Team ID	SWTID1720277644
Project Title	Rice Classification using CNN
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining neural network models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (8 Marks):

Model	Tuned Hyperparameters
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CNN

```
from keras.preprocessing.image import ImageDataGenerator
# Set the image size and batch size
image_size = (50, 50)
batch_size = 32

# Create an ImageDataGenerator object with data augmentation
datagen = ImageDataGenerator(
    rescale=1./255,
    rotation_range=45,
    width_shift_range=0.2,
    height_shift_range=0.2,
    shear_range=0.2,
    zoom_range=0.2,
    horizontal_flip=True,
    fill_mode='nearest'
)
```

```
# Create a generator for the training data
train_generator = datagen.flow_from_dataframe(
    df_train,
    x_col='image',
    y_col='label',
    target_size=image_size,
    batch_size=batch_size,
    class_mode='categorical',
    shuffle=True
)
```

```
# Create a generator for the test data
test_generator = datagen.flow_from_dataframe(
    df_test,
    x_col='image',
    y_col='label',
    target_size=image_size,
    batch_size=batch_size,
    class_mode='categorical',
    shuffle=False
)
```

```
from keras.models import Sequential
from keras.layers import Conv2D, MaxPooling2D, Flatten, Dense
# Set the input shape for the model
input_shape = (50, 50, 3)

# Create a Sequential model
model = Sequential()
model.add(Conv2D(32, kernel_size=(3, 3), activation='relu', input_shape=input_shape))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Conv2D(64, kernel_size=(3, 3), activation='relu'))
model.add(MaxPooling2D(pool_size=(2, 2)))
model.add(Flatten())
model.add(Dense(128, activation='relu'))
model.add(Dense(5, activation='softmax'))
```

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
CNN	We were supposed to evaluate different rice types using the CNN model because it gives the most accurate results and handles complex relationships, large datasets, and huge training time, justifying its selection.