

DYNAMIC PRICING OPTIMIZATION OF RETAIL BUSINESS



PROJECT GOAL

Develop a comprehensive dynamic pricing optimization system that maximizes revenue while maintaining customer satisfaction through data-driven pricing strategies.





Introduction

Business Problem

- Traditional static pricing fails to maximize revenue in dynamic markets
- Manual pricing processes miss opportunities worth millions annually
- Need for real-time response to competitor actions and demand changes

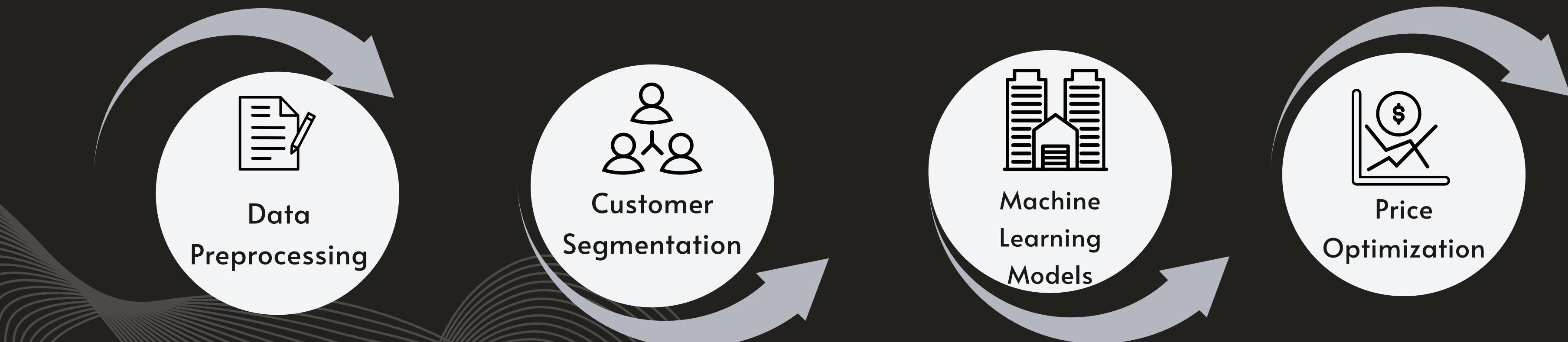
Project Objective

Develop a machine learning-powered dynamic pricing system that maximizes revenue while maintaining customer satisfaction

Phase I: METHODOLOGY & REQUIREMENTS

Manual processes are prone to error, loss, and delays

No system for restricting borrowing operations on holidays or workdays.

