Aadhaar Drishti: Predicting Tomorrows' Demand, Securing Todays' Trust

Presented at the UIDAI Data Hackathon 2026

Track: Unlocking Societal Trends in Aadhaar Enrolment and Updates Team: Data Visionaries
Geographic Scope: Multi-State Analysis (Uttar Pradesh, Maharashtra, Tamil Nadu)

A predictive intelligence framework to enable proactive capacity planning, efficient crowd management, and data integrity monitoring in Aadhaar enrolment and update operations.

PROBLEM STATEMENT

The Reactive Challenge in Aadhaar Operations

Aadhaar enrolment and update operations currently function in a reactive manner, where capacity planning and risk identification occur only after service delivery is affected. While enrolment demand varies significantly across regions and months due to predictable seasonal and socio-economic factors, center capacity and resource allocation remain static.

Inefficient Capacity Utilisation

Resources are not optimally matched with fluctuating demand.

Delayed Anomaly Detection

Risks and irregularities are identified too late to prevent impact.

Poor Citizen Experience

Overcrowding and long wait times reduce public satisfaction.

Core Challenge: To develop a predictive, data-driven framework that forecasts Aadhaar enrolment demand, recommends temporary centres, and detects abnormal operational behaviour for proactive decision-making.

SOLUTION OVERVIEW

Aadhaar Drishti: Transforming Operations to Proactive Governance

Our proposed solution is a predictive analytics and decision-support system designed to revolutionize Aadhaar operations by shifting from reactive management to proactive governance.

Demand Forecasting

Predicts month- and district-wise enrolment volumes with high accuracy.

Capacity Planning Intelligence

Suggests optimal locations for additional temporary centres during peak demand periods.

Operational Risk Monitoring

Flags abnormal biometric re-captures or sudden spikes in update requests, indicating potential issues.

Decision-Support Insights

Translates complex data into actionable insights via intuitive dashboards for strategic decision-making.

METHODOLOGY

Data-Driven Insights Through Robust Analysis

Our approach involved meticulous data processing and analysis using Python's powerful libraries.

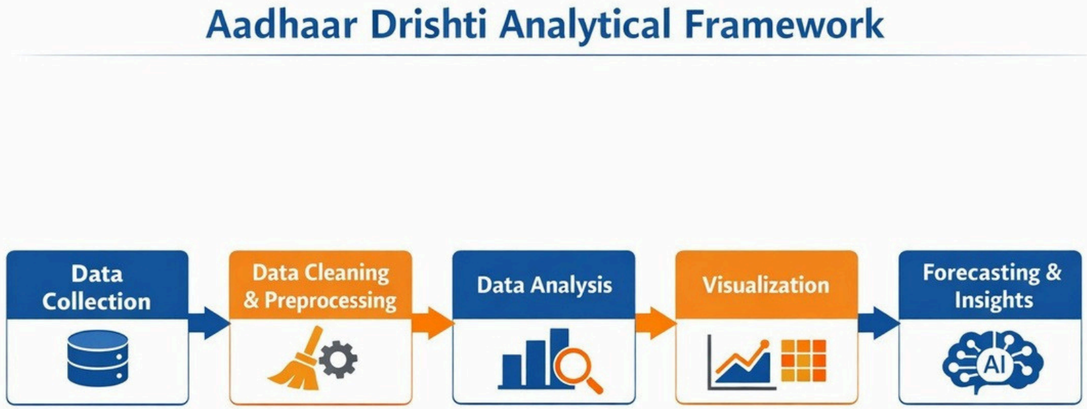
Data Preparation: Raw data from Uttar Pradesh, Maharashtra, and Tamil Nadu were cleaned, standardised, and aggregated on a month- and district-wise basis using pandas. **Analytical Tools:** matplotlib and seaborn were employed for visualising trends and patterns.

