Why Smart Stack?

The Challenge of Credit Card Offer Personalization

Generic Offers

→ Irrelevant and low conversion

One-size-fits-all credit card offers that ignore customer preferences and spending behavior

Lack of Feedback Loops

→ No personalization or learning

Systems fail to capture user feedback and adjust future recommendations accordingly

Slow, Non-Adaptive UX

→ No real-time change based on behavior

Static interfaces that don't update as users interact and reveal preferences

SmartStack aims to deliver personalized, real-time, high-conversion credit card offers through machine learning and user interaction.

How Smart Stack Works

A 6-layer engine that turns raw user activity into meaningful personalized offers in real time

Data Ingestion

Salesforce Marketing Cloud

Google analytics

Kafka

Captures user interactions and financial behavior across channels

Outputs:
Data storage service like amazon s3

Feature engineering

dbt

Spark

Redshift

Transforms raw data into ML- ready features and user signals
by cleaning data and extracting the features

Outputs:
BigQuery, Redshift

ML Model

XGBoost

Redshift

Ranks offers using spend patterns, quiz responses, and click history

Fallback:
SmartScore rules-based ranking

AI Messaging

Perplexity

GPT

Gemini

Generates personalized explanations for why offers were selected

Example:
"Because you travel often..."

Application Layer

Firebase

Redis

Manages user engagement metrics, streaks, and achievement badges

Features:
Streaks, badges, challenges

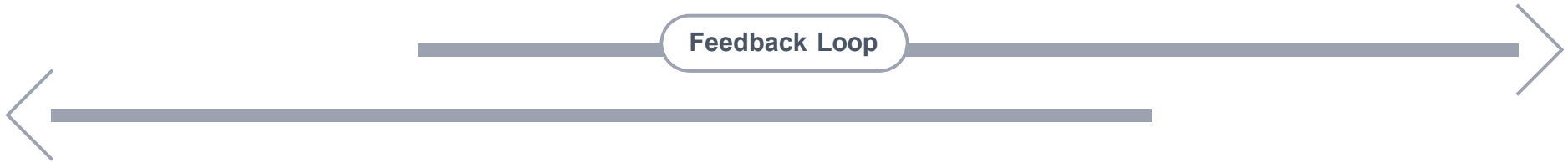
Feedback Loop

React

Cloudflare

User feedback is collected through clicks,spends and any kind of interaction

UX:
Top offers, skip options, feedback



Kafka connects all stages

Real-time event streaming ensures data consistency across the entire pipeline

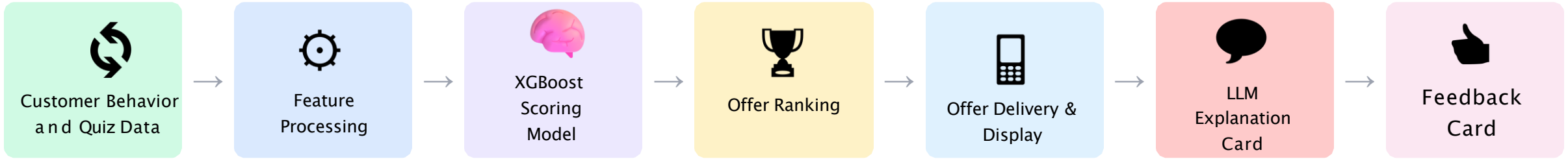
Data Storage

Raw data in GCS/S3, processed features in Vertex AI Feature Store

Feedback is routed back

User interactions inform model retraining and offer optimization

How the Smart Stack Personalization Model Works



How It Works

- Quiz, normalized spend,geographical data and browsing behavior are captured live via the portal and streamed in real time
- Engineered features include: spend trends, category preferences, reward vs discount focus
- Google Analytics,Kafka,salesforce marketing cloud process and clean data before model scoring Offers are cached and refreshed only when significant behavioral shifts are detected
- LLM generates explanations like: "You spent 3x more on Dining last month, so we picked this!" User feedback loops back to improve future recommendations

SmartStack in Action - Sara's Journey

Person: Sarah, 34 | Amex Gold Member | $1,200/month spend | Prioritizes travel experiences with reward heavy offers

	What Sarah Does	What SmartStack Does	
Spending	Eats out Fri-Sun regularly at restaurants	Tracks dining spend signals via Kafka streaming	Behavioral data captured in real-time
App Browse	Opens Amex App and browses "Amex Offers"	XGBoost dynamically re-ranks offers based on profile	Personalized content delivered instantly
Offer View	Searches for dining and cashback heavy offers	XG Boost detects that this is unusual	Helps in finding new preferences
Activation	Clicks "Activate" on travel offer	The XG Boost will send signals about behaviour change to LLM layer	LLM Model will generate a question asking about new preferences of Sarah
respond	She clicks yes on the notification displayed	Asks some more questions and generates new top n offers acc. To new preferences	Increases satisfaction of sara
Feedback	Rates the offer 5/5 for relevance	Feedback loops into XGBoost model refinement	Improves future personalization

Proven Product Impact
improved Click-Through Rate vs generic offers
Continuous ML model improvement via feedback loops
Higher cardmember satisfaction and loyalty scores

As a PM, I Lead:
Quiz & Logic Design: Designing onboarding quiz, fallback logic
Success Metrics: Defining KPIs (CTR, engagement, feedback)
Privacy Leadership: Privacy-first data collection protocols

UI Mockup & Model Comparison

My Offer Feed

Looking for cashback deals today?