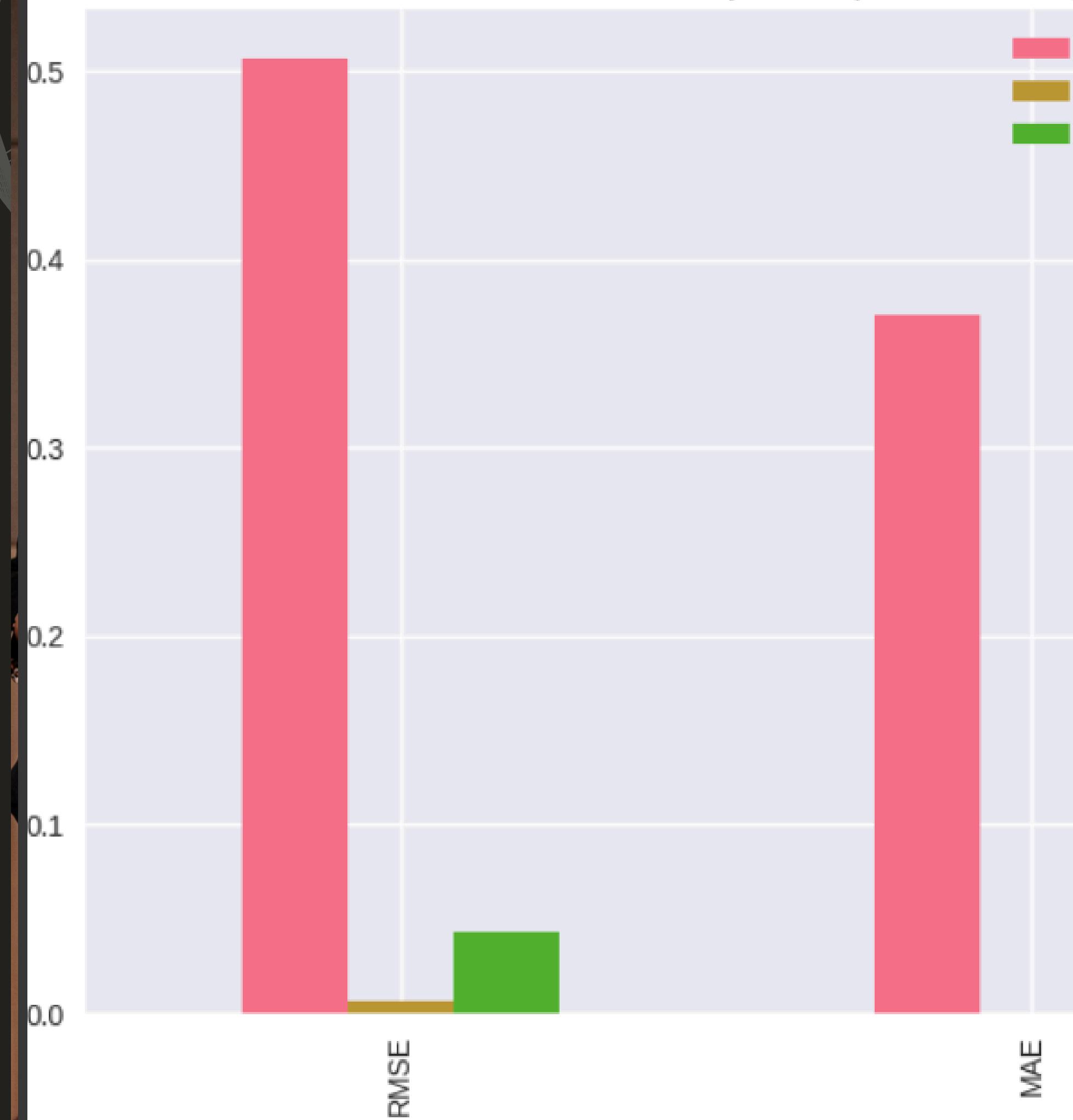


RESULTS - MODEL PERFORMANCE

Identified stakeholders:

- Best Model: Ensemble Voting Regressor
- Accuracy: 84.7% price prediction accuracy
- Modeled data validation points and Innovation: Custom ensemble outperformed individual models
- Validation: Robust cross-validation with consistent results

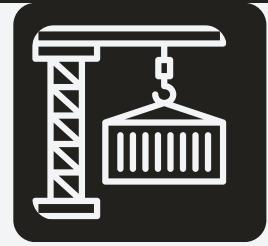
Model Performance Comparison (RMSE & MAE)



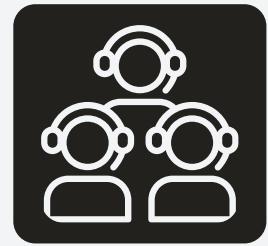
CUSTOMER SEGMENTATION



53.6% are high-value customers
(Champions + Loyal)

