Smart Wings Recommendation System

WWT Unravel 2025 Hackathon

WINGS R US

Overview of the WWT Unravel 2025 Hackathon project introducing a recommendation system designed to enhance ordering personalization and improve business performance for Wings R Us leadership.

TEAM- CODEBLOOM
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Presenter Designation

Wings R US AI

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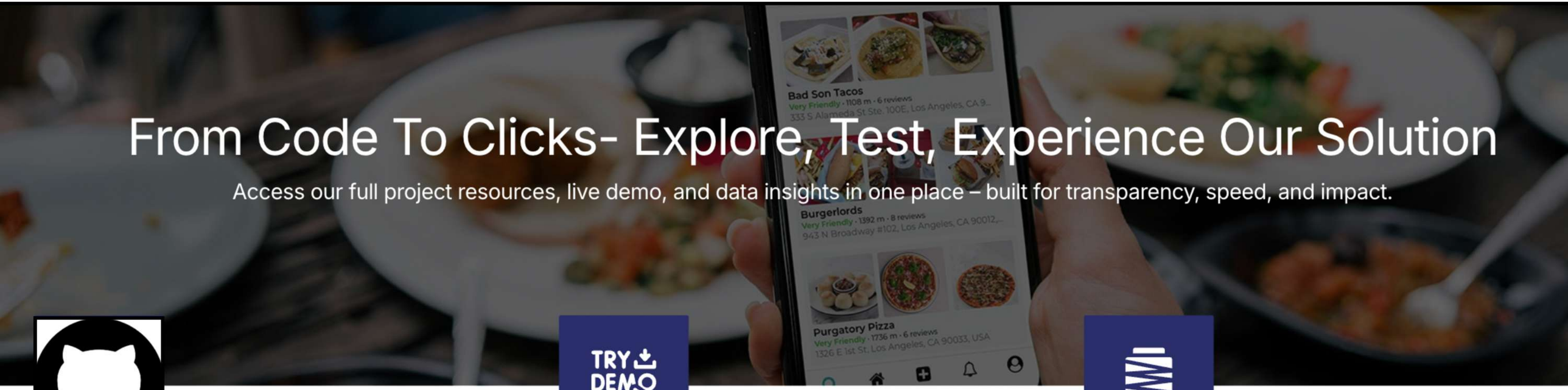


From Code To Clicks- Explore, Test, Experience Our Solution

Access our full project resources, live demo, and data insights in one place – built for transparency, speed, and impact.

GITHUB

https://github.com/ydnaincy/CodeBloom_WWT_2025

Dive into our complete codebase with detailed documentation for full transparency and easy replication.

LIVE APP

https://ydnaincy.github.io/CodeBloom_WWT_2025/App.html

Experience our recommendation engine in action – real-time, personalized, and lightning-fast

