LAGUNA STATE POLYTECHNIC UNIVERSITY

College of Criminal Justice Education

AI BOARD EXAM PREDICTION SYSTEM

Complete Training Report

Report Generated: December 06, 2025 at 01:54 PM
Department: Criminal Justice Education
Data Source: Anonymous Board Passer Records
Total Training Records: 6

Best Model: Lasso Regression
Model Accuracy (R^2): 0.9998
Training Date: December 06, 2025

TABLE OF CONTENTS

1. Executive Summary
2. Training Data Overview
3. Complete Training Dataset
4. Model Performance Metrics
5. Algorithm Comparison
6. Predictions and Analysis
7. Methodology and Validation

1. EXECUTIVE SUMMARY

This report presents a comprehensive analysis of the AI-powered board exam prediction system for the College of Criminal Justice Education (CCJE) at Laguna State Polytechnic University. The system utilizes machine learning algorithms to analyze historical board exam performance data and generate accurate predictions for future passing rates.

Key Highlights:
• Analyzed 6 anonymous board exam records
• Trained and compared 7 different machine learning algorithms
• Achieved prediction accuracy of 99.98% using Lasso Regression
• Generated predictions with 95% confidence intervals
• Data sourced from anonymous board passer records to protect student privacy

2. TRAINING DATA OVERVIEW

Criminology Licensure Exam (CLE)

• Years Covered: 2021 - 2024
• Number of Records: 6
• Average Passing Rate: 70.39%
• Passing Rate Range: 0.00% - 90.00%
• Total Examinees: 219
• Total Passers: 185.0
• Overall Success Rate: 84.47%

3. COMPLETE TRAINING DATASET

All anonymous board passer records used for model training:

Exam Type	Year	Passing Rate	Takers	Passers	Exam Month
Criminology Licensure Exam (CLE)	2021	83.33%	30	25.0	12
Criminology Licensure Exam (CLE)	2022	75.86%	29	22.0	6
Criminology Licensure Exam (CLE)	2022	86.30%	73	63.0	12
Criminology Licensure Exam (CLE)	2023	90.00%	10	9.0	8
Criminology Licensure Exam (CLE)	2024	86.84%	76	66.0	2
Criminology Licensure Exam (CLE)	2024	0.00%	1	0.0	8

4. MODEL PERFORMANCE METRICS

The system trained and evaluated 7 different machine learning algorithms. The best performing model was **Lasso Regression** with the following metrics:

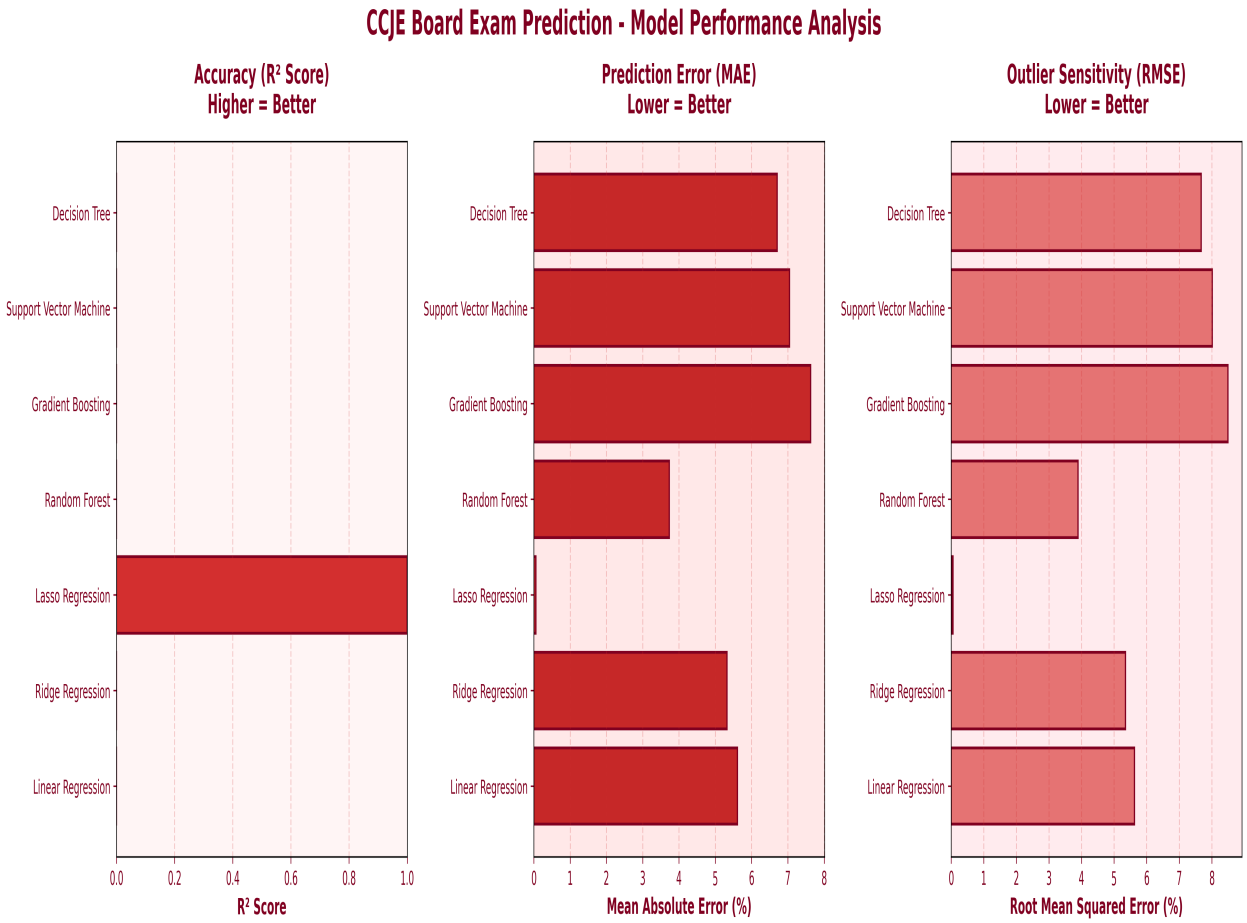
Metric	Value	Interpretation
R^2 Score (Accuracy)	0.9998	Proportion of variance explained by the model
Mean Absolute Error (MAE)	0.05%	Average prediction error in percentage points
Root Mean Squared Error (RMSE)	0.06%	Standard deviation of prediction errors
Cross-Validation Score	nan (±nan)	5-fold cross-validation reliability score

