AI-Driven Customer Service Reminder System

Automating and personalizing vehicle service reminders for automotive dealerships and service networks using advanced data science and machine learning.

by Santhosh Jecob
AI/ML Engineer
Hope AI

Project Overview: Revolutionizing Automotive After-Sales

This capstone project introduces an AI-driven system to transform how automotive dealerships manage customer service reminders. Our end-to-end data science workflow ensures efficient, personalized communication, enhancing customer loyalty and operational efficiency.

Automated Reminders

Predicts and sends timely service notifications.

Personalized Communication

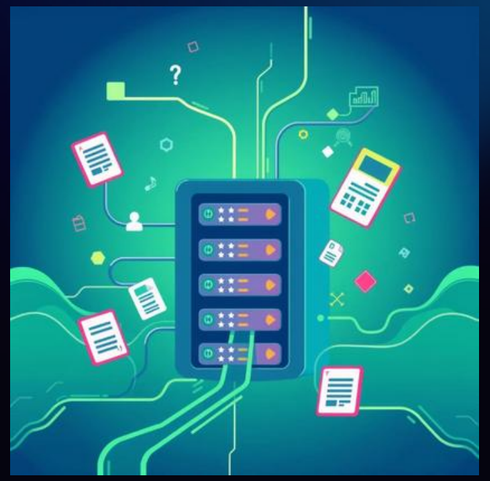
Tailors messages and channels to individual customer needs.

End-to-End Workflow

Covers data handling, model training, and deployment.

Step 1 & 2: Data Foundation - Collection & Preprocessing

Data Collection



Gathering all relevant customer, vehicle, and service records.

- **Structured Data:** Tabular data (purchase year, odometer, warranty, service history, communication).
- **Unstructured Data:** Free-text customer feedback.

