Offer Personalisation Agent

Team Stack

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Problem Statement

Static, Human-Defined Offers

Marketing teams **manually** create offers based on **intuition** rather than real-time data,

Hit-or-miss campaigns some customers are **over-rewarded** others remain under-engaged.

Generic Targeting

Offers are often sent to **broad customer segments** (e.g., "All Silver-tier members").

This fails to account for individual **behaviors, preferences, or predicted** value.

Leads to wasted budget, **reduced ROI**, and **offer fatigue.**

Misaligned Business Goals

Offers are rarely optimized for specific KPIs like reducing churn, driving repeat purchases, or **boosting basket size.**

Businesses often measure campaign success by **redemption rate**, but this doesn't always translate to actual revenue or retention.

Solution - Offer Personalisation Agent

Learns from Data

Analyzes **transaction history, engagement patterns, demographics, and loyalty behavior.**

Uses ML models (e.g., K Means, XGBOOST, reinforcement learning) to predict what will work for each customer.

Optimizes for Business KPIs

Dynamically selects **offer attributes** (discount %, bonus points, free item, etc)

Adapts offers in real-time

Dynamic Target Audience

Increase repeat purchase → personalized bonus points for frequent shoppers.

Reduce churn → retention-focused offers for disengaged customers.

Maximize revenue → higher spend thresholds for high-value customers.

Success Criteria

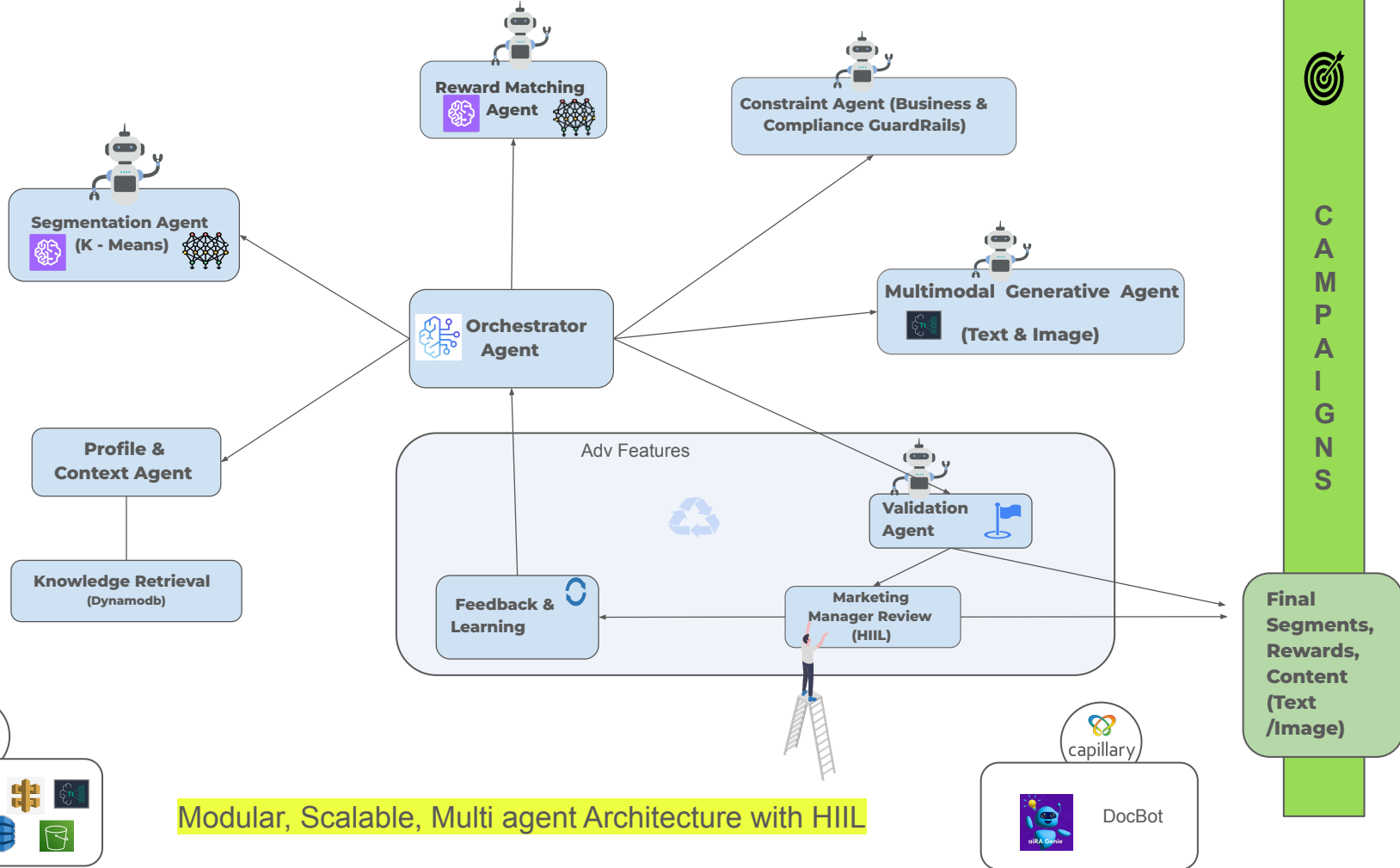**Higher Offer ROI**: More conversions.

