

Data Storm 6.0

# Agent Performance Analysis

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Team Cognic AI

## Introduction

This report presents an analysis of agent performance using historical and recent data. The goal is to evaluate overall performance and categorize agents into actionable groups as (High/Medium/Low performers). This report also recommend tailored interventions, and propose a method for tracking improvements over time.

## Performance Score Calculation

Both the 'train' and 'test' datasets were combined.

A composite **Performance Score** was derived based on:

- **ANBP Total:** Annual Net Business Premium, reflecting revenue contribution.
- **Consistency Score:** Reflects how consistent the agent's policy performance is.

### Consistency Score

Consistency Score is based on the Coefficient of Variation (CV) of policy counts.

$$\text{Consistency Score} = 1 - (\text{Policy Mean} / \text{Policy Standard Deviation})$$

Policy Mean and Policy Standard Deviation are the mean and standard deviation of the new\_policy\_count of each agent.

### Calculating Performance Score

Both ANBP Total and Consistency Score are normalized using MinMaxScaler, and a weighted average is used to compute the final performance score. The formula to calculate the performance score is given below:

$$\text{performance\_score} = 0.6 * (\text{normalized ANBP}) + 0.4 * (\text{consistency score})$$

The function used to calculate the performance score is given below:

```
import pandas as pd
from sklearn.preprocessing import MinMaxScaler

def calculate_performance_score(df, anbp_weight=0.6, consistency_weight=0.4):
    # Group by agent and compute metrics
    agent_grouped = df.groupby('agent_code').agg({
        'ANBP_value': 'sum',
        'new_policy_count': ['mean', 'std']
    })

    # Flatten column names
    agent_grouped.columns = ['ANBP_total', 'policy_mean', 'policy_std']
    agent_grouped = agent_grouped.reset_index()

    # Compute Coefficient of Variation (CV) and consistency score
    agent_grouped['policy_cv'] = agent_grouped['policy_std'] / agent_grouped['policy_mean']
    agent_grouped['policy_cv'].replace([float('inf'), -float('inf')], 1, inplace=True)
    agent_grouped['policy_cv'] = agent_grouped['policy_cv'].fillna(1)
    agent_grouped['consistency_score'] = 1 - agent_grouped['policy_cv']
    agent_grouped['consistency_score'] = agent_grouped['consistency_score'].clip(lower=0)

    # Normalize ANBP and consistency scores
    scaler = MinMaxScaler()
    agent_grouped[['ANBP_scaled', 'consistency_scaled']] = scaler.fit_transform(
        agent_grouped[['ANBP_total', 'consistency_score']]
    )

    # Final performance score
    agent_grouped['performance_score'] = (
        anbp_weight * agent_grouped['ANBP_scaled'] +
        consistency_weight * agent_grouped['consistency_scaled']
    )

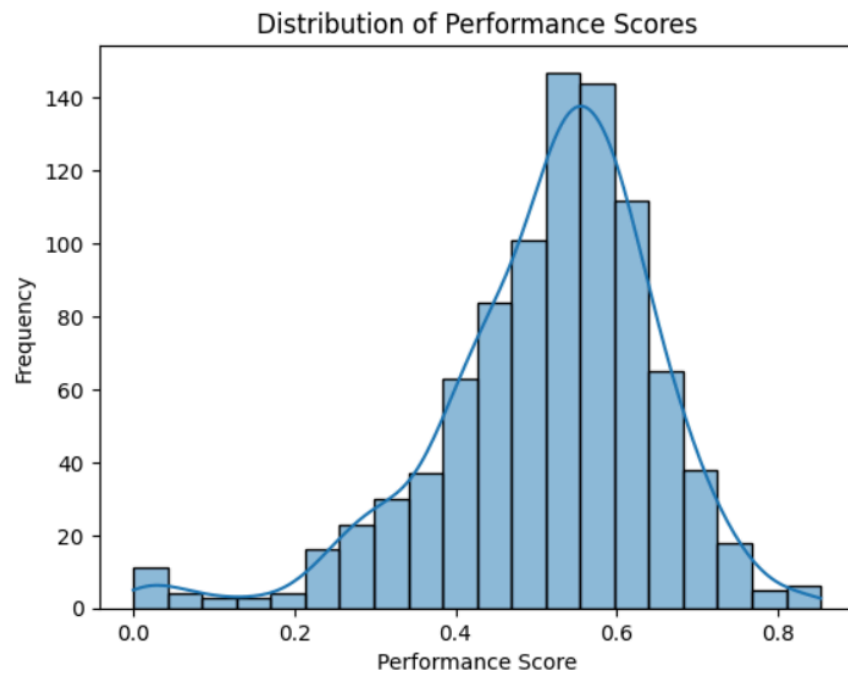
    return agent_grouped[['agent_code', 'ANBP_total', 'policy_mean', 'policy_std',
        'consistency_score', 'performance_score']]
```