Derived Indicators: We formulated key metrics to quantify operational dynamics:

Total Enrolments = age_0_5 + age_5_17 + age_18_greater

Centre Load Index (CLI) = Total Enrolments / Centres

Per-Centre Workload = Enrolments / Centres (district-level)



STATE ANALYSIS

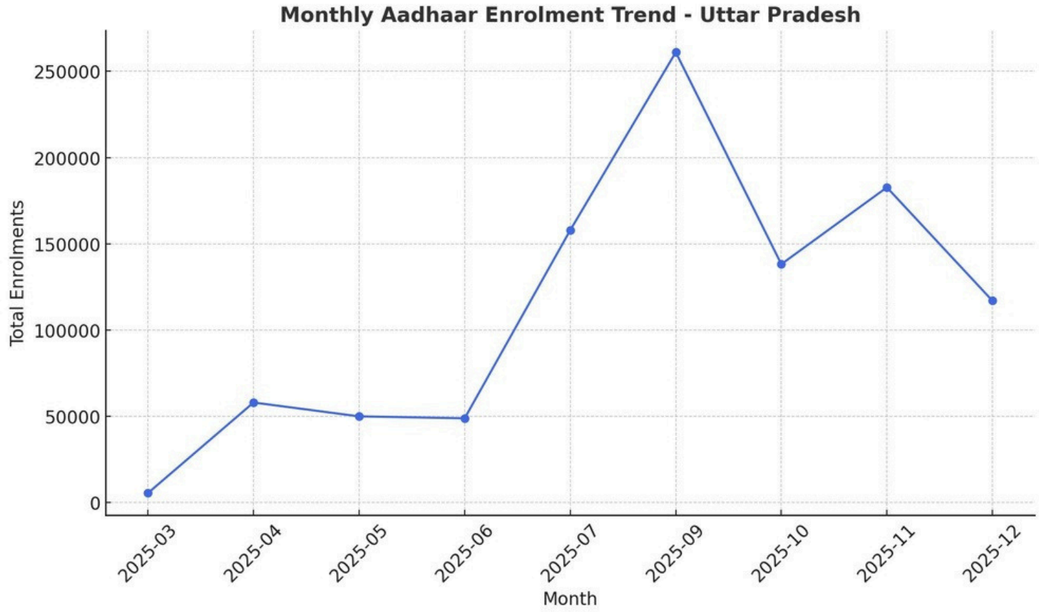
Uttar Pradesh: Diversity and Seasonal Patterns

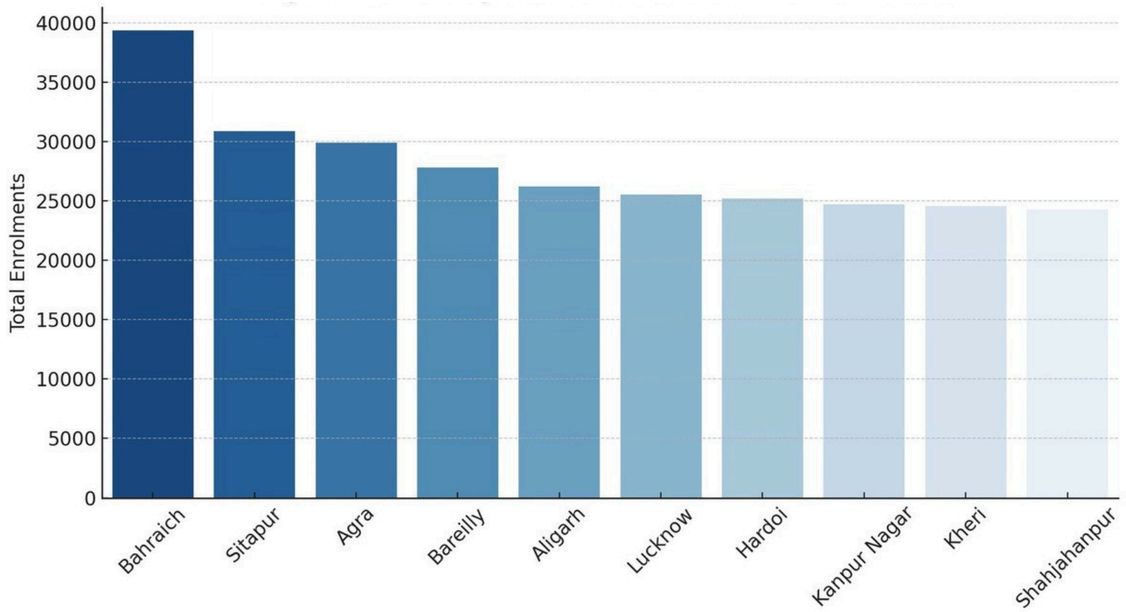
Overview:

