

Agent Performance Classification Methods

Data Strom 6.0



Team :Data Nexus

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Agent Performance Classification Methods

1.0 Introduction

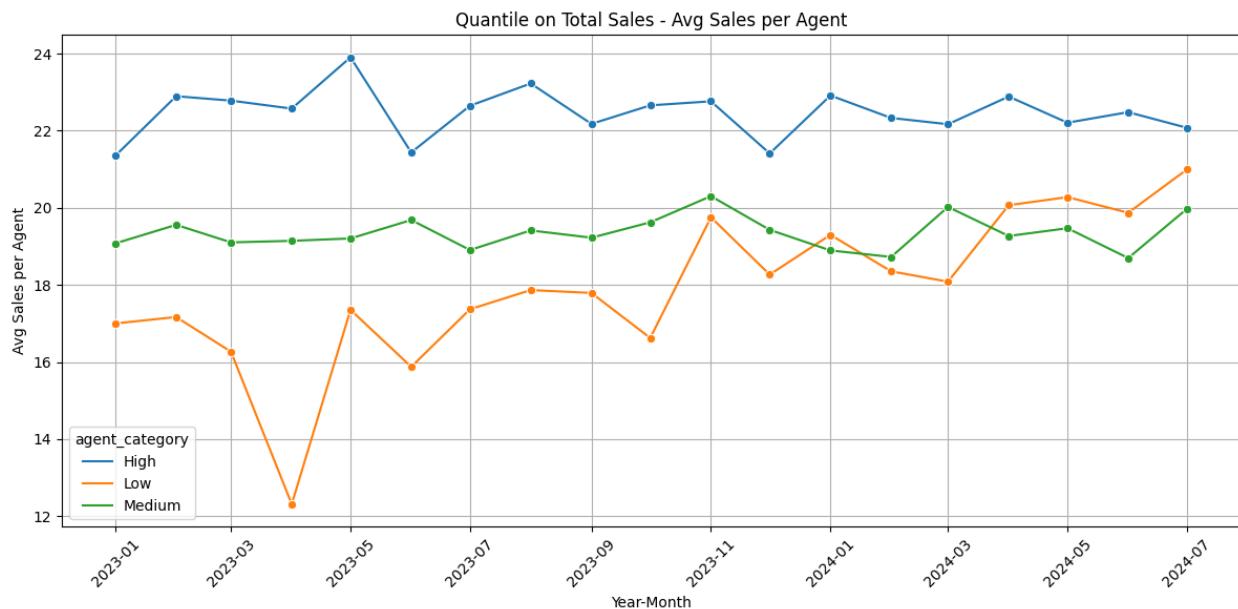
Categorizing insurance agents based on their performance is crucial for developing targeted interventions to improve productivity and efficiency. The goal is to identify high, medium, and low performers so that appropriate strategies can be implemented to help each group improve.

I'll analyze six different classification methods, examining their statistical validity, practical applications, and suitability for your specific task of developing intervention strategies.

2.0 Methods Overview

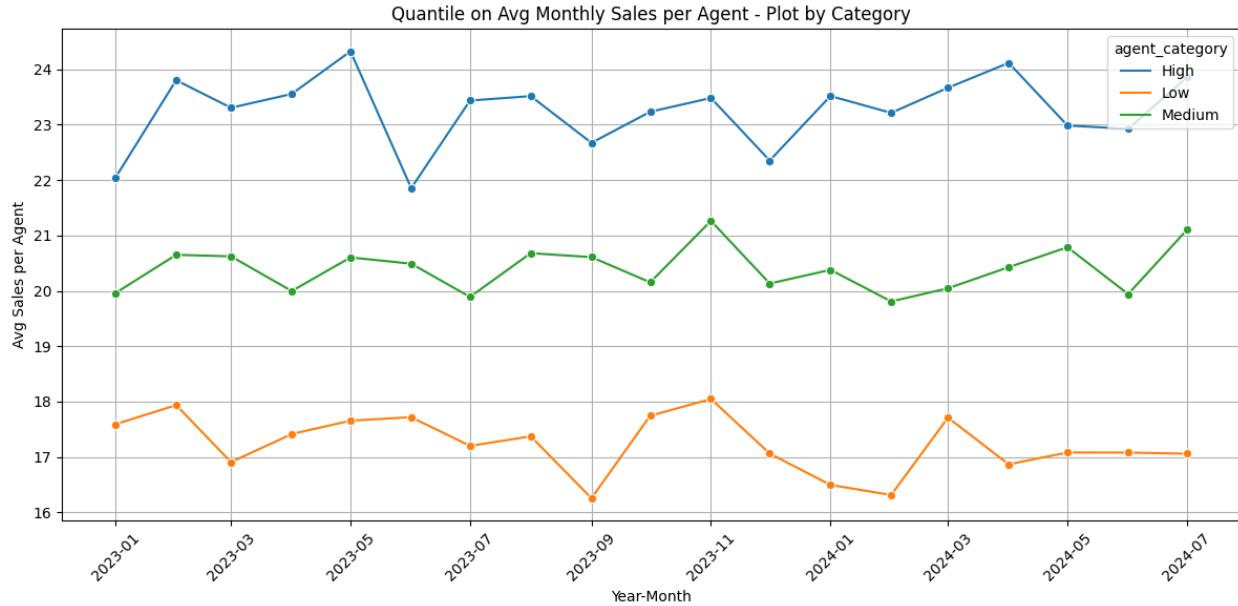
2.1 Quantile Based on Total Sales

This method uses each agent's cumulative sales over all time periods and divides them into performance categories using percentile thresholds (typically 25th and 75th percentiles). It's a straightforward approach that focuses on overall achievement.