## Performance Analysis

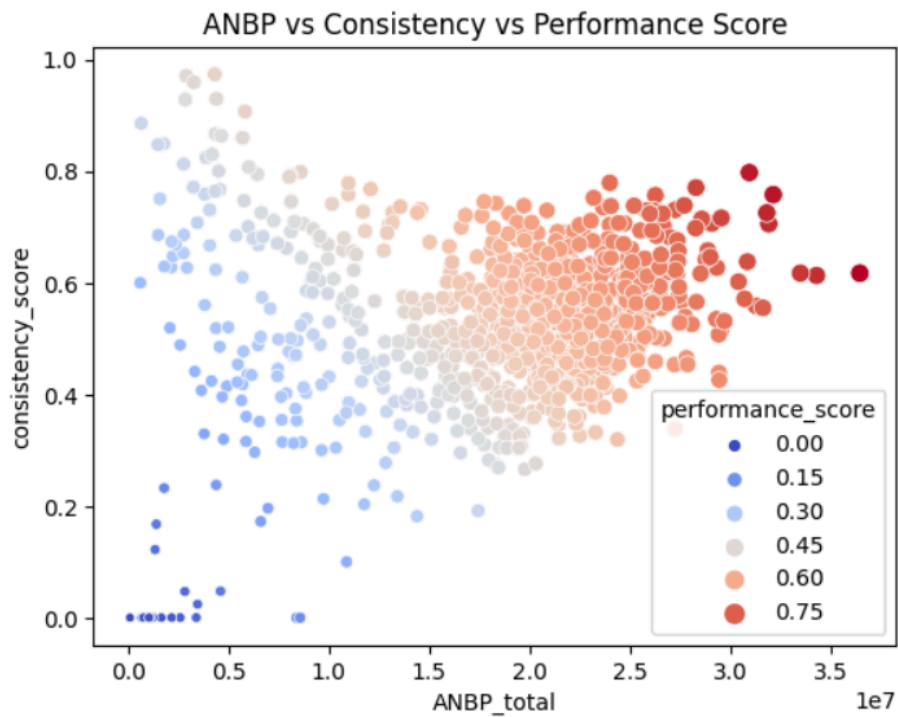
### Summary Statistics

Statistic	ANBP_total	policy_mean	policy_std	consistency_score	performance_score
count	914.00	914	905	914	914
mean	18181100.00	20.334984	9.269892	0.526339	0.514779
std	6913578.00	2.634427	1.93004	0.143541	0.136186
min	94900.00	10	0.57735	0	0
25%	14984220.00	18.857143	8.32409	0.450381	0.444406
50%	19742080.00	20.333333	9.442558	0.53162	0.534077
75%	22738470.00	21.857143	10.542657	0.616788	0.603554
max	36452520.00	31	16.350331	0.973317	0.853549

## Distribution of Performance Scores



## ANBP vs Consistency vs Performance Score



## Observations and Insights from the Statistics and the Plots

### Summary Statistics

- ANBP is highly variable across the agents. Its high standard deviation suggests significant differences in business volume. Therefore a weighted scoring should be needed to reflect top contributors without allowing extreme values to dominate.