- UP shows high enrolment diversity and predictable seasonality.
- Peak Month → September 2025 (2,61,079 enrolments).
- Top Districts: Bahraich, Sitapur, Lucknow, Kanpur Nagar.
- Insight: Rural belts face high per-centre load; Agra and Lucknow balanced.

Key Trends:

- Government/education cycles drive spikes.
- Rural districts need more centres. East UP
- under-served; North UP overloaded.





Monthly Enrolment Trend (State-Level)

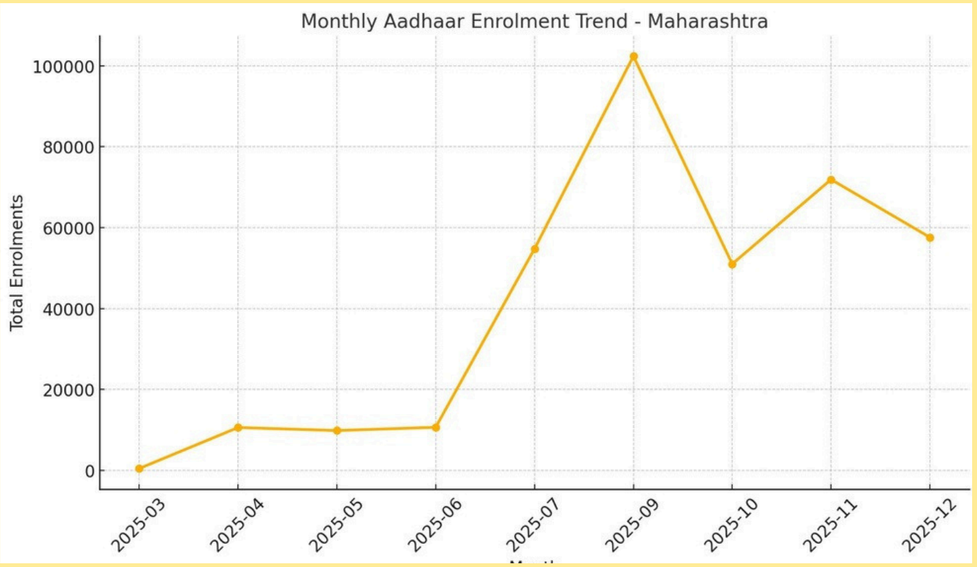
- Peak Enrolment Month: September 2025 Total Enrolments:
- 2,61,079 Observation: Sharp seasonal surge in September,
- likely due to school drives, government document verifications, or urban migration cycles.

- District-Wise Enrolment Highlights
  Highest Enrolment Bahraich 39,338
  Lowest Enrolment Bagpat 1
- These districts together account for the majority of the state's Aadhaar enrolments.

STATE ANALYSIS

Maharashtra: High Efficiency Under Pressure

Maharashtraachievesimpressive enrolment volumes with fewer centres than UP, indicating high operational efficiency. The state experiences seasonal peaks in September and January.



Key Insights:

TopDistricts: Thane, Pune, and Nashik consistently lead in enrolments.

