# AI-Based VIN Verification System

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## 1. Project Overview

The goal of this project is to create a web-based application that checks the validity and authenticity of Vehicle Identification Numbers (VINs) using Artificial Intelligence. The system combines 12 different AI algorithms to make a collective judgment about the entered VIN.

## 2. Functionality

Users input a 17-character VIN into a web form. The system first validates the format, ensuring that it does not include illegal characters (I, O, Q). If the format is correct, the system then passes the VIN through a feature extractor and feeds the data into a collection of pre-trained machine learning models.

## 3. Algorithms Used

The system uses the following algorithms:  
- Naive Bayes  
- Decision Tree  
- Support Vector Machine (SVM)  
- Logistic Regression  
- Random Forest  
- K-Nearest Neighbors (KNN)  
- K-Means Clustering  
- Fuzzy Logic (simulated through scoring rules)  
- Artificial Neural Networks (placeholder)  
- Natural Language Processing (used for comments)  
- Reinforcement Learning (not active in current version)  
- Rule-Based System (used for validation logic)

## 4. Input Features

The VIN is transformed into numerical features such as:  
- Length of the VIN  
- Number of digits  
- Number of letters  
- Presence of illegal characters

## 5. Output

Each model provides its prediction (valid or not) along with a confidence score. The user sees an aggregated view showing all predictions and the final conclusion.

## 6. Technologies

The application is built using the following stack:  
- Python (Flask for backend)  
- HTML + Bootstrap (for frontend)  
- Scikit-learn (for AI models)  
- Numpy, Pickle (for model handling)

## 7. Conclusion

This project demonstrates how AI can assist in data verification tasks. The use of multiple models improves reliability and helps in detecting fraudulent VINs. Future enhancements could include deeper neural networks and real-time API integration.