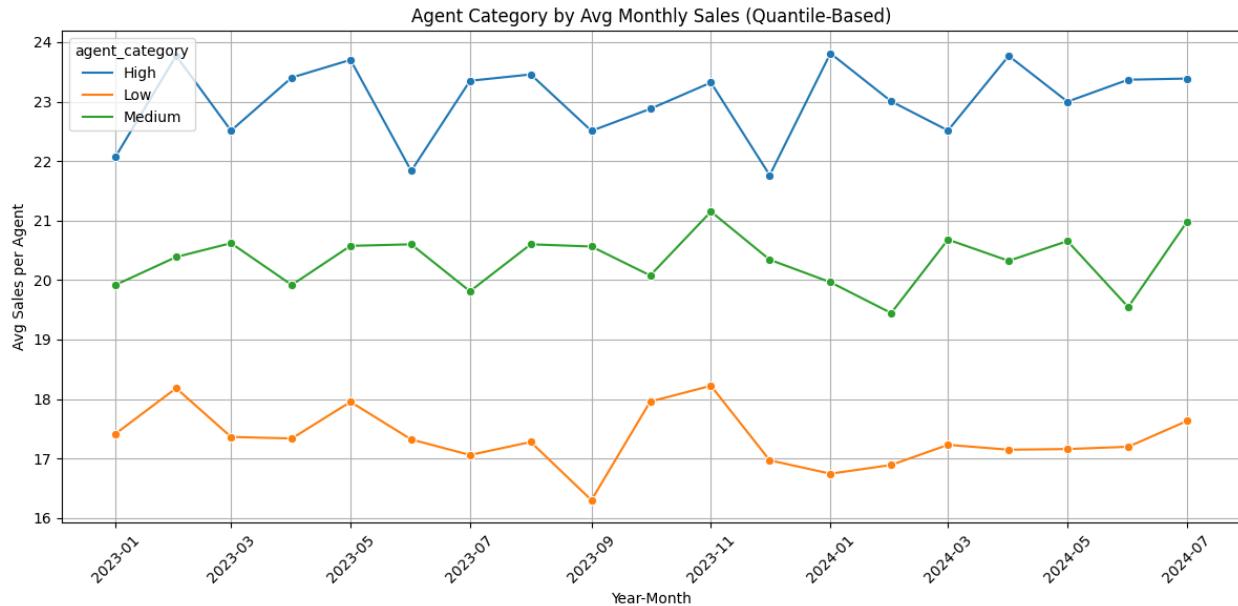
2.2 Quantile Based on Average Monthly Sales (Group Level)

Instead of total sales, this method examines average monthly sales at a category level. This accounts for time-based performance and helps identify consistent performers.



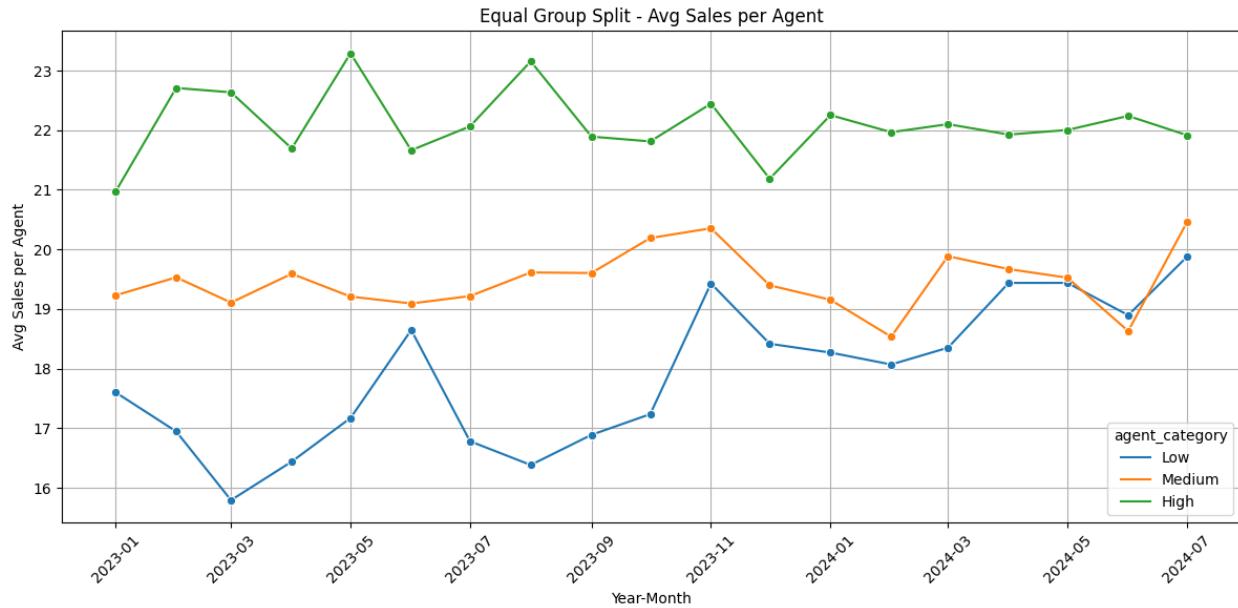
2.3 Quantile on Agent's Average Monthly Sales (Individual-Based)

This method calculates each agent's average monthly performance (total sales divided by active months) before applying quantile thresholds. This approach normalizes for tenure differences between agents.



2.4 Equal-Sized Groups (Tertile Split)

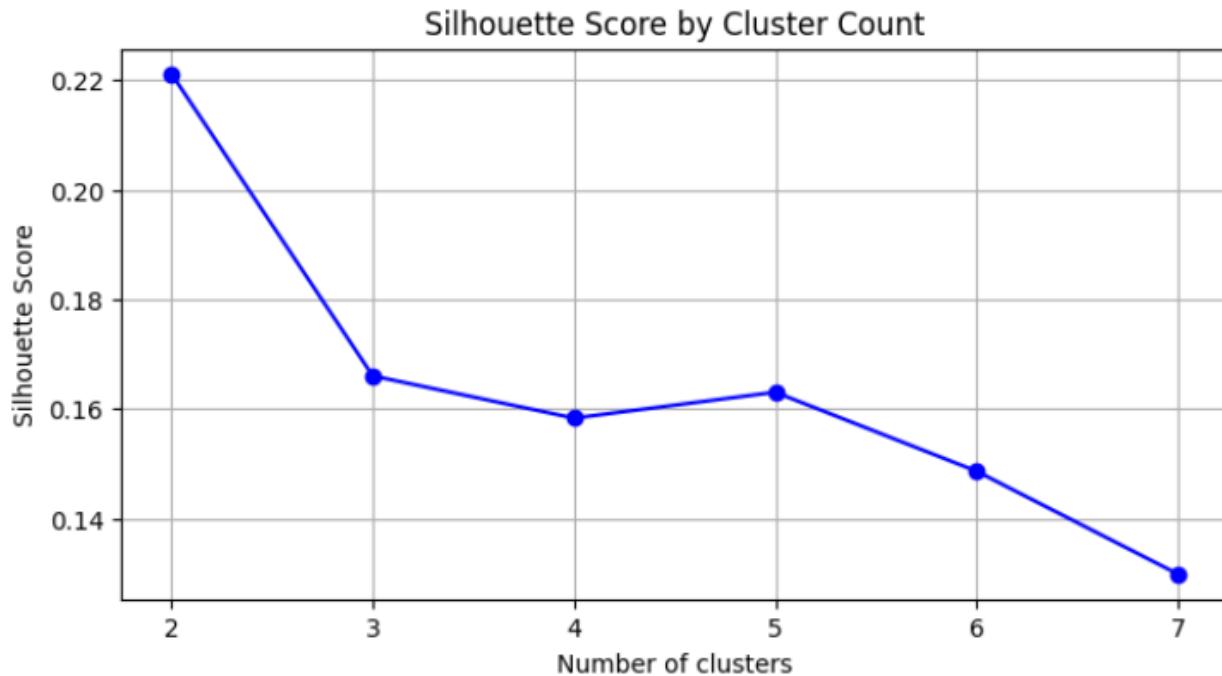
This method simply divides agents into three equally-sized groups based on sorted total sales. It ensures balanced group sizes but doesn't account for natural performance breakpoints.



