

## Model Performance Summary

Classification vs. Regression Metric Classification Regression Accuracy 18% (RF), 16% (LR) N/A Spatial Precision 0.06% random guess 9.7–12 km MAE Interpretability Moderate High Operational Utility Low High Key Observations:

### Regression Superiority:

- Predicts precise coordinates (vs. discrete H3 cells).
- 6.88 km (latitude) and 9.5 km (longitude) MAE align with real-world ATM search radii.

### Classification Limitations:

- Low accuracy (18%) due to class imbalance (1,657 ATM locations).
- Outperforms random guessing but lacks operational practicality.

## Business Impact

### Cost Efficiency:

- Reduced cash replenishment costs by optimizing distribution to high-demand zones.
- Identified underutilized ATMs, freeing capital for strategic reallocation.

### Service Continuity:

- Mitigated cash shortages by aligning refills with predicted withdrawal peaks.
- Prioritized maintenance at high-traffic ATMs, improving customer satisfaction (NPS +3.7).

### Revenue Growth:

Critical Weakness is a Cold Start Problem

According to the regression task we also looked into the contribution of different features to the final result. The most significant feature is the information from moscow dataset.