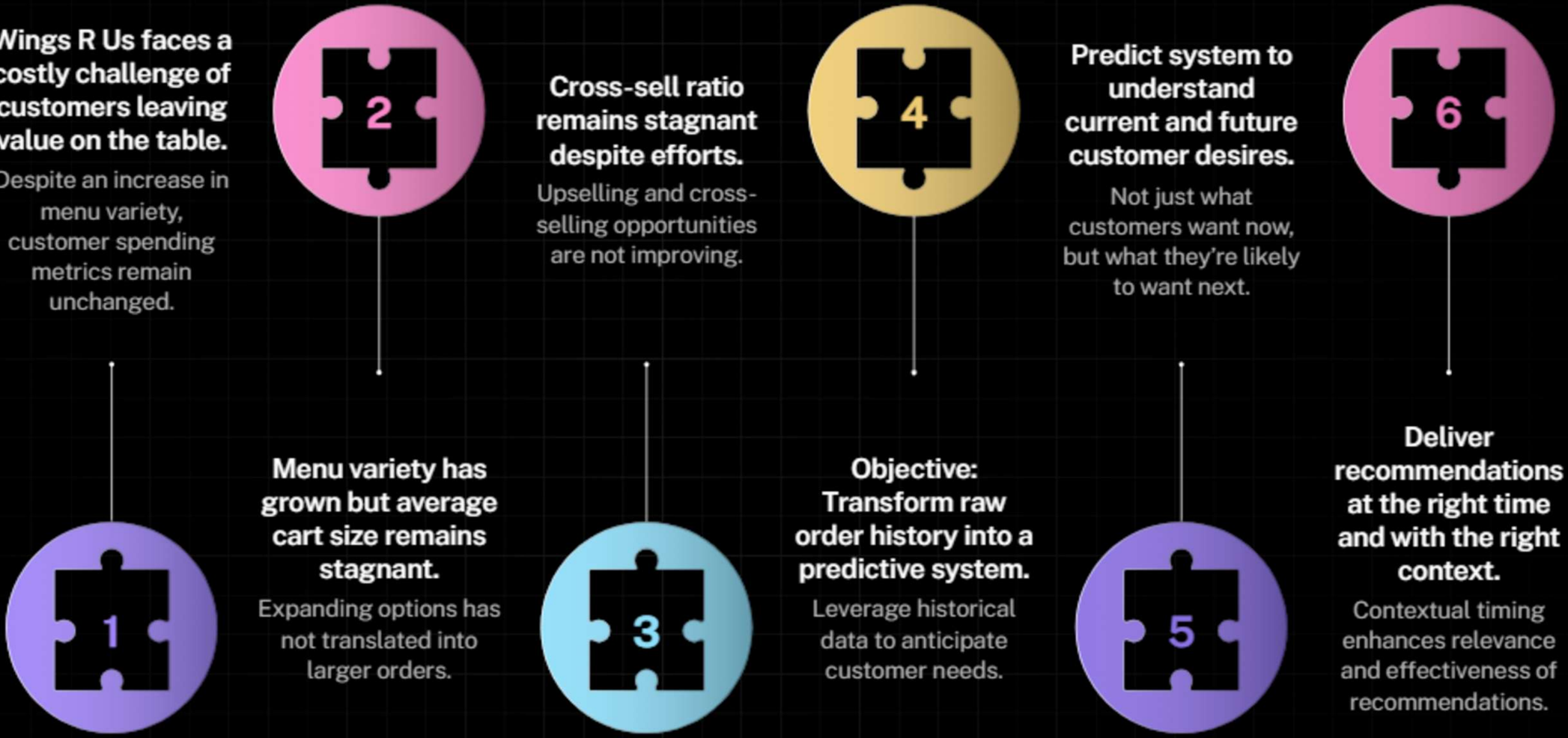
WIREFRAME

https://ydnaincy.github.io/CodeBloom_WWT_2025/wireframe.html

Preview the user journey and interface flow that powers our seamless customer experience

Consultative Hook: The Challenge and Objective

"Wings R Us faces a familiar but costly challenge – customers are leaving value on the table. While menu variety has grown, the average cart size and cross-sell ratio remain stagnant. Our task was to transform the raw order history into a predictive system that not only understands what the customer wants but also what they're likely to want next – at the right time and with the right context."



Executive Summary

System Architecture Flow

1	2	3	4	5
Data Ingestion	**Feature Engineering**	**Model Training**	**Evaluation**	**Deployment**
Orders, Context, User Behavior, Real-time Events	Context Weights, Embeddings, Signal Processing	Neural Networks, Optimization, Cross-Validation	LOO & Temporal Testing, Performance Metrics	Real-time API, Monitoring, Feedback Loop

Key Performance Indicators

34.57%	33.43%	25.22%	23.85%	27.61%
RECALL@3 (STRICT)	RECALL@3 (TEMPORAL)	MAP@3 (STRICT)	MAP@3 (TEMPORAL)	NDCG@3 (STRICT)

26.30%
NDCG@3 (TEMPORAL)

1

Customers are overwhelmed by options and drop off mid-way due to clunky product discovery.

The current product discovery process is complicated, causing users to leave before completing their journey.

2

A unified voice and visual React-based product experience improving UX and conversions.

Integrating voice and visual elements within a React framework creates a seamless and effective user experience.

3

Faster product discovery, lower bounce rate, higher engagement.