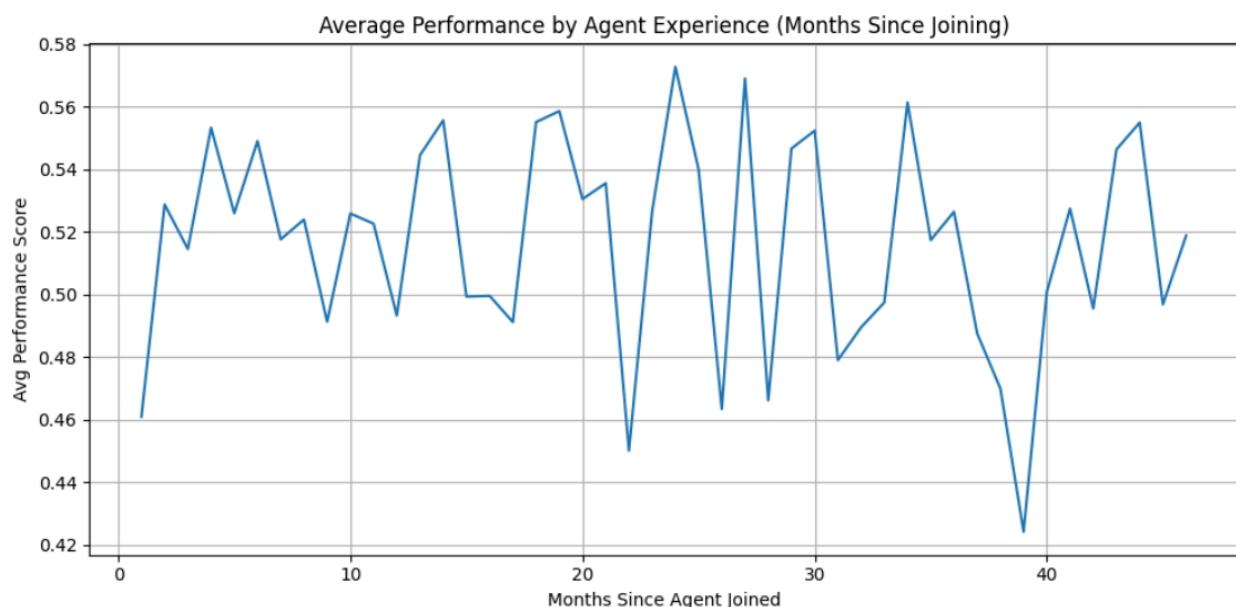
### Distribution of Performance Scores

- The performance score has a slightly left skewed distribution.

### ANBP vs Consistency vs Performance Score

- Most data points cluster between ANBP 1.5–3.0 and consistency 0.2–0.8, with performance scores ranging from 0.30 to 0.75.

### Average Performance by Agent Experience



The average performance of the agents was plotted against their experience as above. The agent experience was calculated using the month joined and the date data was recorded.

The graph shows a sudden increase of the performance after joining, and during 5-10 months the performance is decreasing. From there on the performance fluctuates and a slightly high performance can be seen on average during the 20-30 months. There is also a sudden slope

near 40. It is also noticeable that the performance variation is slightly lower at the later part of the distribution.

The early decline in performance during 5-10 months may be due to the challenges like lack of sustained support, or difficulty adapting to role complexities after initial training.

Performance fluctuates between 0.46–0.56, with an average increase during 20–30 months. This suggests agents may gain proficiency or benefit from experience, but inconsistency remains a challenge.

A sharp decline to 0.42 occurs around 40 months, may be due to external factors like role fatigue or lack of growth opportunities.