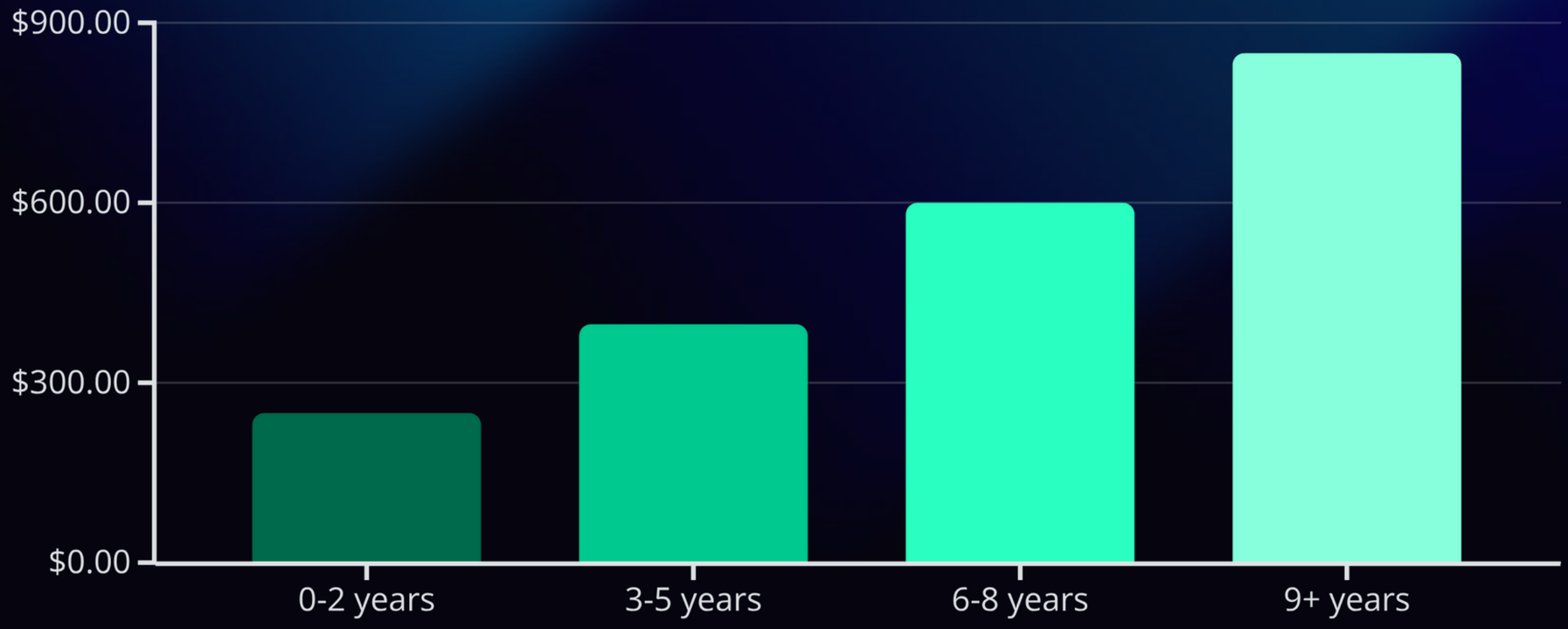
Data Preprocessing

Preparing raw data for analysis and model training.

- **Cleaning & Transformation:** Handling missing values, data type conversion, outlier filtering.
- **Feature Engineering:** Creating new features (e.g., age_of_vehicle, avg_kms_per_month).
- **Encoding & Sentiment Analysis:** Converting categorical data, generating sentiment features from feedback.

Step 3: Exploratory Data Analysis (EDA)

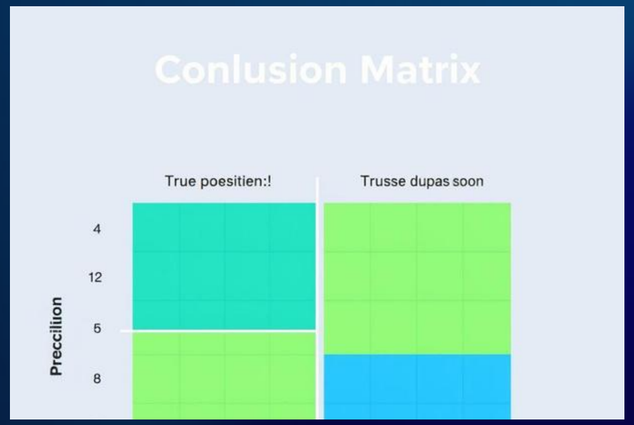
Gaining deep insights into the data to inform model development and identify key trends.



EDA involves understanding feature distributions (histograms, boxplots) and identifying relationships between variables (scatterplots, cross-tabulations) to determine feature importance for predictive modeling.

Step 4: AI Models - Classification

Predicting urgent service needs to enable proactive customer engagement.



Urgent Service Prediction

Identifies vehicles needing service within 120 days based on comprehensive features including odometer, last service, warranty status, and sentiment from customer feedback.

Machine Learning Techniques

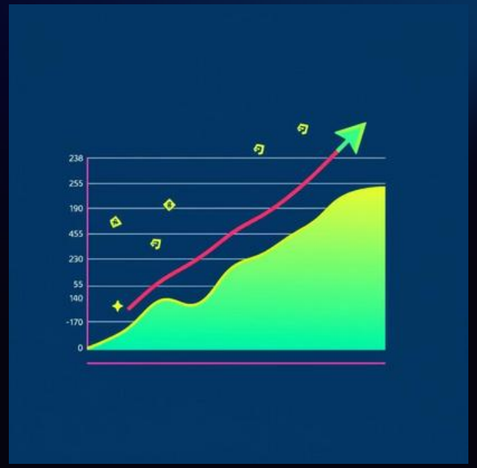
Leverages advanced supervised classification: RandomForest, GradientBoosting, and LightGBM pipelines.

Key Business Value

Drives proactive service reminders, reduces customer churn, enables personalized marketing, and optimizes call-center operations for high-priority customers.

Step 4: AI Models - Regression & Clustering

Regression Models



Predicting continuous numerical values for enhanced planning.