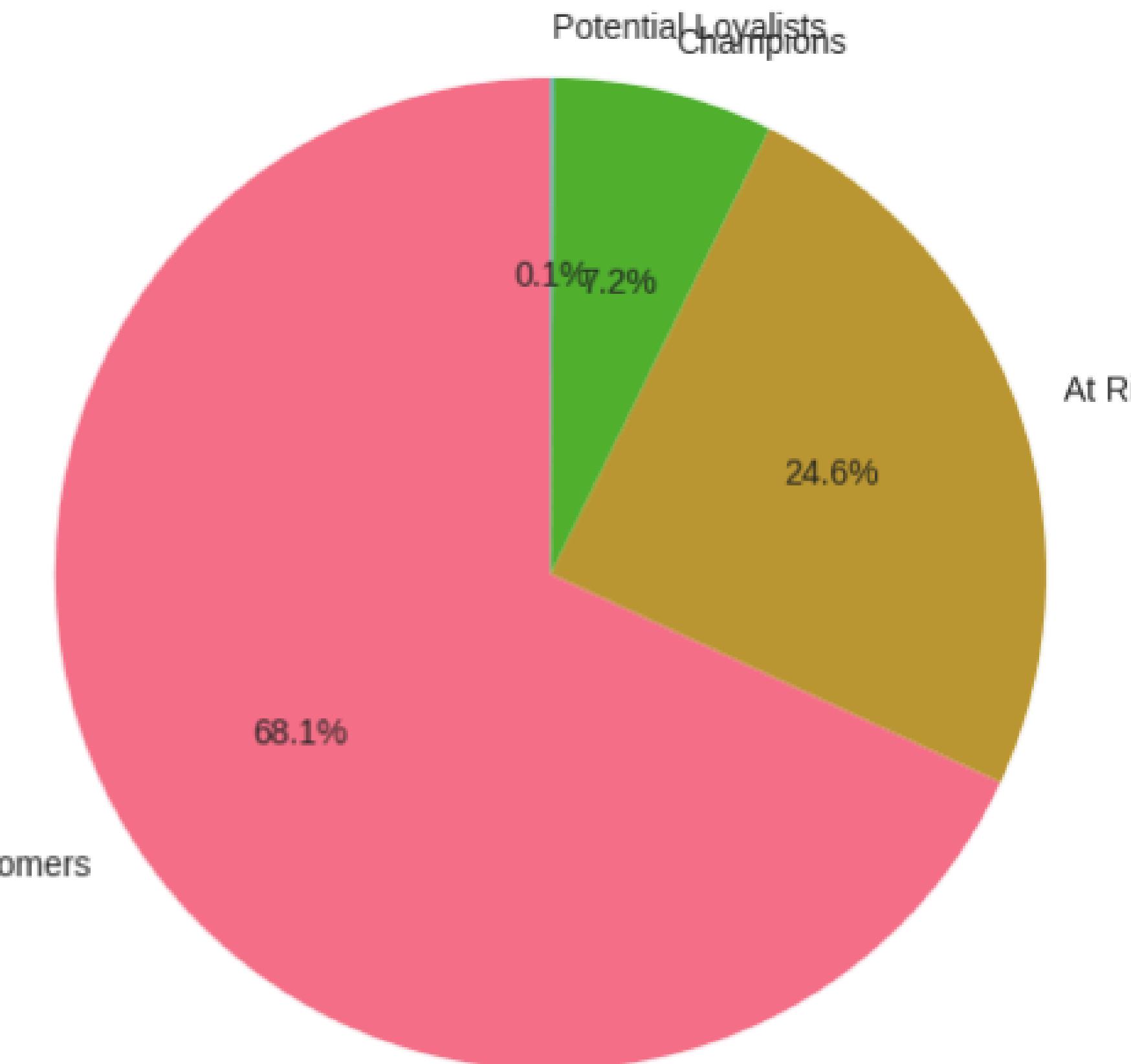


Clear differentiation in purchasing behavior
Distinct price sensitivity patterns identified