Yes, show 💸 | No thanks →

Cashback

10% cashback at Starbucks

Valid until June 30th, 2023

You spent 3x more on coffee shops last month, so we picked this offer for you!

Was this helpful?

Travel

Activate

5% back on hotel bookings

Valid for bookings made by August 15th

Based on your recent travel spending, this hotel offer matches your needs.

Was this helpful?

Dining

Activate

3x Points at Restaurants

Every weekend in July

This matches your weekend dining pattern we noticed from your recent interactions

SmartPrompt appears as a right-side panel overlay only during major behavioral shifts. The main offer feed remains fully accessible and interactive. All prompt interactions are voluntary and non-intrusive.

Why We Use XGBoost

- Excellent with structured tabular data
- High accuracy & fast prediction speed
- Handles missing and skewed data well
- Interpretable via feature importance

Model Comparison

Model	Accuracy	Speed	industry fit
XGBoost	High	High	Excellent
Light GBM	High	Very high	Not tested a lot
Cat boost	High	Medium	Not a good fit

"XGBoost strikes the best balance between accuracy and real- time scalability, making it perfect for scoring offers in a production system. LLM explanations and user feedback close the loop, creating transparency and continuous improvement."

The Smart Stack Pod

Cross-functional team enabling real-time personalization at scale

Product & Strategy

>Define personalization vision & user flow
>Finalize MVP features like quiz, fallback, and streaks
>Own roadmap, OKRs, and impact tracking

AI & MLTeam

> Train offer scoring model (XGBoost + fallback)
> Deciding what LLM will we use
> Perform A/B Testing on features

Data Engineering

> Real-time Kafka pipelines between different layers
> layers Feature store management (Big query)
> Data quality checks & backfill jobs

Marketing team

> Provide the description of offers.
> Run email campaigns

Frontend and backend team

> Design quiz UI and interaction flow
> Focus on improving the response time and scaling the backen
> Testing the frontend and backend

Legal, Privacy & Compliance

> Implement PII redaction and consent checks
> Maintain audit trails & GDPR safeguards
> Ensure LLM usage follows internal governance

- ### Collaboration Workflow

> Agile sprints (2-week cycles)
> Weekly syncs across data, product, UX MVP feedback loop from internal testers
> Shared Notion/JIRA tracker

Key Success Enablers

>Tools: Big query,Fast API, Redis, Firebase
>Collaboration: Slack, JIRA, GitHub
>Privacy by Design: Redaction filters, consent-first data
>Dashboards: Datadog + Looker alerts
>Continuous learning: Shareback meetings + LLM prompt tuning

Smart Stack Launch Plan - 4 -Phase Lifecycle

Phase 1: Development
(5 Weeks)
$200,000-$220,000

Activities
- Define personalization logic
- Build XGBoost scoring engine
- Set up Kafka,google analytics,Big Query
- Design quiz questions

Risks & Fixes:
⚠ Wrong feature selection
✅ Run A/B tests on historical data

Phase 2: Testing
(2 Weeks)
$50,000-$57,000

Activities
- Quietly launch to 10% users (shadow mode)
- Track quiz responses, offer clicks
- Ensure bug fixes & privacy compliance

Risks & Fixes:
⚠ Private data exposure in logs
✅ Anonymized IDs + Consent based collection

Phase 3: Deployment
(3 Weeks)
$71,000-$92,000

Activities
- Roll out to all customers
- Monitor clicks, skips, badges/streaks
- Enable monthly quiz refresh

Risks & Fixes:
⚠ System crashing due to heavy traffic

Phase 4: Stabilization
(4 Weeks + Monthly)
& Feedback Loop

Activities
- Retrain model weekly with live data
- Review offer skips & quiz skips
- Improve LLM output tone/quiz
- Route feedback to dashboards

Risks & Fixes:
⚠ Model goes stale
✅ Scheduled retraining cycles

⚠ Feedback not applied
✅ send notifications to PM, assign ownership

Smart Stack System Failure Response
Problem
Personalization engine crashes during peak hours, affecting thousands of credit card users
Solution
•**0-5 min:** System auto-switches to cached personalized offers
•**5-30 min:** Engineers identify memory leak in AI model
•**30+ min:** Product manager coordinates fix team
•**Under 4 hours:** Deploy fix, restore real-time engine, add better monitoring
Results
•**98% performance maintained** using cached offers
•**Customers barely noticed** - seamless experience
•**Quick recovery** with improved system resilience
Key Innovation: Smart caching strategy prevented business disruption while maintaining personalized user experience during technical failure.

Smart Stack Success Metrics

User Experience

🎯 Engagement Metrics

Click-Through Rate on Offers

Offer Conversion Rate

🔍 AI Trust

4.2+/5 rating for LLM description

🎯 User Experience

Measures personalization effectiveness and user satisfaction

Business Impact

💰 Revenue Metrics

Revenue per User (RPU)

Offer Redemption Rate

📈 Growth Metrics

User Retention Rate

💰 Business Impact

Quantifies financial value and growth from personalization

System Performance

Technical Metrics

Response time

System uptime after issues

🔄 Model Quality

Prediction Accuracy

System Performance

Ensures reliable, fast, and accurate AI recommendations