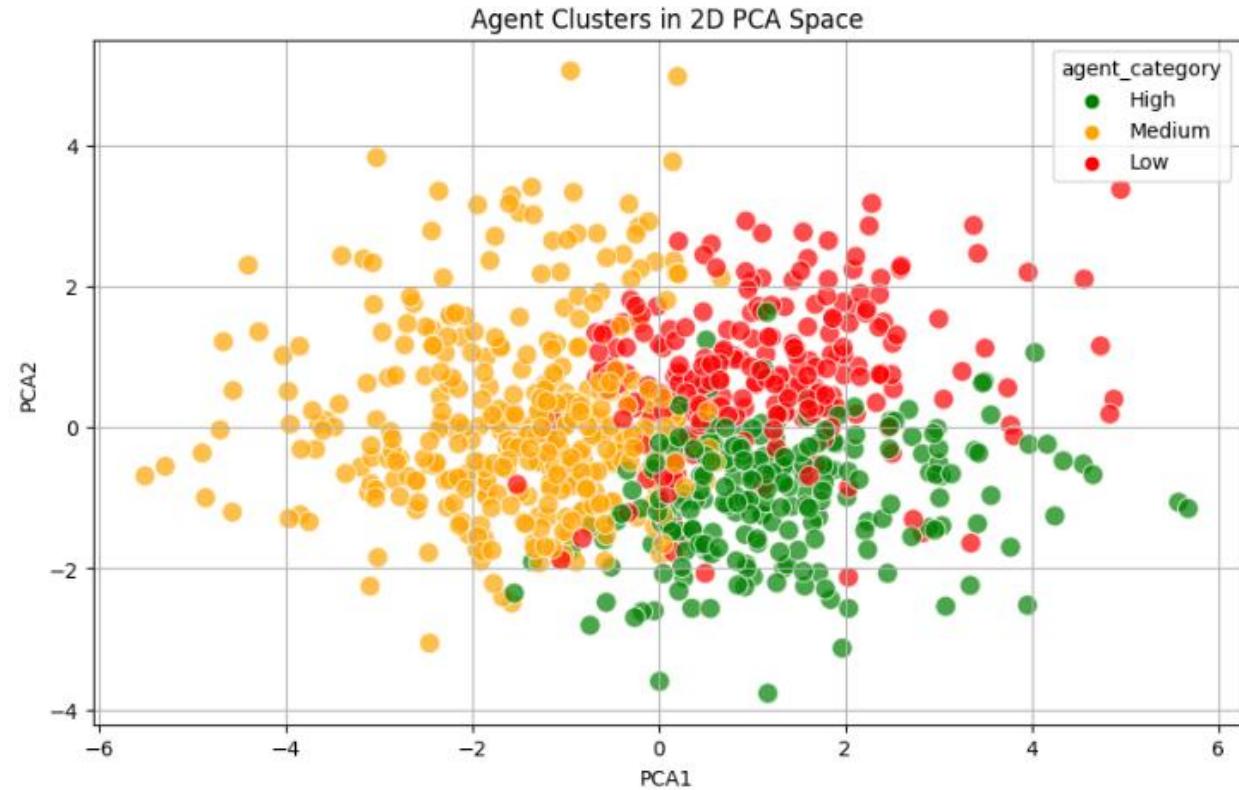
2.5 K-Means Clustering (Method 1)

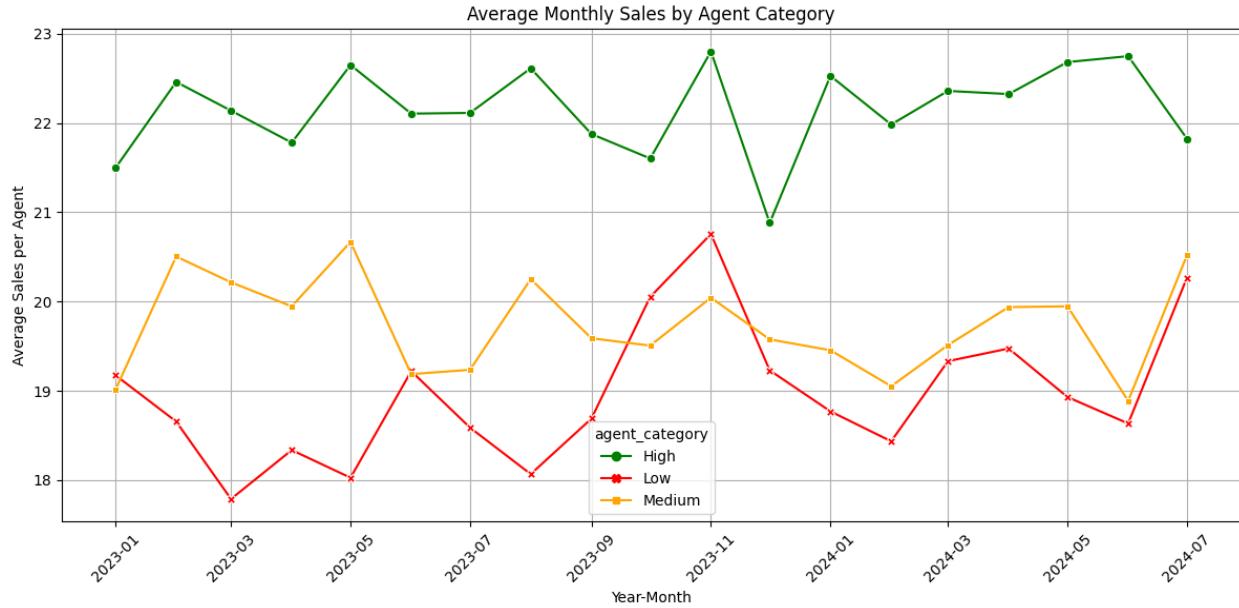
This approach uses Agglomerative Clustering to categorize agents. It starts by creating numerous features from the provided data, focusing on sales volume, business value generated, customer relationships, and the agent's tenure. To ensure the clustering process isn't skewed, it identifies and manages outliers using Z-scores. The method then explores different numbers of potential clusters, using the silhouette score as a guide to determine the most appropriate segmentation. Ultimately, it forms three distinct performance groups – High, Medium, and Low – and labels these groups based on the average sales performance of the agents within them.

