Data Storm v6.0
(Team name - DataSurge)

Part 1:

1.2 Factors affecting early performance

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========== FEATURE IMPORTANCE ANALYSIS ==========

Top 15 features by average importance:
                              Feature   Importance
21              quotation_trend_short   98.651593
18        unique_customers_last_7_days   66.679316
9                     unique_customers   62.776193
14              months_since_first_sale   56.768599
2                  customer_trend_long   51.271490
5           quotation_to_customer_ratio   48.513747
4                     engagement_score   47.286352
20               quotation_consistency   47.283440
26                           agent_age   46.769103
17                proposal_acceleration   45.762063
29                customer_consistency   45.262299
11   number_of_cash_payment_policies   44.270242
15                  cash_payment_ratio   43.522967
25                proposal_consistency   42.263503
0                    activity_diversity   42.259504
```

1.3 Personalized action plan recommendation system for at-risk agents.

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========== PERSONALIZED RECOMMENDATIONS ==========
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Personalized Recommendations by Risk Segment:

High Risk Agents (Probability of NILL > 0.75):

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1. Immediate intervention with daily check-ins and
mentoring
2. Focused training on proposal-to-sale conversion
techniques
3. Set daily activity targets for customer contacts and
proposals
4. Pair with a high-performing agent for shadowing
5. Weekly performance review with branch manager
```

Medium-High Risk Agents (Probability of NILL 0.5-0.75):

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1. Bi-weekly check-ins with team leader
2. Targeted training on specific weak areas identified by
the model
3. Increase activity in high-converting customer segments
4. Set weekly goals for proposal and quotation activities
5. Provide additional marketing support and lead
generation
```

Medium-Low Risk Agents (Probability of NILL 0.25-0.5):

```
1. Monthly check-ins with team leader
2. Focus on improving conversion rates
3. Encourage peer learning and knowledge sharing
4. Set bi-weekly goals for customer engagement
5. Provide access to additional training resources
```

Low Risk Agents (Probability of NILL < 0.25):

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1. Quarterly performance review
```

2. Continuous learning opportunities
3. Focus on upselling and cross-selling to existing customers
4. Incentivize maintaining consistent activity levels
5. Recognize and reward positive performance trends

Part 2:

2.1 Method to classify current agent performance

This solution uses an advanced machine learning approach to classify insurance agents based on their current performance. The main focus is to identify "NILL" agents—those who have not sold any new policies—and separate them from performing agents.

Classification Framework

Target Definition:
Agents are categorized using their new_policy_count:

- **NILL Agents:** 0 new policies

- **Performing Agents:** 1 or more new policies

Model Approach:
A robust **ensemble model** is used, which combines predictions from four different classifiers:

- XGBoost

- LightGBM

- Random Forest

- Gradient Boosting

These models work together through a **voting system** to improve prediction accuracy and stability.

Risk Segmentation

Based on the probability that an agent is NILL, the model segments agents into four risk categories:

- **Low Risk (0.00 – 0.25):** Very likely to sell new policies

- **Medium-Low Risk (0.25 – 0.50):** Likely to perform with some support

- **Medium-High Risk (0.50 – 0.75):** May underperform without intervention

- **High Risk (0.75 – 1.00):** Very likely to remain NILL agents

Key Performance Indicators (KPIs)

The model identifies the most important factors that influence agent performance, including:

- **Activity Metrics:**
  Frequency of proposals, quotation conversion efficiency, and engagement with customers

- **Time-Based Factors:**
  Agent tenure, time since first sale, and how recent their last activity was

- **Conversion Efficiency:**
  How effectively agents convert proposals into actual sales, and how many customers they acquire

- **Agent Characteristics:**
  Age, experience level, and how their activity levels relate to their time with the company

2.2 Intervention strategy based on performance category

The model recommends **specific action plans** based on each agent's risk level, helping managers support agents effectively.

High Risk Agents (Probability of NILL > 0.75)

These agents are at high risk of not selling any policies. They need **intensive and immediate support**, such as:

- Daily check-ins and mentoring

- Training focused on improving proposal-to-sale conversions

- Daily targets for contacting customers and making proposals

- Shadowing high-performing agents

- Weekly performance reviews with the branch manager

Medium-High Risk Agents (Probability 0.50 – 0.75)

These agents show signs of underperformance and require **targeted support**:

- Bi-weekly meetings with the team leader

- Training focused on weaknesses found by the model

- Focused efforts on customer segments that convert well

- Weekly targets for proposals and quotations

- Extra marketing help and lead generation support

Medium-Low Risk Agents (Probability 0.25 – 0.50)

These agents are generally doing well but could benefit from **ongoing support**:

- Monthly check-ins with the team leader

- Guidance to improve sales conversion rates

- Opportunities for peer learning and collaboration

- Bi-weekly engagement goals

- Access to optional training resources

Low Risk Agents (Probability < 0.25)

These agents are top performers. The focus here is on **retention and motivation**:

- Quarterly performance reviews

- Continuous development opportunities

- Strategies for upselling and cross-selling

- Incentives for staying active and consistent

- Public recognition and rewards for strong performance

2.3 Progress tracker to measure changes over time.

While the current code predicts risk levels, a full tracking system would help monitor agent progress, evaluate interventions, and enable early action. Below is a structured framework for implementing such a system.

Key Metrics to Track

Activity Metrics:

- **Proposal Intensity**: Number of proposals submitted per month

- **Quotation Activity**: Quotations generated per month

- **Customer Engagement**: Number of unique customers contacted

- **Recent Trends**: Short-term activity metrics (last 7, 15, 21 days)

Conversion Metrics:

- Proposal-to-Quotation Ratio

- Quotation-to-Policy Ratio

- Customer-to-Proposal Ratio

- Overall Conversion Efficiency

Performance Outcomes:

- New Policy Count

- ANBP (Annual New Business Premium)

- Net Income Generated

Implementation Plan

1. Time-Series Monitoring

- Track agent **risk scores weekly or monthly**

- Monitor how agents **move between risk segments**

- Visualize performance trends over time (line charts, heatmaps)

2. Intervention Effectiveness

- Run **A/B tests** on intervention strategies (e.g., compare outcomes between agents who received mentoring vs. none)

- Measure changes in risk score **before and after interventions**

- Calculate **conversion improvement rates**

3. Early Warning System

- Flag agents with:

  - **Declining activity** trends

- - **Worsening conversion** ratios

  - **Rising risk scores**

- Send **automated alerts** for agents moving toward High Risk

4. Feedback Integration

- Collect **qualitative feedback** from branch/team managers

- Include **self-assessment inputs** from agents

- Use feedback to **retrain and fine-tune** the model

5. Visualization Dashboard

- Agent-level cards showing:

  - Current and historical **risk scores**

  - Recent activity and sales outcomes

- Team and regional views of:

  - **Risk distribution**

  - Performance trends

- Progress trackers for **activity targets** and **policy outcomes**