

# BioMLStudio

## Machine Learning Analysis Report

Generated: December 03, 2025 at 22:40

## Table of Contents

1. Dataset Summary
2. Preprocessing Steps
3. Model Selection & Training
4. Performance Metrics
5. Visualizations
6. Predictions & Results

# 1. Dataset Summary

Property	Value
Dataset Name	seq_001_affected.fasta
Dataset Type	dna
Total Samples	40
Features	71
File Size	0.01 MB

# 2. Preprocessing Steps

## Step 1: Load and Clean Data

- Loaded 40 sequences from FASTA
- Removed invalid characters
- Extracted labels from headers
- Label distribution: {'affected': 20, 'normal': 20}

## Step 2: Handle Missing Values

- No missing values found

## Step 3: Feature Engineering (Biological)

- Added 6 engineered features

## Step 4: Sequence Encoding (kmer)

- Applied k-mer encoding (k=3)

## Step 5: Feature Normalization (standard)

- Normalized 71 features using standard scaling

## Step 6: Data Splitting

- Encoded target variable (2 classes)
- Split data: 28 train, 4 val, 8 test

### 3. Model Selection & Training

Model	Training Time	Score
Logistic Regression	1.37s	1.0000
Random Forest	0.16s	1.0000
Gradient Boosting	0.06s	1.0000

**Best Model:** Logistic Regression

## 4. Performance Metrics

**Training Metrics:**

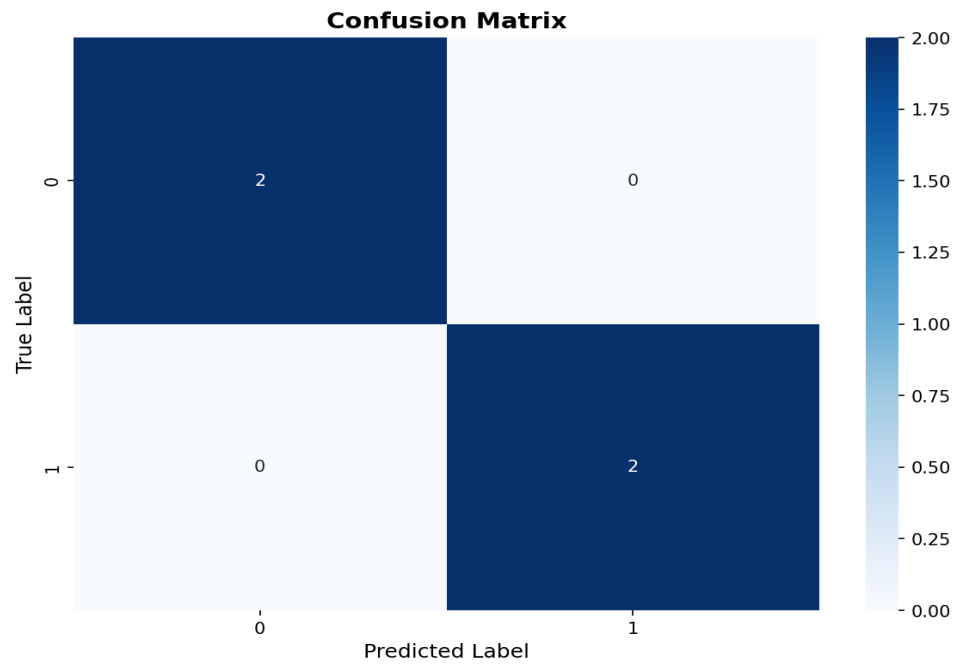
Metric	Value
Accuracy	1.0000
Precision	1.0000
Recall	1.0000
F1 Score	1.0000
Roc Auc	1.0000

**Validation Metrics:**

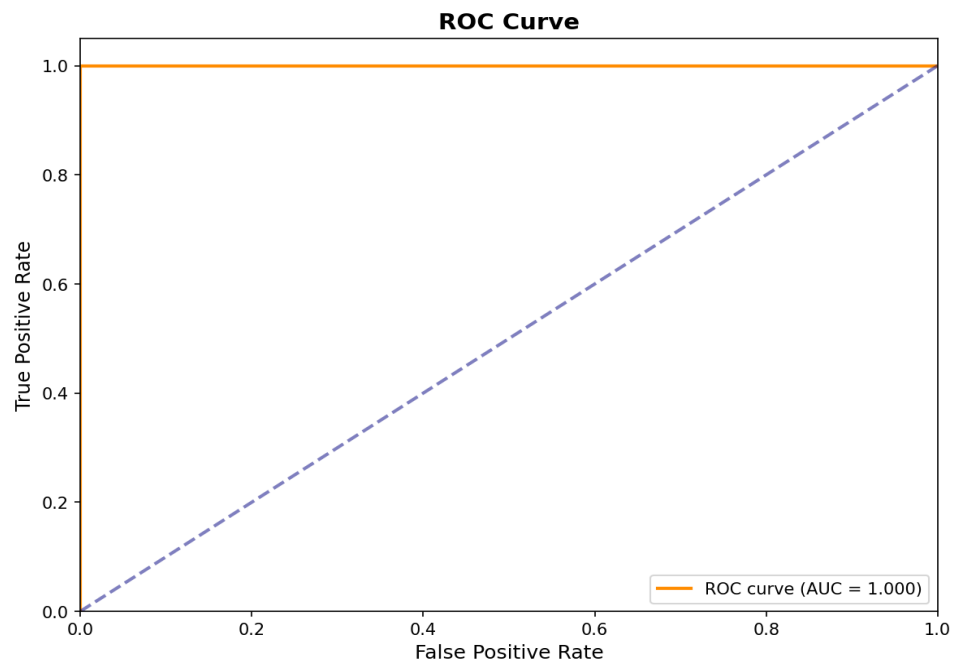
Metric	Value
Accuracy	1.0000
Precision	1.0000
Recall	1.0000
F1 Score	1.0000
Roc Auc	1.0000

## 5. Visualizations

### Confusion Matrix



### Roc Curve



## 6. Training Summary

**Total training time:** 2.02 seconds

**Key Events:**

[SUCCESS] Logistic Regression - Score: 1.0000

[SUCCESS] Random Forest - Score: 1.0000

[SUCCESS] Gradient Boosting - Score: 1.0000

[SUCCESS] Best model: Logistic Regression (Score: 1.0000)

*Report generated by BioMLStudio - AI-Based No-Code Platform for Bioinformatics*

*© 2025 BioMLStudio. All rights reserved.*