To validate the significance of these groupings, Method 1 employs ANOVA. This statistical test checks if the average values of key performance indicators differ significantly across the identified agent categories. Finally, it provides a basic understanding of each cluster by showing the average values of the key features for each group. The results are also visualized using Principal Component Analysis (PCA) to show cluster separation in a lower-dimensional space and time series plots to illustrate the average monthly sales trends for each agent category.



The chart indicates that two clusters provide the best balance of cluster cohesion and separation based on the silhouette score; however, since part 2 asks to categorize agents into three categories (high, medium, and low), we choose three clusters.

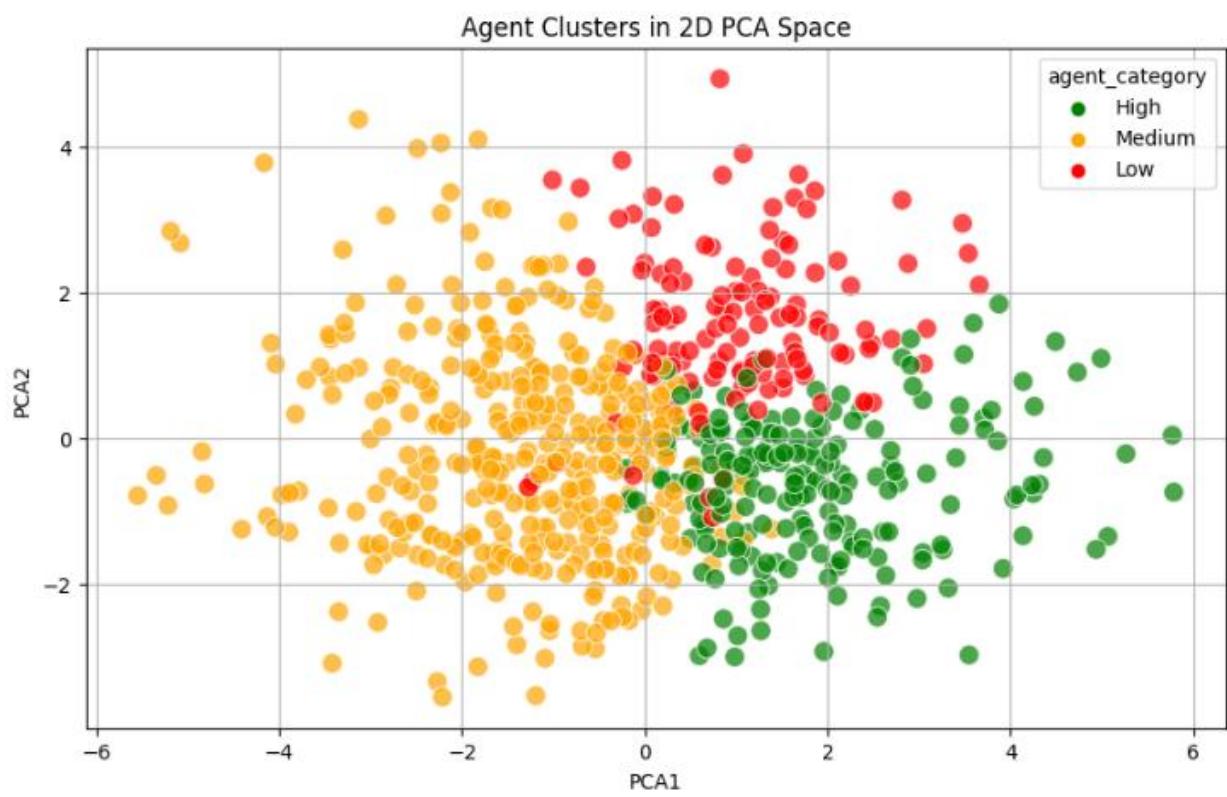
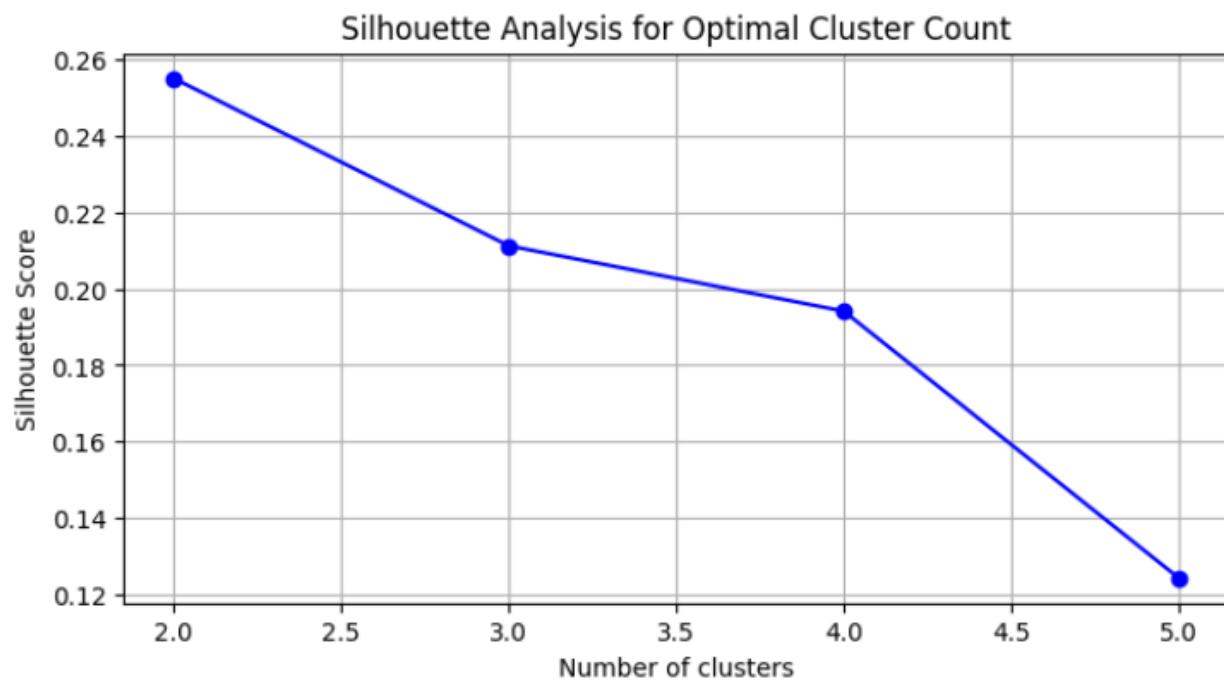