- **Purpose:** Forecasts next service cost, days until next service, and Customer Lifetime Value (CLTV).
- **Business Value:** Supports predictive maintenance, accurate financial forecasting, and strategic warranty/AMC planning.

Clustering Models

Unsupervised grouping of customers for targeted strategies.

- **Purpose:** Segments customers based on driving behavior, service spend, feedback sentiment, and service regularity.
- **Business Value:** Essential for customer profiling, product bundling, targeted offers, and capacity planning (e.g., "price-sensitive & regular" vs. "premium, late responders").

Step 5: Final Model & Output Generation

Preparing the trained models for operational use and generating actionable outputs.

Trained Model Storage

Highly accurate model pipelines saved as .pkl or .joblib files (e.g., service_reminder_model.pkl).

Customer Segmentation Output

Customers categorized into segments: Critical, High Priority, Medium, Low, based on prediction, due date, and feedback score.

Personalized Communication

Generates tailored reminder messages and recommends communication channels (email, WhatsApp, SMS, phone) in a CSV format for deployment.

Step 6: Final Presentation & Performance Metrics

Showcasing the project's success through key results, workflow diagrams, and robust performance metrics.

Key Performance Indicators

- **Model Performance:** Detailed classification reports and confusion matrices.
- **Accuracy:** Classification models demonstrate near-perfect precision and recall (1.00) for urgent and high-priority customer identification.
- **Business ROI:** Quantifying the return on investment from implementing the AI-driven system.

Deployment: From Data to Automated Action

Seamless integration into existing systems for continuous, automated service reminder generation.

Local/Server Batch Deployment

Run Python script (e.g., 02.Classification_04.ipynb) with latest customer data (modify_service_df.csv) to generate ai_based_service_reminder.csv

Model Deployment as a Service

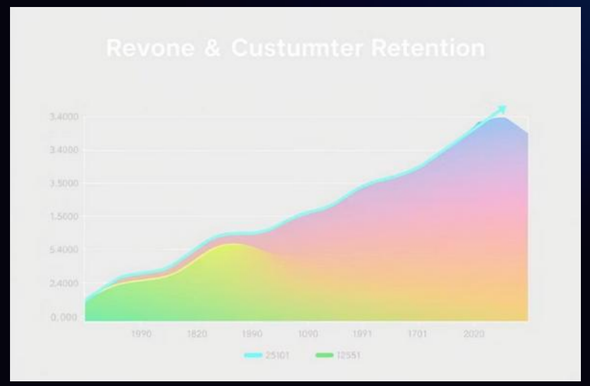
Export trained model (service_reminder_model.pkl) as a Flask/FastAPI microservice or scheduled script.

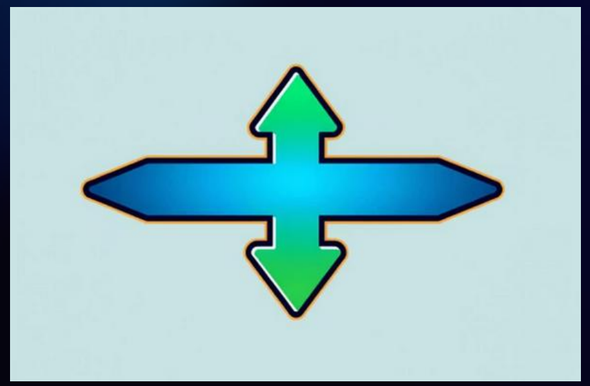
CRM/Messaging Gateway Integration

Connect deployed service with CRM systems or messaging gateways for automated dispatch of communications.

Transforming Automotive After-Sales: Our Impact

This AI-driven system creates significant value by optimizing operations and enhancing customer relationships.





- **Increased Revenue:** Through enhanced customer retention and strategic upselling.
- **Reduced Operational Costs:** By automating routine service reminder tasks.
- **Hyper-Personalization:** Fostering improved customer loyalty and satisfaction.
- **Enhanced Customer Experience:** Making the after-sales journey smart, automated, and customer-centric.

Thankyou