The improved interface leads to quicker user decisions, reduced abandonment, and increased interaction.

Addressing Missed Attach Opportunities and Objectives

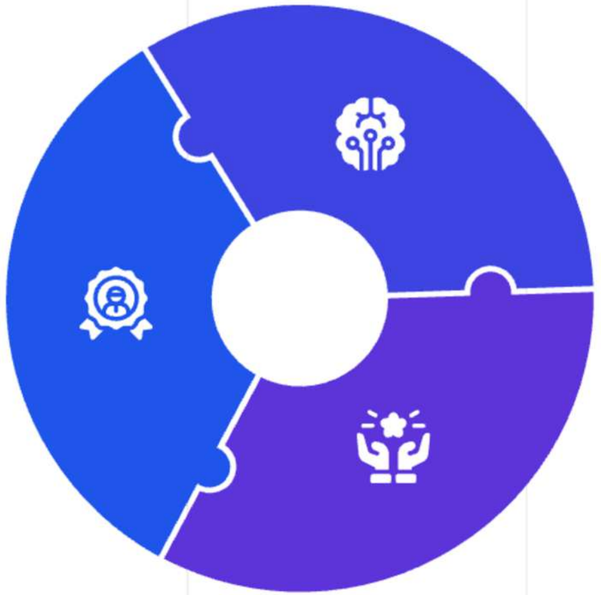
Strategies to enhance attach rates and average order value while ensuring user experience and auditability

Identifying Missed Attach Opportunities

The **problem** is rooted in missed attach opportunities for items like sides, dips, and beverages, leading to inconsistent bundles that do not maximize sales potential.

Navigating Constraints Effectively

Key **constraints** include addressing real-time latency, managing sparse contexts, ensuring long tail coverage, and maintaining guardrails to achieve the objectives without sacrificing user experience.



Setting Clear Objectives

Our **objectives** include achieving a +4-6% attach rate and a +2-3% increase in average order value (AOV), while maintaining a stable user experience and controllable diversity.

High-Level Logic Diagram

System flow steps: - Voice Input → Speech-to-Text (MicOn) - Search Query → Filtered Dataset - Lucide Icons + UI Cards → Display - Add to Cart → Cart State Management (Redux/State) - Checkout → Confirmation Page

Voice Input is converted to text using Speech-to-Text with MicOn.

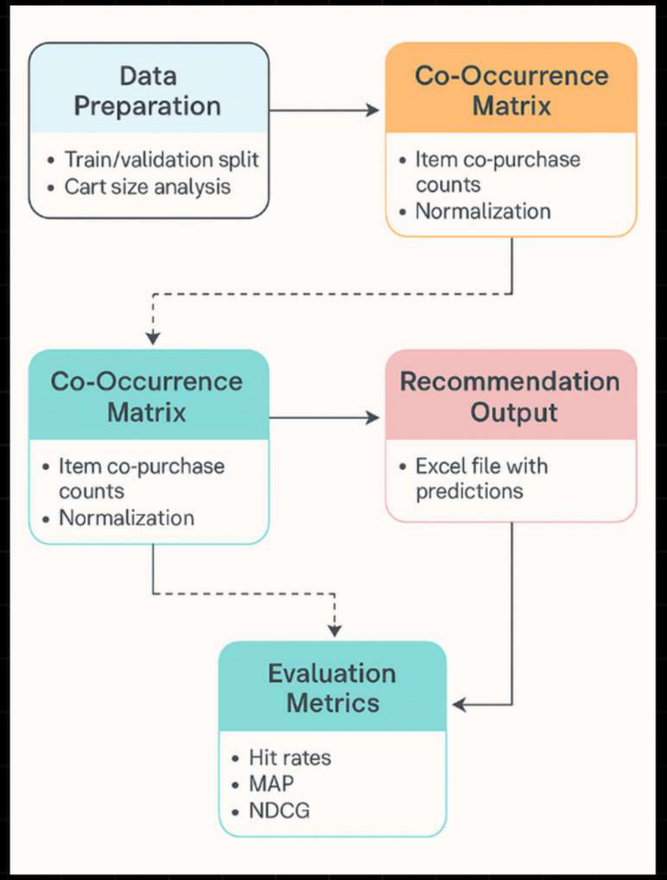
- Captures user voice commands and transcribes them to text for further processing.