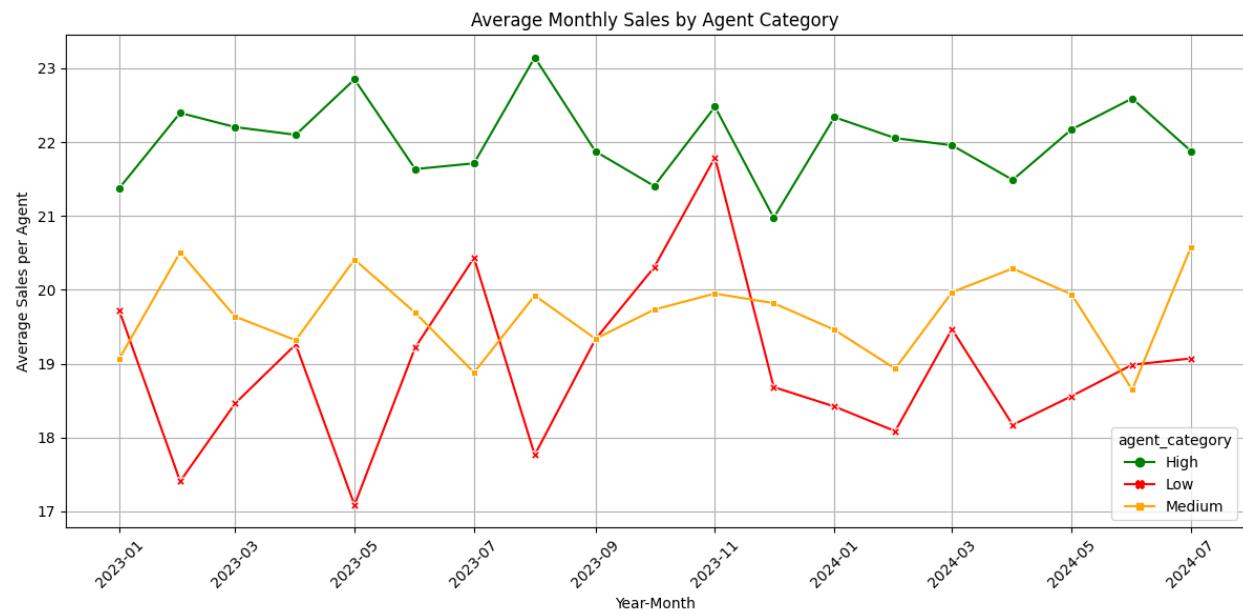


2.6 K-Means Clustering (Method 2)

Similar to the first method, this approach also leverages Agglomerative Clustering to segment agents based on their performance. However, it expands on the feature engineering process by including additional derived metrics like conversion rates and customer value. For outlier handling, it uses the Interquartile Range (IQR) method, which is more robust to extreme values. While it also uses the silhouette score to inform the choice of the number of clusters, it explicitly sets the final number of clusters to three to align with the desired High, Medium, and Low performance categories. The labeling of these clusters is again based on the average sales performance within each group.

Method 2 goes further in its statistical validation by not only performing ANOVA but also conducting post-hoc Tukey HSD tests. These tests allow for pairwise comparisons between the performance groups, identifying which specific groups are significantly different from each other in terms of key performance indicators. Additionally, it offers a more comprehensive view of each cluster's characteristics by presenting both the raw average values and the normalized average values for the key features. Like Method 1, it also includes visualizations such as PCA plots to show cluster separation and time series plots to track average monthly sales for each agent category over time.





3.0 Comparison of Agent Performance Categorization Methods

To decide the best method for categorizing agent performance, we compare the **7 methods** based on:

- **ANOVA Results** (F-statistic and p-value) – Higher F and lower p indicate better separation between groups.
- **Interpretability** – How easily the categories can be explained.
- **Business Relevance** – Whether the method aligns with key performance metrics (sales, policies, income).

3.1 Summary Table of Methods

Method	F (new_policy)	F (ANBP)	F (net_income)	Pros	Cons
1. Quantile (Total Sales)	180.94	76.98	23.93	Simple, easy to explain	Ignores active months (may misclassify part-time agents)
2. Quantile (Avg Monthly Sales - Group)	327.71	105.38	21.24	Accounts for time, better group separation	Less granular than individual-based
3. Quantile (Avg Monthly Sales - Agent)	354.68	115.83	23.41	Most precise (per-agent adjustment)	Slightly more complex
4. Equal-Sized Groups (Tertile Split)	199.70	70.31	19.90	Balanced group sizes	May force arbitrary splits
5. Clustering – Method 1	125.11	243.51	207.87	Captures non-linear patterns	Harder to interpret
7. Clustering Method 2	102.16	192.40	198.54	Balanced performance metrics	Some overlap in net_income (Tukey HSD)

Note: Higher F-values indicate better between-group separation, and all p-values are significant (p=0.0000).

3.2 Key Observations

3.2.1 Quantile-Based Methods (1-3)

Best for simplicity & interpretability

- **Method 3 (Agent Avg Monthly Sales)** has the **highest F-scores** for policy count and ANBP, meaning it best separates agents by performance.
- **Method 2 (Group Avg Monthly Sales)** is a good alternative if individual adjustments aren't needed.
- **Method 1 (Total Sales)** is the simplest but may misclassify agents with varying activity.

3.2.2 Equal-Sized Groups (Method 4)

Balanced groups, but weaker separation

- Forces agents into equal-sized buckets, which may not reflect true performance differences.
- Lower F-scores than quantile-based methods.

3.2.3 Clustering Methods (5-7)

Best for multidimensional separation

- **Method 5 (3 Clusters)** performs well but is harder to explain.
- **Method 6 (2 Clusters)** is too simplistic (only High vs. Low).
- **Method 7 (Alternative 3-Cluster)** shows good separation but has some net_income overlap (Tukey HSD).

3.3 Final Decision Table

Rank	Method	Best For	Limitation
1	Quantile (Agent Avg Monthly Sales)	Best overall separation & fairness	Slightly more complex
2	Clustering – Method 01	Multidimensional insights	Harder to explain
3	Quantile (Group Avg Monthly Sales)	Simpler than agent-level	Less precise