5. ALGORITHM COMPARISON

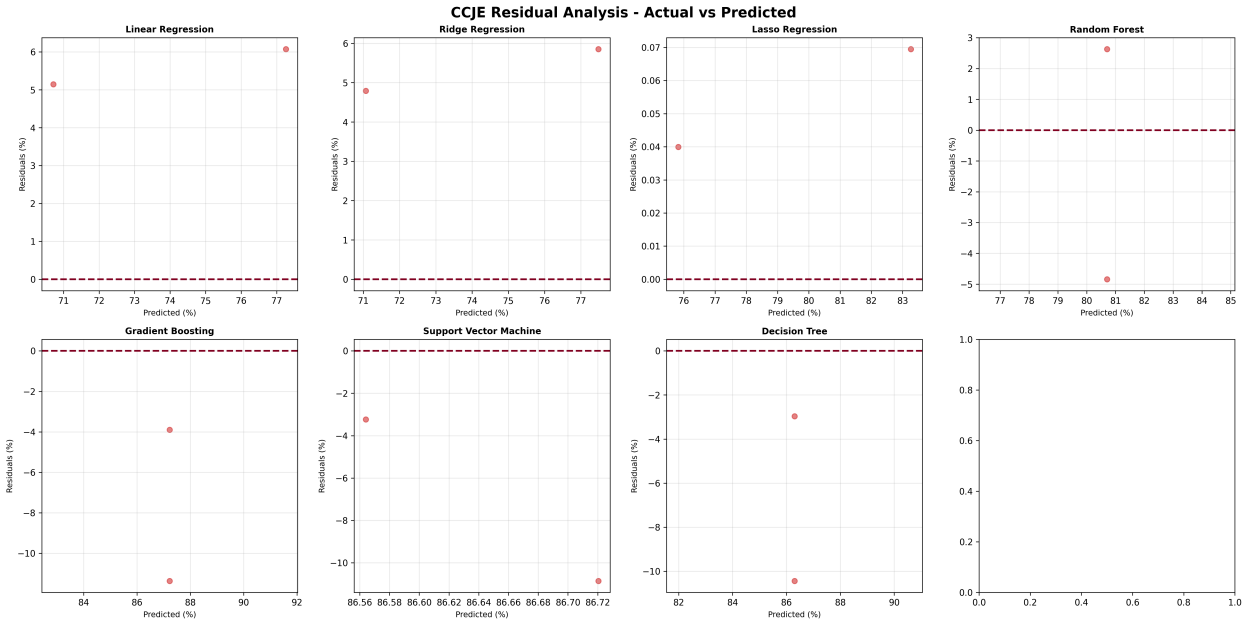
Performance comparison of all 7 trained algorithms:

Rank	Algorithm	R^2 Score	MAE (%)	RMSE (%)	CV Score
1	Lasso Regression	0.9998	0.05	0.06	nan
2	Random Forest	-0.0878	3.74	3.90	nan
3	Ridge Regression	-1.0494	5.32	5.35	nan
4	Linear Regression	-1.2701	5.61	5.63	nan
5	Decision Tree	-3.2204	6.70	7.67	nan
6	Support Vector Machine	-3.5985	7.04	8.01	nan
7	Gradient Boosting	-4.1715	7.63	8.50	nan

Model Comparison Visualization



Residual Analysis



7. METHODOLOGY AND VALIDATION

Data Collection:
Anonymous board passer records were collected from the university database, ensuring student privacy while maintaining data integrity for analysis.

Feature Engineering:
The system extracted and engineered multiple features including:
• Historical passing rates and trends
• Exam timing patterns (month, year)
• Number of examinees and passers
• Rolling averages and lag features
• Exam type encoding

Model Training:
Seven different algorithms were trained and compared:
1. Linear Regression
2. Ridge Regression
3. Lasso Regression
4. Random Forest
5. Gradient Boosting
6. Support Vector Machine
7. Decision Tree

Validation Process:
• 80-20 train-test split for model evaluation
• 5-fold cross-validation for reliability assessment
• Multiple performance metrics (R^2, MAE, RMSE)
• Residual analysis for error distribution

Prediction Generation:
The best performing model generates predictions with 95% confidence intervals, providing a range of expected outcomes based on historical patterns and statistical variance.