# Model Development Phase Template

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| Date | 20 June 2025 |
| Student Name | Hrituraj Shashikant Narvekar |
| Project Title | GreenSnap: A Vegetable Classifier |
| Maximum Marks | 10 Marks |

## Initial Model Training Code, Model Validation and Evaluation Report

### Initial Model Training Code

```
# Load pre-trained MobileNetV2
base_model = MobileNetV2(weights='imagenet', include_top=False, input_shape=
(224, 224, 3))
base_model.trainable = False

# Add custom layers
x = base_model.output
x = GlobalAveragePooling2D()(x)
x = Dense(128, activation='relu')(x)
predictions = Dense(15, activation='softmax')(x)  # 15 vegetable classes
model = Model(inputs=base_model.input, outputs=predictions)

# Compile model
model.compile(optimizer=Adam(learning_rate=0.001),
              loss='categorical_crossentropy',
              metrics=['accuracy'])

# Train model
history = model.fit(train_data, validation_data=val_data, epochs=10)

# Save model
model.save('vegetable_classifier_model.h5')
```

## Model Validation and Evaluation Report

| Model | Summary | Training and Validation Performance Metrics |
|---|---|---|
| **Model 1** (MobileNetV2 + Custom Layers) | **Layer Summary:**<br>• MobileNetV2 base model<br>• GlobalAveragePooling2D<br>• Dense(100, relu)<br>• BatchNormalization<br>• Dropout(0.5)<br>• Dense(3, softmax)<br><br>**Total Parameters:** 2,311,305<br>**Trainable Parameters:** 2,304,505<br>**Non-trainable Parameters:** 5,500 | **Training Accuracy**: 87.71%<br>**Validation Accuracy**: 89.24%<br><br>Training converged well with slight overfitting mitigated by dropout and batch normalization. |