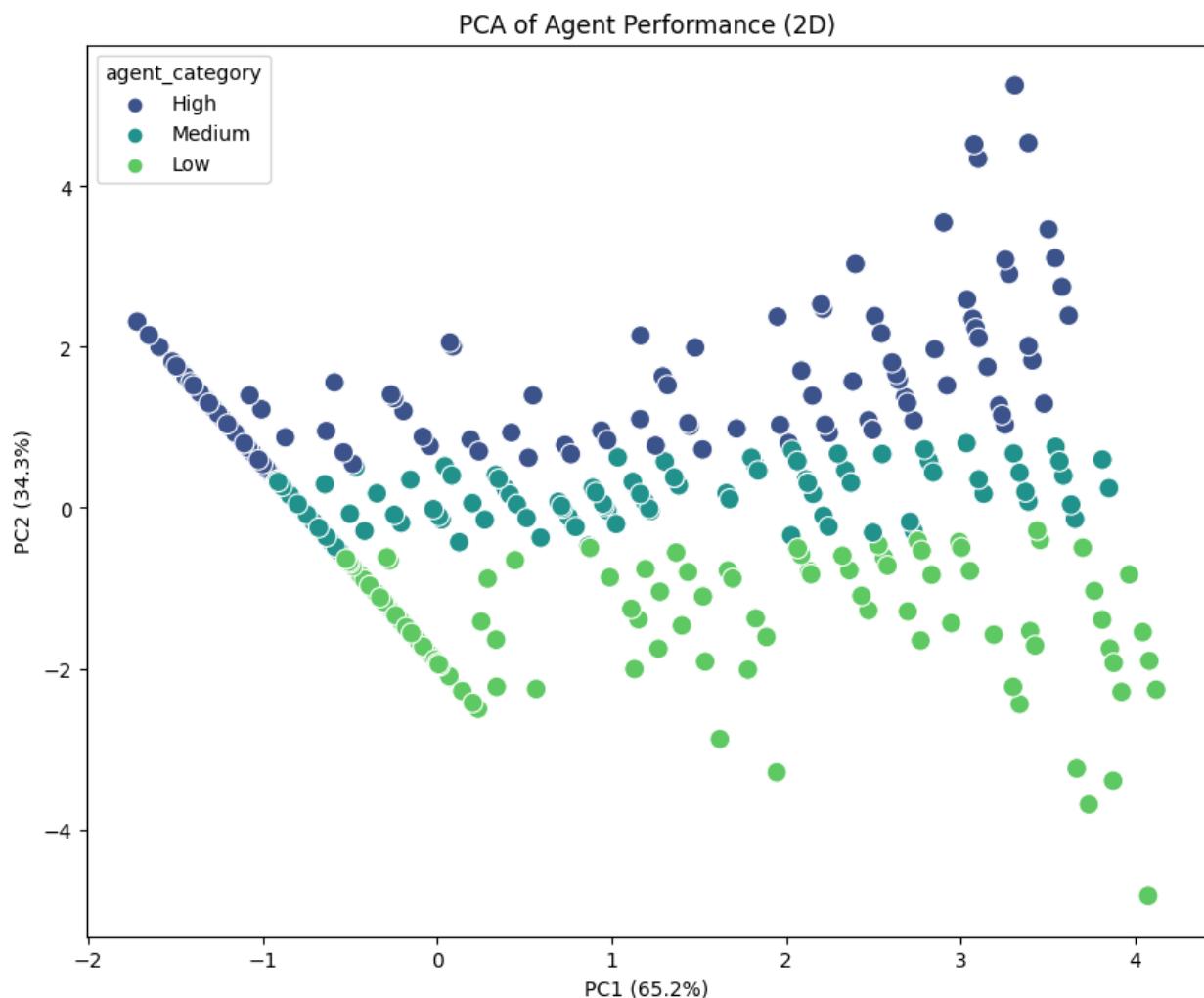
4.0 Best Method for Agent Performance Categorization (Part 2 - Monitoring & Improvement)

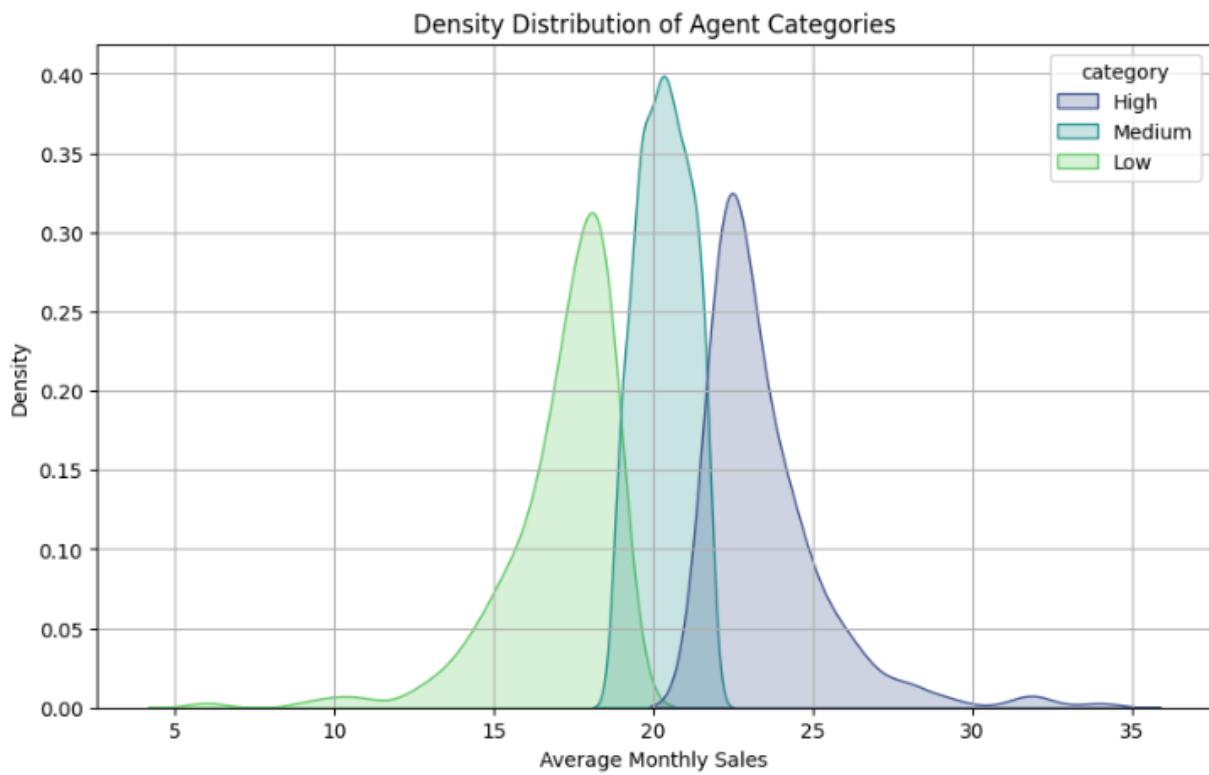
For monitoring and improving existing agent performance, the best method is:

Method 3: Quantile-Based on Agent's Average Monthly Sales (High/Medium/Low)