Improved Customer Experience

Strategic Agility Human In the Loop

Direct KPI Impact: Retention, revenue growth, CLV.

Trigger :
User /
Behavioral /
Scheduled
Campaigns

Reward Matching Agent

Constraint Agent (Business & Compliance GuardRails)

Segmentation Agent (K - Means)

Multimodal Generative Agent (Text & Image)

Orchestrator Agent

Profile & Context Agent

Knowledge Retrieval (Dynamodb)

Adv Features

Validation Agent

Feedback & Learning

Marketing Manager Review (HIIL)

CAMPAIGNS

Final Segments, Rewards, Content (Text /Image)

aws

capillary

DocBot

aiRA Genie

Modular, Scalable, Multi agent Architecture with HIIL

Profiling Agent: Microservice Agent

Fetch real-time profile (purchase history, loyalty tier, preferences).

Total Customers Analyzed: 80,000

Cleaned, Normalised and prepped data with good distribution.

I/P parameters:

Basic demographics: name, age

Loyalty status: current slab/tier, lifetime value, points balance.

Behavioral: transaction history, frequency, recency.

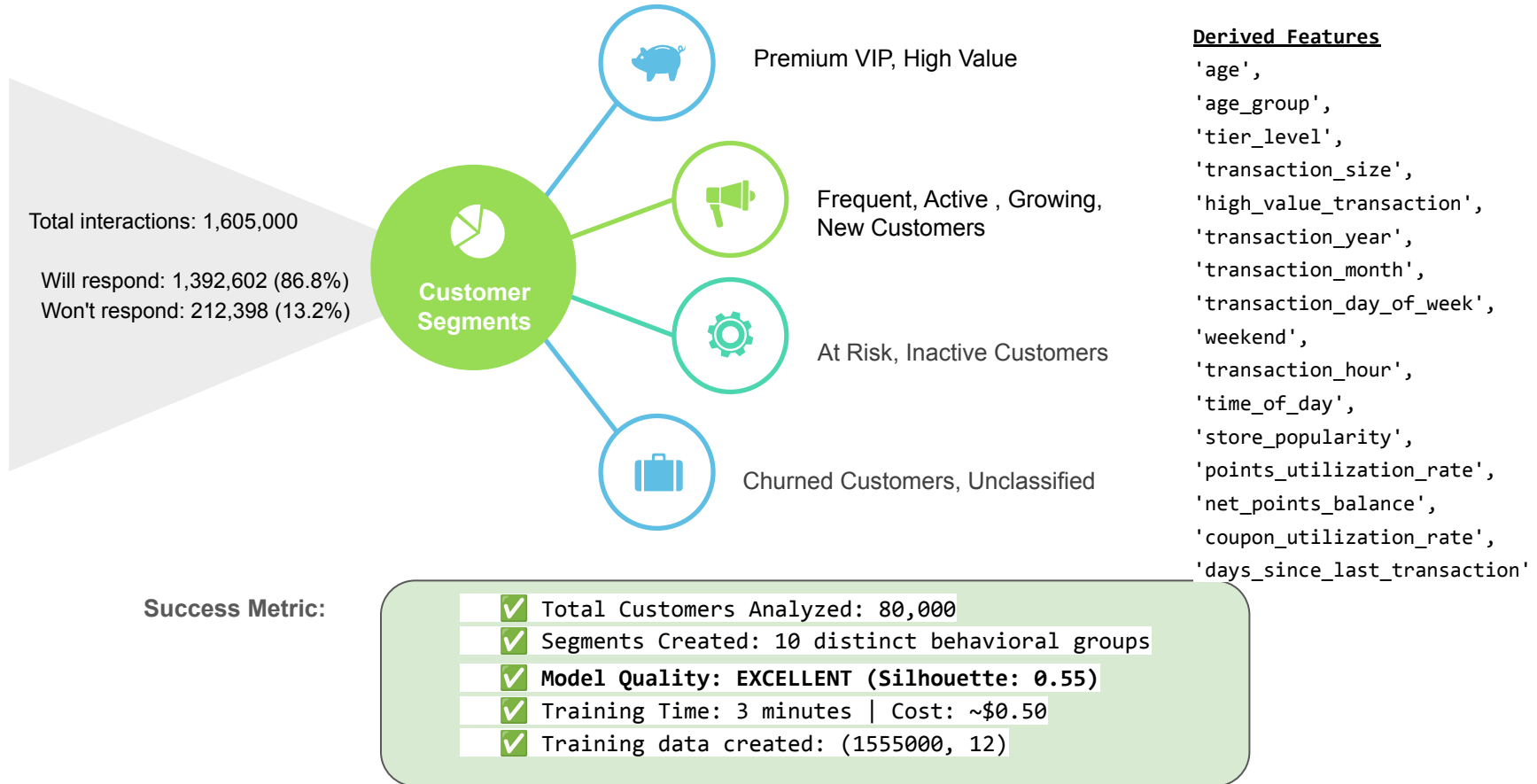Preferences: category affinity, channel preference (email, SMS, app)

O/P parameters:

A schema for Customer Profile.