## Performance Categorization

Agents were segmented into **High**, **Medium**, and **Low** performers using a **z-score-based approach** that considers the **mean** and **standard deviation** of the performance scores.

**Categorization formula:**

```
mean_score = performance_df['performance_score'].mean()
std_score = performance_df['performance_score'].std()

def categorize_performance(score):
    if score >= mean_score + 0.5 * std_score:
        return 'High'
    elif score <= mean_score - 0.5 * std_score:
        return 'Low'
    else:
        return 'Medium'
```

**Categorization Explanation:**

- **High Performers**
  - These agents are performing significantly above average. These agents are likely the top contributors and show high consistency and productivity.
- **Low Performers**
  - These agents are performing well below average. These agents may require more support, training, or guidance to improve their performance.

- **Medium Performers**

- Agents whose performance scores fall **within one standard deviation** of the mean (between the high and low thresholds). These agents are performing at an average level and may benefit from targeted interventions to help them either improve to high performance or avoid a decline to low performance.

### Why This Method Was Used:

- **Focus on Normal Distribution**

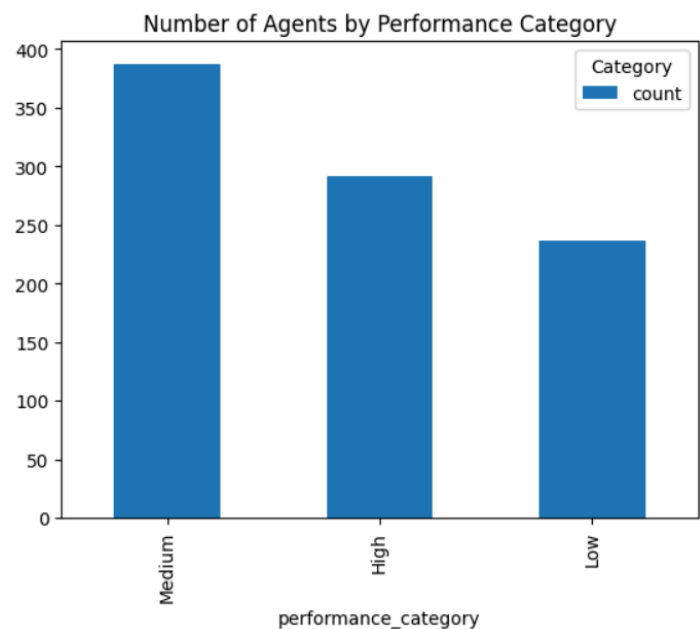
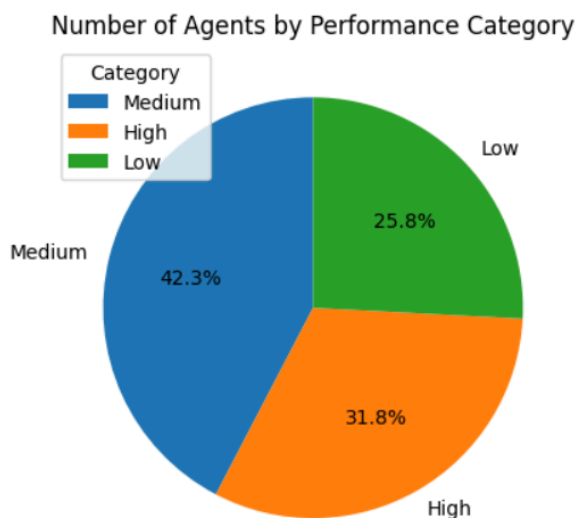
- The method is based on the assumption that the performance scores are roughly **normally distributed**, as the mean and standard deviation are key properties of a normal distribution. This allows us to meaningfully split the agents into three categories using standard deviation as a threshold.

- **Relative Performance**

- By defining the thresholds relative to the mean and standard deviation instead of defining fixed thresholds, the method ensures that High performers are truly above the average, and Low performers are significantly below average. This makes the categorization more dynamic and adaptable to any distribution of scores, rather than relying on arbitrary fixed intervals.