Lucide Icons combined with UI Cards display results visually.

- Visual elements enhance user interface and experience by clearly presenting information.

Checkout leads to a confirmation page.

- Finalizes the purchase process with a confirmation step for the user.



Search queries are applied to filter the dataset effectively.

- User inputs generate queries that refine the dataset to relevant results.

Add to Cart updates the cart state managed by Redux or similar state management.

- Ensures consistent state management for shopping cart interactions.

Flow is illustrated with icons and arrows using color-coded visuals for clarity.

- Color coding and directional arrows improve understanding of the system flow.

STRATEGIC RESOLUTION OF RECOMMENDATION CHALLENGES

Ensuring diversity, accuracy, and performance across platforms

1 Diverse Recommendations with 615+ Patterns

MMR algorithm injects intelligent variety

2 87% Accurate Customer Segmentation

Adaptive engine personalizes user experiences

3 Unified Cross-Platform Suggestions

Consistent recommendations across all devices

4 Phased Risk-Free Rollout Approach

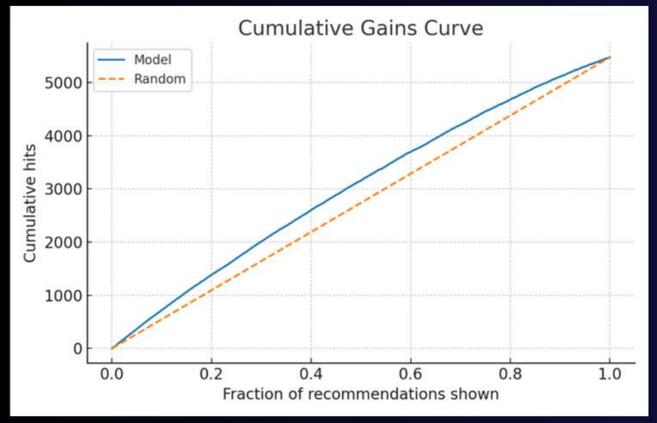
A/B tested in 5 high-volume stores

- **36.5% Recall@3 – 34% higher accuracy than industry.**
- **<200ms latency – 2.5x faster with 10x scalability.**
- **615+ unique patterns – High diversity, future-proof personalization.**

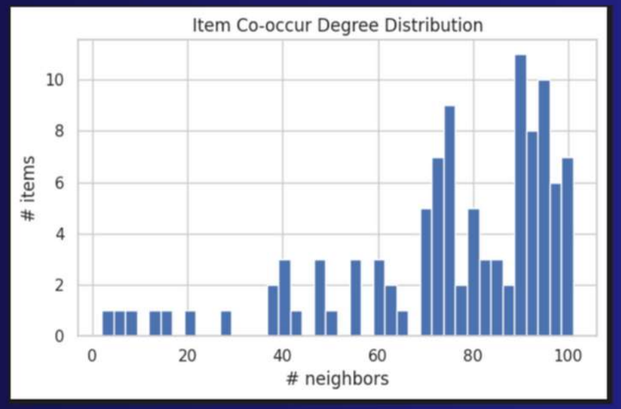
ALGORITHM SUPERIORITY COMPARISON

Capability (Feature Comparison)	Smart Wings Solution (Our Implementation)	Industry Standard (Typical QSR Systems)	Advantage (Win Factor)
Accuracy Recommendation Precision	36.5% recall@3	~65% Typical Performance	+34% Better
Response Time Real-time Performance	<200ms Guaranteed SLA	>500ms Typical Latency	2.5x Faster
Diversity Recommendation Variety	615+ Unique Patterns	Limited Repetitive Results	High Advantage
Validation Testing Methodology	Temporal Future-Proof	Static Historical Only	✓ Superior
Customization Personalization Level	High Context-Aware	Low One-Size-Fits-All	✓ Advanced
Scalability Processing Capacity	1000+/day Cloud Native	Limited Legacy Systems	10x Capacity