Features:
'First_name',
'loyalty_tier',
'Bill_id',
'bill_amount',
'points_earned',
'points_redeemed',
'total_coupons_issued',
'coupons_redeemed_in_bill'
'store_name', 'zone',
'transaction_date',
'last_transaction_date',
'date_of_birth',

Customer Segmentation - K Means Clustering

Total interactions: 1,605,000

Will respond: 1,392,602 (86.8%)
Won't respond: 212,398 (13.2%)

Customer Segments

Premium VIP, High Value

Frequent, Active , Growing, New Customers

At Risk, Inactive Customers

Churned Customers, Unclassified

Derived Features
```
'age',
'age_group',
'tier_level',
'transaction_size',
'high_value_transaction',
'transaction_year',
'transaction_month',
'transaction_day_of_week',
'weekend',
'transaction_hour',
'time_of_day',
'store_popularity',
'points_utilization_rate',
'net_points_balance',
'coupon_utilization_rate',
'days_since_last_transaction'
```

Success Metric:

✅ Total Customers Analyzed: 80,000
✅ Segments Created: 10 distinct behavioral groups
✅ **Model Quality: EXCELLENT (Silhouette: 0.55)**
✅ Training Time: 3 minutes | Cost: ~$0.50
✅ Training data created: (1555000, 12)

Reward Matching Agent - XGBOOST

Premium VIP
    Points Promotion,
    min_value: 1000,
    85% Response Rate

Active Frequent
    Points Promotion & Coupon Series,
    Promo min_value: 200,
    75% Response Rate

Growing Potential
    Coupon Series,
    Promo min_value: 50,
    60% Response Rate

Standard Active
    Coupon Series,
    Promo min_value: 100,
     65% Response Rate

Training Data

Reward Catalog:
Total offers: 311

  Columns:
        ['offer_type', 'offer_id', 'offer_name',
         'total_value', 'customers_count', 'usage_count',
'usage_rate', 'value_per_customer', 'value_per_usage',
'total_value_log', 'customers_count_log', 'usage_count_log',
'offer_type_freq', 'offer_name_freq']

 Sample of your reward catalog:

      Offer_type - Coupon Series
      offer_id   - 588904
      offer_name - Flat 30% off on PT Apparels for
      Winback B

Business Constraints Agent

Use **Response Guardrails**:

- **Require JSON Schema Output**

  - Define required keys: `decision`, `audit`.
  - Reject free-text only responses.

- **Numerical Boundaries**:

  - Discount must be between 0–100.
  - Points required must be ≥0.

- **Custom rules:**

  - For non-high users → reject if `discount_pct >`
  - Expiry check → reject if `already expired`

Guardrails

Sensitive Information Protection

Content Filters

regex-based patterns to block invalid outputs:

- Discounts above 100% →
  `"(1[0-9]{2,}|[2-9][0-9]{2,})%"`

- Negative values → `"-[0-9]+"`

- Expired date → regex to catch any ISO date older than `now`

Multimodal Text / Image Generator Agent

AI Model: TITAN amazon.titan-image-generator-v1

Premium VIP
      Prompt : Will have the below:
      Style: "luxury premium elegant",
      Main_text: **EXCLUSIVE VIP OFFER** ←— **Text Generator**
      Colors : "black gold white"
SMS /Whatsapp - Image dimensions & Template

I/P parameters:
Customer Data
User Id , Name, Email, Segment

Segment Data
Offer_title
Discount_percentage
Personalized_text
Coupon_code
Expiry_date
validity_days

Reward Data
Ml_prediction
Confidence_level
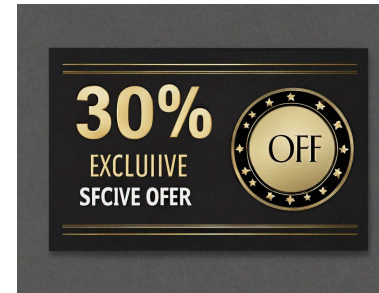Prediction

.
O/P parameters:

1) Personalised Coupon Text

2)Optional : Image

Sample Text Generated:

Exclusive VIP experience awaits, {customer_name}! Your premium status unlocks 25% off luxury collections.",

 Welcome {customer_name}! Your growth journey starts with 15% off your next purchase.",

Hi {customer_name}! Here's your personalized 15% discount, just for you.",

GTM & What Next?

1) Enable **marketer to select cluster(s) + campaign goal**.

2) Let AI agent **auto-pick the right offer** per user.

3) Deliver through **one channel first** (e.g., email).

4) Add SMS/push later.

Whats Next?

- Define **campaign goals** (e.g., "Reduce churn", "Drive repeat purchase", "Boost basket size").

- Select **audiences** (e.g., "Cluster 4", "High Value Users").

- Choose **offer pool** (system filters out invalid ones automatically).

- Schedule **campaign runs** across channels (email, SMS, push, in-app).

Thanks You for your time !!!