kristalball - AI Engineer | Talent Screening Form | A short write-up

1. What is the core business problem and why does it matter?

The core business challenge is Inefficient inventory management across multiple hotel bar locations. Managers often:

- Run out of popular items, causing guest dissatisfaction
- Overstock slow-moving brands, leading to waste and increased costs

This not only impacts revenue but also reduces operational efficiency. The aim of this project is to develop a system that forecasts demand and recommends optimal par levels helping managers order the right amount at the right time.

2. What assumptions did you make? Why?

- Past demand reflects future patterns: A basic requirement for time series forecasting.
- Clean, reliable input data: We assume the consumption data is accurate and representative.
- 7-day forecast window: Weekly ordering cycles are common in bar inventory planning.
- Par level = Mean + 1 Std Dev: This covers roughly 95% of demand variation, ensuring service levels while controlling overstock.

These assumptions help build a simple yet effective prototype that's easy to understand and deploy.

3.What model did you use and why did you choose it?

I used **Facebook Prophet** for demand forecasting because:

- It handles seasonality and trends with minimal configuration
- It is robust to missing data and outliers
- It works well for daily-level forecasts and is easy to interpret

Prophet is ideal for a business scenario where transparency and ease of use matter as much as accuracy.

4.How does your system perform? What would you improve?

The system:

- Forecasts 7-day demand for each brand at each bar
- Calculates a recommended par level
- Simulates inventory behavior to estimate:
    - Stockout days
    - Average overstock (ml)

This gives managers a clear picture of how much to stock and what risks they might face.

Improvements:

- Include external factors like events, weather, or pricing
- Use more advanced models like ARIMA or LSTM for certain brands
- Build a real-time dashboard to visualize and manage orders

5.How would this solution work in a real hotel?

- The system pulls daily consumption data from each bar.
- It forecasts demand for the upcoming week.
- Managers get automated par level suggestions.
- Inventory is reordered accordingly.

This replaces guesswork with data-driven decisions, saving money and improving guest experience.

Thankyou.

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