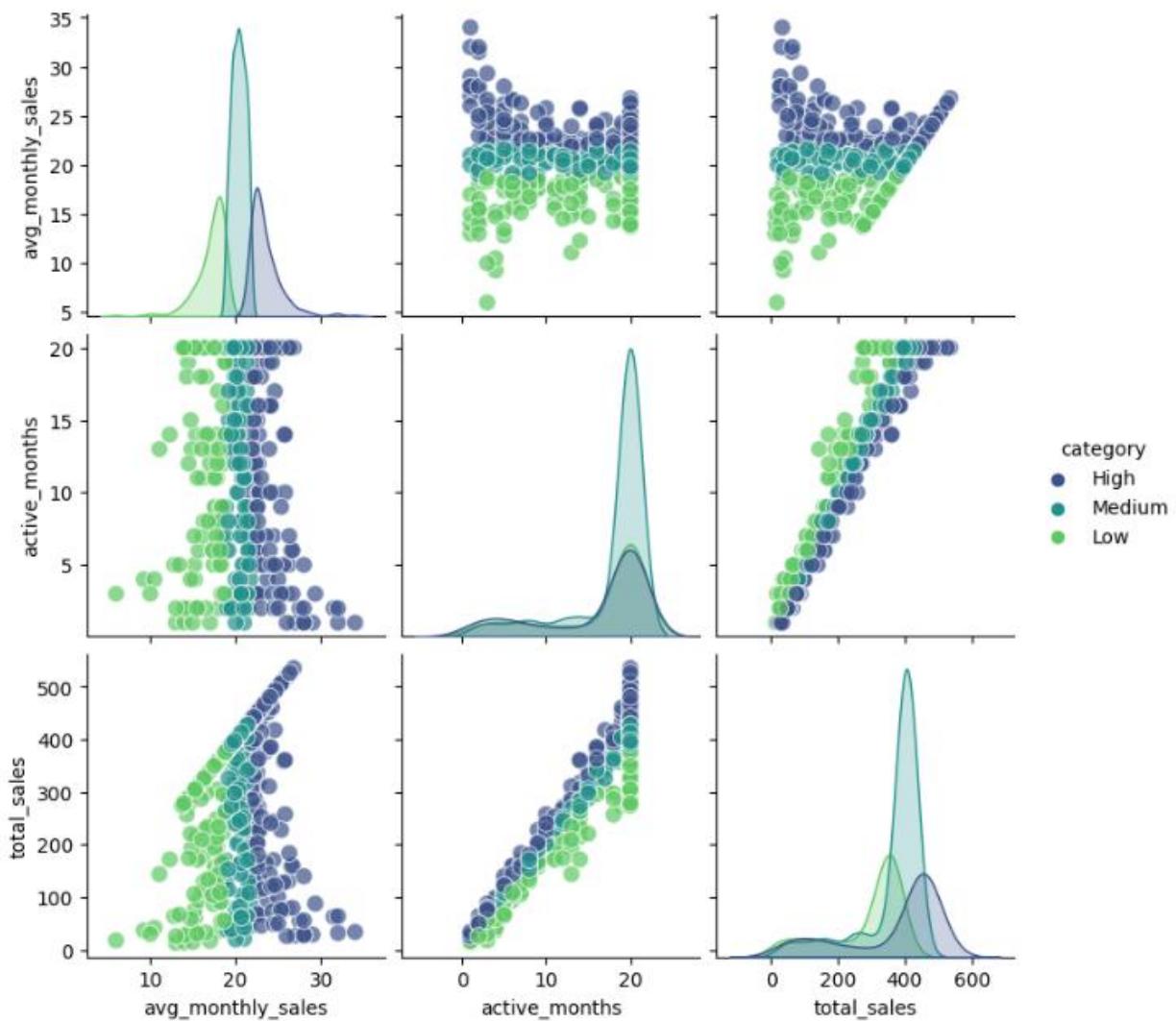
Why?

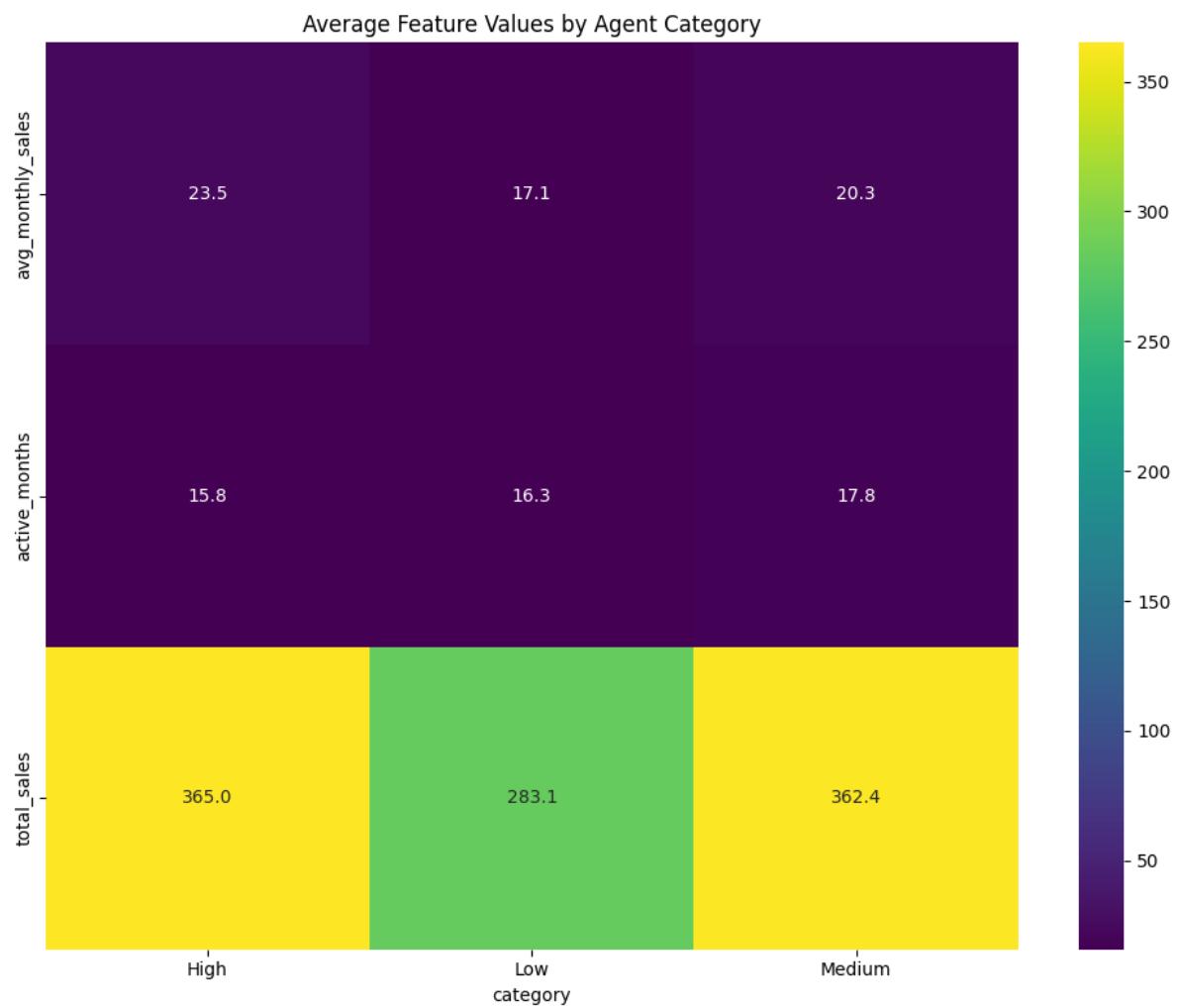
1. **Fair & Accurate** – Adjusts for activity time (active months), so part-time agents aren't unfairly penalized.
2. **Strong Statistical Separation** – Highest F-scores in ANOVA for new_policy_count (354.68) and ANBP_value (115.83).
3. **Simple & Interpretable** – Easier to explain to managers/agents than clustering.
4. **Aligned with Business Goals** – Directly ties performance to sales productivity (per month).





