



Model Development Phase

Date	6 July 2025
Team ID	SWTID1749821186
Project Title	Enhancing Product Reliability: Leveraging Transfer Learning for Fault Detection
Maximum Marks	10 Marks

Initial Model Training Code, Model Validation and Evaluation Report

Initial Model Training Code:

```
build_and_train_model(base_model_func, preprocess_func, model_name, input_shape=(224, 224, 3), epochs=10):
print(f"\n--- Training {model_name} ---")
# Load the base model
base_model = base_model_func(weights="imagenet", include_top=False, input_shape=input_shape)
for layer in base_model.layers:
    layer.trainable = False
x = GlobalAveragePooling2D()(base_model.output)
output = Dense(1, activation='sigmoid')(x)
model = Model(inputs=base_model.input, outputs=output)
# Compile the model
opt = Adam(learning_rate=0.001)
model.compile(optimizer=opt, loss='binary_crossentropy', metrics=['accuracy'])
# Callbacks
checkpoint = ModelCheckpoint(
     f'best_{model_name.lower()}.h5',
monitor='val_accuracy',
     save_best_only=True,
     mode='max'
early_stopping = EarlyStopping(monitor='val_accuracy', patience=5, restore_best_weights=True, verbose=1)
# Create data generators for this specific model
training_set, test_set = create_data_generators(train_directory, test_directory, preprocess_func, target_size=input_shape[:2])
# Train the model
history = model.fit(
     training_set,
    validation_data=test_set,
epochs=epochs,
steps_per_epoch=len(training_set),
validation_steps=len(test_set),
      callbacks=[early_stopping, checkpoint]
print(f"\n--- {model_name} Training Complete ---")
return model, history, test_set
```

Model Validation and Evaluation Report:





Model	Summary	Training and Validation Performance Metrics
VGG16	Layer (type)	
Inceptionv3	March Marc	





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