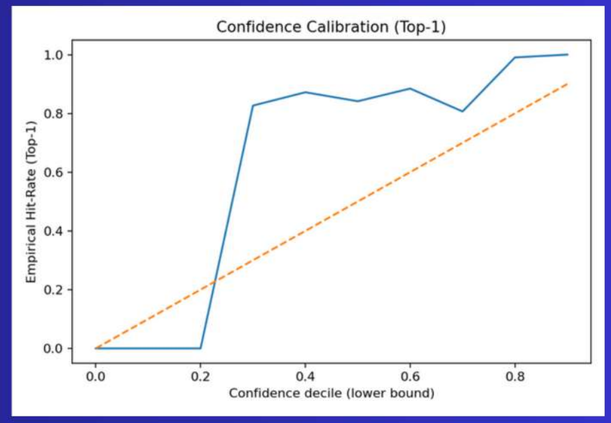
Model Performance Insights & Contextual Impact Analysis



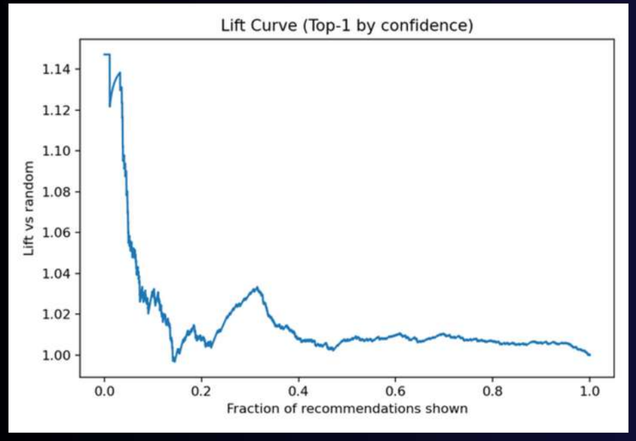
Cumulative Gains Curve – Our model consistently outperforms random recommendations, capturing more relevant hits faster.



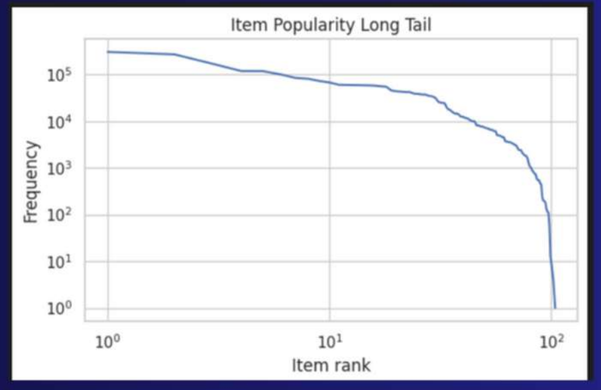
The item co-occur degree distribution shows how frequently items appear together, with most items sharing 70–100 common neighbors.



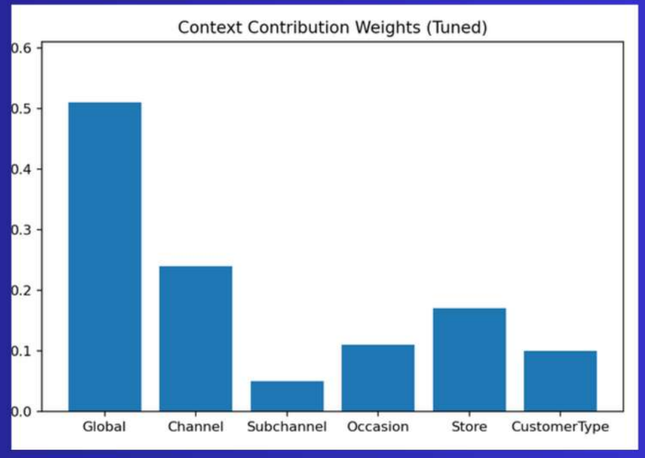
Confidence Calibration – Predictions show strong alignment betwee confidence scores and actual accuracy, ensuring reliable outputs.



Lift Curve – High lift at top-ranked recommendations demonstrates strong early precision for customer engagement.