## Performance Category Distribution

Given below is the distribution of the three performance categories in the dataset.





The agents are fairly balanced, with a slight increase toward medium performers, suggesting room for growth in both high and low categories.

The large medium group also aligns with the experience-based performance graph's fluctuations, suggesting many agents stabilize at average levels over time.

## Custom Interventions for Each Group

### High Performers

- **Characteristics:** High ANBP, high consistency
- These agents usually have high productivity and consistently exceed targets. It will be beneficial for the company if these agents are trained with other skills. Recognizing them will also help to keep their performance at a high level.
- **Interventions:**
  - **Advanced Training:**
    - Offer specialized workshops (e.g.: leadership, strategic decision-making) to prepare them for higher roles.
  - **Mentorship Roles**
    - Pair them with medium/low performers to foster knowledge sharing.
  - **Recognition programs**
    - Provide performance-based bonuses or recognition to maintain motivation.

### Medium Performers

- **Characteristics:** Moderate ANBP, moderate consistency
- These agents will usually meet targets but may lack consistency, and may struggle with specific skills. They may also need training to develop their performance.
- **Interventions:**
  - **Targeted Skill Development**
    - Identify weak areas (e.g.: time management, technical skills) via performance reviews and provide tailored training.
  - **Regular Feedback**
    - Implement weekly (or bi-weekly depending on the decisions made by the higher management) check-ins with managers to set short-term goals and address challenges.
  - **Peer Learning**

- Encourage collaboration with high performers through team projects.
- **Goal Setting**
  - Set incremental, achievable targets to build consistency.

## Low Performers

- **Characteristics:** Low ANBP, low policy consistency
- The agents in this category may frequently miss targets, may lack skills or motivation.
- **Interventions:**
  - **Skill Training**
    - Low performers may need to be provided with foundational training to address skill gaps (e.g.: product knowledge, customer service).
  - **Motivational Support**
    - Offer coaching or counseling to identify and address personal or professional challenges.
  - **Close Supervision**
    - Assign a manager (or even a high performer) to monitor progress and provide daily/weekly guidance.

## Track Progress Over Time and Identify if Interventions Are Working

### Tracking Progress:

1. **Data Collection**
  - Collect the relevant data in order to calculate the performance score.
2. **Performance Dashboards:**
  - Create visual dashboards to track individual and group performance trends over time.
3. **Periodic Reviews**
  - Conduct monthly performance reviews to compare current data against the data before interventions.
  - Track performance\_score, ANBP, and new\_policy\_count trends
  - Every 3–6 months, reclassify agents and review changes.
4. **Feedback Survey**

- Gather qualitative feedback from agents as well as managers to assess the impact of interventions.

Tracking process can be carried out using a dashboard like this:



### Identifying Effectiveness:

- **Quantitative Metrics:**
  - **High Performers**
    - Look for sustained or improved performance.
    - Identify successful transitions to leadership roles.
  - **Medium Performers**
    - Check for consistent target achievement.
    - Check the movement to the high-performer category.
  - **Low Performers**
    - Monitor for incremental improvements.
    - Monitor if they are meeting minimum targets within timelines.
- **Qualitative Indicators:**
  - Improved engagement in training and team activities.
  - Positive feedback from managers or peers.
- **Adjustments**
  - If metrics show no improvement after 2-3 months, revise interventions.

- **Long-Term Trends:** Use statistical analysis to identify correlations between interventions and performance improvements over 6-12 months.

By combining data-driven tracking with tailored interventions, the company can ensure continuous improvement and measure the effectiveness of each strategy.

## Conclusion

Using a data-driven performance scoring system, we identified key trends in agent performance and proposed custom strategies to boost productivity and consistency. Regular evaluation will ensure interventions are driving measurable improvements.