Pairwise Relationships with Agent Categories





4.1 Implementation Steps

4.1.1 Categorize Agents (High/Medium/Low)

- **High Performers (Top 25%)**
 - Avg monthly sales \geq 75th percentile
 - **Example:** Agents selling **> \$22,000/month**
- **Medium Performers (25th–75th percentile)**
 - Steady but not outstanding
 - **Example:** Agents selling **15,000–15,000–22,000/month**
- **Low Performers (Bottom 25%)**
 - Need urgent improvement
 - **Example:** Agents selling **< \$15,000/month**

4.2 Why Not Clustering?

While clustering (Method 5) gives multidimensional insights, it's **harder to implement** for ongoing monitoring because:

- Less intuitive for managers ("Why is Agent X in 'High' when sales are low?").
- Requires recalibration if business priorities change (e.g., shifting focus to net_income).

5.0 Intervention Strategy by Agent Performance Category

Based on Observed Trajectories, Conversion Efficiency, and Growth Patterns

5.1 High-Performing Agents

Typical Behavior:

- Show fast learning during onboarding and outperform peers by 3–12 months
- Continuously improve their conversion rates
- Exhibit self-driven learning and often experiment with new techniques

Strategic Goal: Retain, recognize, and accelerate their growth

1. Interventions & Why:

1. Elite Mentorship & Thought Leadership

- **Why:** These agents thrive on growth and recognition. Giving them leadership exposure satisfies career aspirations and helps scale their mindset to others.
- **Example:** Pair them with executives for strategy discussions and allow them to mentor rising performers.

2. Accelerated Career Pathways

- **Why:** High performers continue to grow even after 12+ months. Without clear advancement paths, they risk disengagement.
- **Action:** Assign them strategic accounts and prep them for senior sales or training roles.

3. Recognition & Rewards

- **Why:** Their early and continuous results merit public validation. Recognition also strengthens loyalty.
- **Action:** Implement spotlight awards, performance retreats, or quarterly celebration events.

4. Stretch Assignments & Pilots

- **Why:** Their “step changes” in growth suggest they enjoy challenges. Let them test new tools or market approaches to unlock innovation.

5.2 Medium-Performing Agents

Typical Behavior:

- Gradually improve with time but may lack consistency or advanced techniques
- Some momentum visible during the 3–12 month acceleration phase
- Potential to break into top tier if properly supported

Strategic Goal: Bridge performance gap through skill-building and momentum coaching

2. Interventions & Why:

1. Individual Development Plans (IDPs)

- **Why:** These agents are stable but need a nudge. Structured goals provide direction and accountability.
- **Action:** Managers co-create monthly KPIs and review them with performance coaching.

2. Targeted Skill-Building Workshops

- **Why:** Conversion rates are often average—indicating they understand the sales process but lack finesse.
- **Action:** Focus training on objection handling, emotional intelligence, and high-conversion product pitching.

3. Peer Acceleration Programs

- **Why:** Shadowing high performers can unlock the “how” of excellence through direct modeling.
- **Action:** Implement cross-shadowing sessions, peer reviews, and roundtables.

4. Sales Support Enhancements

- **Why:** They’re doing most things right but need efficiency tools to free up time for closing deals.
- **Action:** Provide lead scoring tools, sales templates, and admin support.

5.3 Low-Performing Agents

Typical Behavior:

- Plateau early, show flat performance trends
- Erratic proposal-to-policy conversion, indicating poor targeting or inconsistent pitch quality
- Often overwhelmed or lack foundational sales structure

Strategic Goal: Stabilize performance through structure, repetition, and support

3. Interventions & Why:

4. Foundation Reboot Program

- **Why:** They often missed key onboarding lessons. Going back to basics helps rebuild confidence and competence.
- **Action:** Use simple scripts, call reviews, and weekly coaching for behavior correction.

5. Simplified Product Focus

- **Why:** Flat growth suggests complexity is a barrier. Simpler products with higher conversion help build early wins.
- **Action:** Restrict them to high-margin, easy-sell products with tailored materials.

6. Daily Routines & Task Tracking

- **Why:** These agents need structure to develop habits. Clear daily tasks encourage accountability.
- **Action:** Use checklists and dashboards to reinforce effort and show progress.

7. High-Touch Supervision & Peer Mentoring

- **Why:** Continuous feedback prevents drift. Peer mentors help normalize best practices without the pressure of hierarchy.
 - **Action:** Assign supportive mid-performers as informal mentors and meet weekly for progress updates.
-

5.4 Why These Interventions Work

Based on Trajectory Analysis:

- **Separation occurs early**, so the sooner we act, the higher the ROI on support.
- **Top performers gain compounding benefits**, so sustained growth strategies are vital.
- **Conversion rates are the true differentiator**, making targeted sales efficiency training critical for mid/low performers.

 By aligning interventions to actual behavior, we don't waste resources treating all agents the same—and we maximize growth potential across every tier.

6.0 Progress Tracker (Optional Tool)

A simple 3-tier tracker for all performance categories using visual traffic light status.

Metric	Description	Frequency	Red (⚠)	Yellow (⚡)	Green (✓)
Monthly Sales	# of policies sold	Monthly	< Target by 50%+	Within 80-100% of target	Exceeds target
Conversion Rate	Proposals → Policies	Monthly	< 10%	10–20%	> 20%
Activity Score	Weighted score of key tasks (calls, demos, proposals)	Weekly	< 60% target	60–80%	80%+
Skill Development	% Training Completed & Coach Rating	Bi-Monthly	< 50% done or poor feedback	In progress	Completed & positive feedback
Retention Risk	Motivation/Engagement Score	Quarterly	Low engagement signs	Some fatigue signs	Highly engaged

 **Pro Tip:** Color-coded dashboards make it easier for managers to spot improvement or stagnation at a glance.

- **A/B Test Interventions** (e.g., Does training improve Medium performers' conversion rates?).
- **Promote/Demote Agents** if they shift categories for 3+ months.