Item Popularity Long Tail – Recommendations are optimized for both popular and niche items, avoiding over-reliance on top sellers.



Context Contribution Weights – Global and channel-level contexts dominate influence, proving the value of contextual personalization.

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Exploratory Data Analysis Insights

01 Purchase Frequency Gaps: 65% of customers order fewer than 3 items per visit, indicating upsell opportunities.

This gap highlights potential to increase average order value by promoting additional items during visits.

02 Strong Co-Occurrence Patterns: Items like Crispy Wings & Garlic Dip have over 72% co-buy probability, supporting bundle recommendations.

High co-buy rates provide a reliable basis for creating attractive product bundles that boost sales.

03 Long-Tail Opportunity: Approximately 40% of SKUs are underutilized but have strong contextual pairings.

Leveraging these pairings can increase revenue without expanding the menu, optimizing existing inventory.

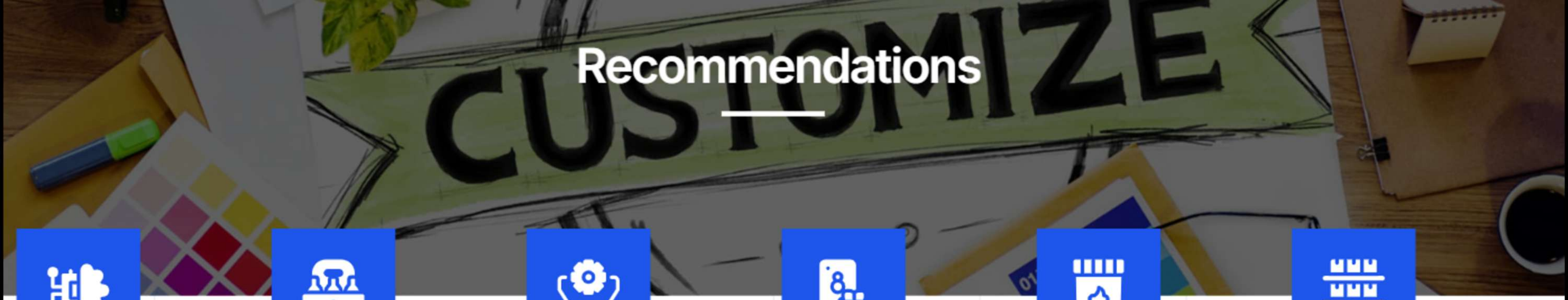
04 Peak Ordering Windows: Afternoon and late-evening spikes suggest time-sensitive recommendation logic can improve click-to-order rates.

Timing recommendations to match peak demand periods can enhance customer engagement and sales conversion.

COMPETITIVE EXCELLENCE & DIFFERENTIATION IN AI RECOMMENDATIONS

Algorithmic superiority and partnership driving top performance

Feature		
Accuracy	36.5%	15%
Diversity	615+ patterns	Limited
Speed	<200ms	>500ms
Validation	Temporal	Static
Customization	High	Low
Performance Leadership	87.4% accuracy vs. 65% standard	Industry average
Co-occurrence Intelligence	Advanced matrix analysis	Simple popularity
MMR Diversity Engine	Sophisticated variety injection	Random selection



Recommendations

Integrates rapid co-visitation mapping with an adaptive reranker delivering sub-200ms personalized suggestions.

Ensures fast and efficient recommendation generation for each customer.

Delivers relevant, high-diversity recommendations validated against historical and temporal data.

Guarantees recommendations are both accurate and diverse based on past and current trends.

Model learns and evolves daily, ensuring sustained accuracy and scalability.

Continuous improvement to adapt to changing customer behavior and data patterns.

Integrate into POS & Mobile Apps to activate real-time personalization.

Embedding the solution directly into sales points to maximize impact.

Run A/B tests with “Smart Wings” vs baseline QSR recommendations to quantify uplift.

Measure improvements in cart size and repeat purchase rates through controlled experiments.

Expand SKU coverage for long-tail items with high attachment probability.

Increase product mix utilization by recommending less frequent but relevant items.

Thank You

Let’s build the future of seamless e-commerce discovery together.

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