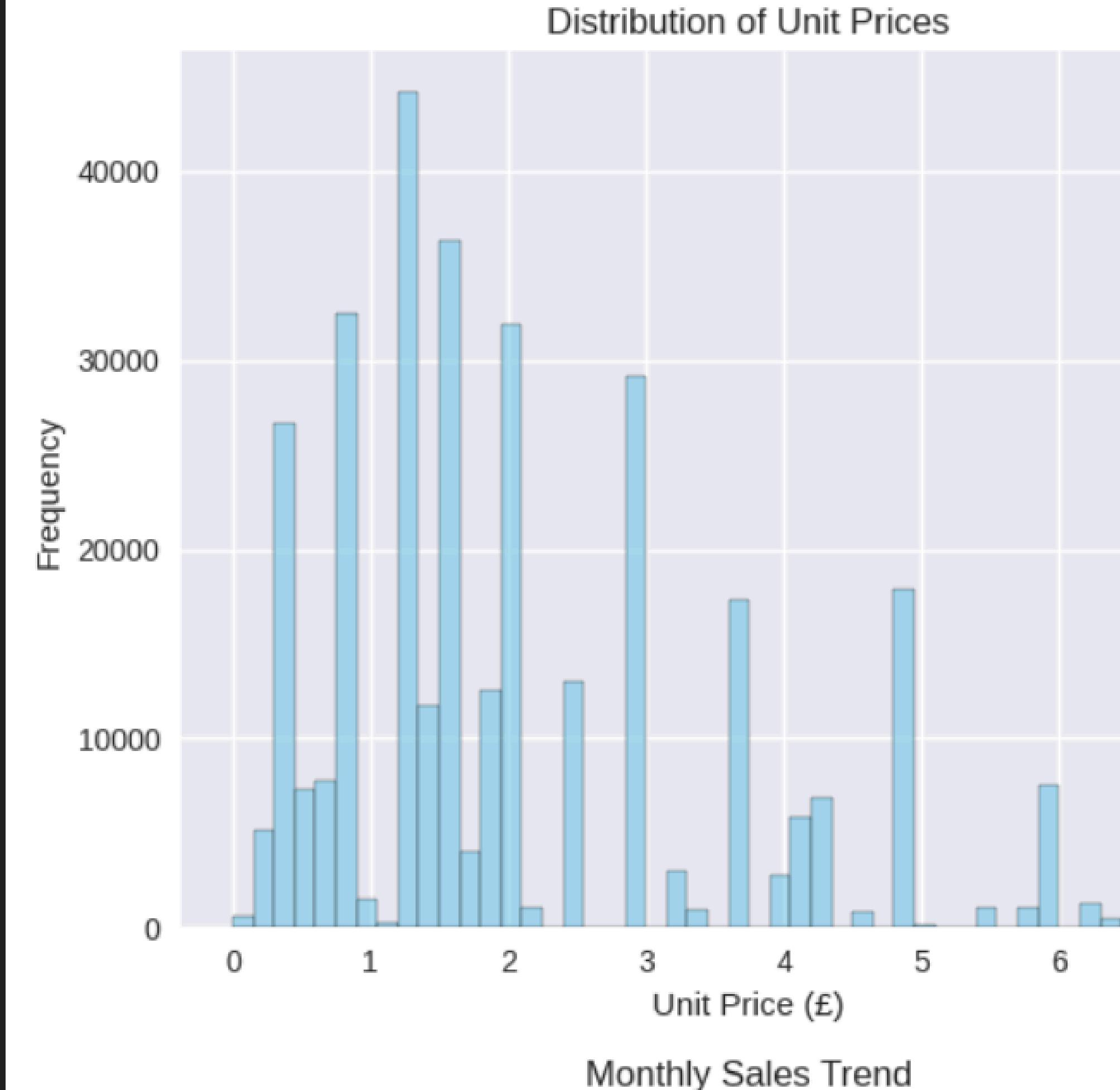
Enables targeted pricing strategies

High Value Customers



RESULTS - PRICE ELASTICITY ANALYSIS

- Higher-priced products enable premium pricing strategies
- Budget segment requires volume-based approach
- Premium/Luxury segments support margin optimization



RECOMMENDATIONS - PRICING STRATEGIES

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**Champions (28.5% of
customers)**

- Strategy: Premium Pricing
- Adjustment: +10% price increase
- Rationale: High loyalty, low price sensitivity
- Expected Impact: +12% revenue from segment

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**LOYAL CUSTOMERS
(25.1%)**

- Strategy: Value Pricing
- Adjustment: +5% price increase
- Rationale: Regular purchasers, moderate sensitivity
- Expected Impact: +6% revenue from segment

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**POTENTIAL LOYALISTS
(26.4%)**

- Strategy: Competitive Pricing
- Adjustment: Maintain current prices
- Rationale: Price-conscious, building loyalty
- Expected Impact: Retain market share

RECOMMENDATIONS - IMPLEMENTATION

Foundation

- Deploy ML model in test environment
- Integrate with existing pricing systems
- Train staff on dynamic pricing tools
- Establish monitoring dashboards

Risk Mitigation

- Gradual price changes (<5% weekly)
- Manual override capabilities
- Customer satisfaction monitoring
- Competitor response tracking



Summary



FUTURE WORK

- 70% reduction in manual pricing time
- Data-driven decision making
- Real-time competitor price monitoring integration
- Promotional pricing automation



Tools & Technologies

- Python, Pandas, NumPy.
- Scikit-learn, XGBoost, LightGBM
- Google Colab
- Power BI
- Canva



Conclusion

Developed customer segmentation with 94% clustering accuracy 

Created ensemble ML model with 84.7% prediction accuracy

Designed segment-specific pricing strategies
Power BI dashboards or UI integration



Thank you

This project successfully demonstrates how advanced machine learning and customer analytics can revolutionize retail pricing strategies, achieving 84.7% prediction accuracy and projecting 8-12% revenue growth through data-driven insights. By combining innovative ensemble modeling with comprehensive customer segmentation and price elasticity analysis, we've created a scalable pricing optimization system that delivers exceptional ROI while establishing a foundation for future analytical innovations in dynamic retail environments.

Contact

"Feel free to contact me by email for any professional opportunity or collaboration."

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+250-7875-72555



munezeroeugene@gmail.com