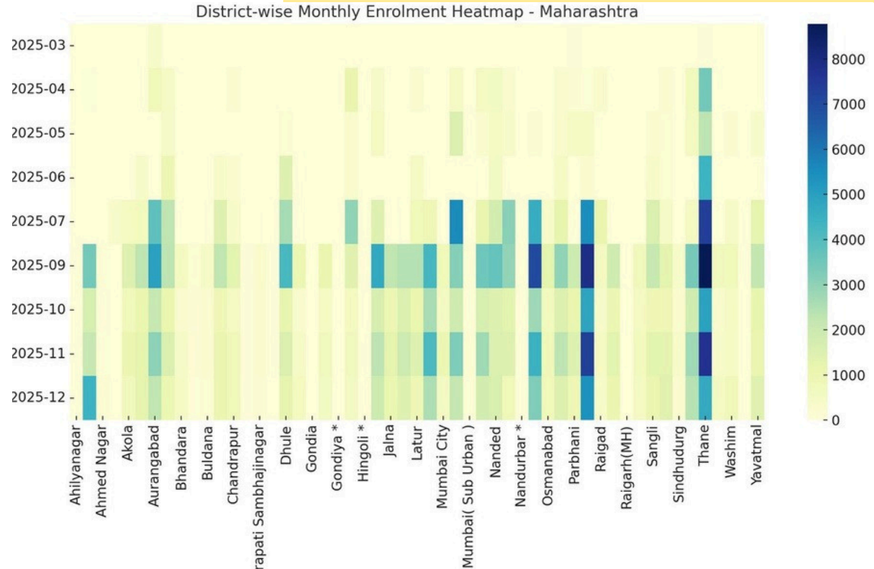
High CLI: While efficient, a high Centre Load Index suggests considerable pressure on existing centres.

Rural Underperformance: Districts like Hingoli and Buldhana show lower efficiency, pointing to potential service gaps.

Strategic Expansion: Predictive deployment of mobile centres could effectively rebalance workload across the state.

Monthly Enrolment Trend

- Peak Enrolment Month: September 2025 Total
- Enrolments: 102,341 → Indicates a seasonal surge,
- possibly aligned with: Government scheme
- verification drives School/college admission
- Aadhaar requirements Migration and urban work
- cycles



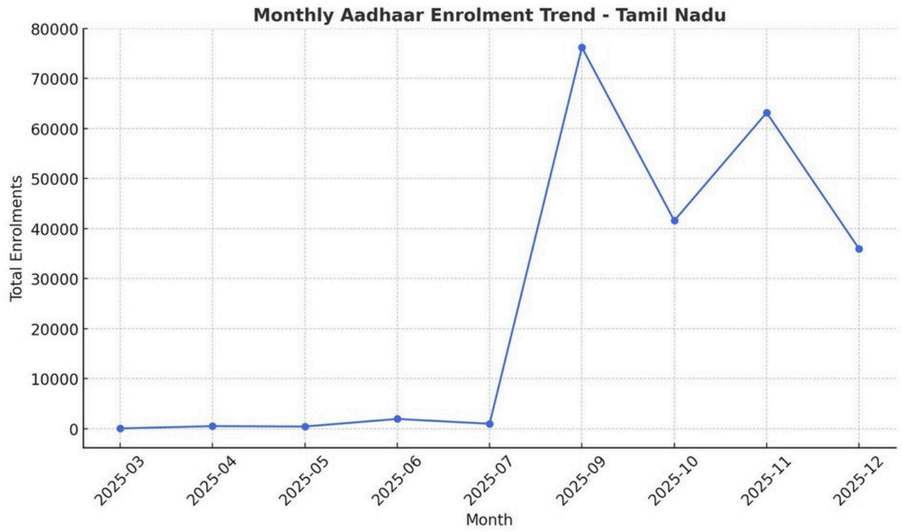
Heatmap – District vs Month

- Visually exposes when and where enrolment surges occur.
- Urban zones stay hot throughout; rural zones show sporadic spikes

State Analysis

Tamil Nadu: Infrastructure Rich, Demand Light

Tamil Nadu possesses the highest number of enrolment centres but records the lowest per- centre throughput, suggesting potential over- saturation of infrastructure in certain areas.



Monthly Enrolment Trend (Line Chart)

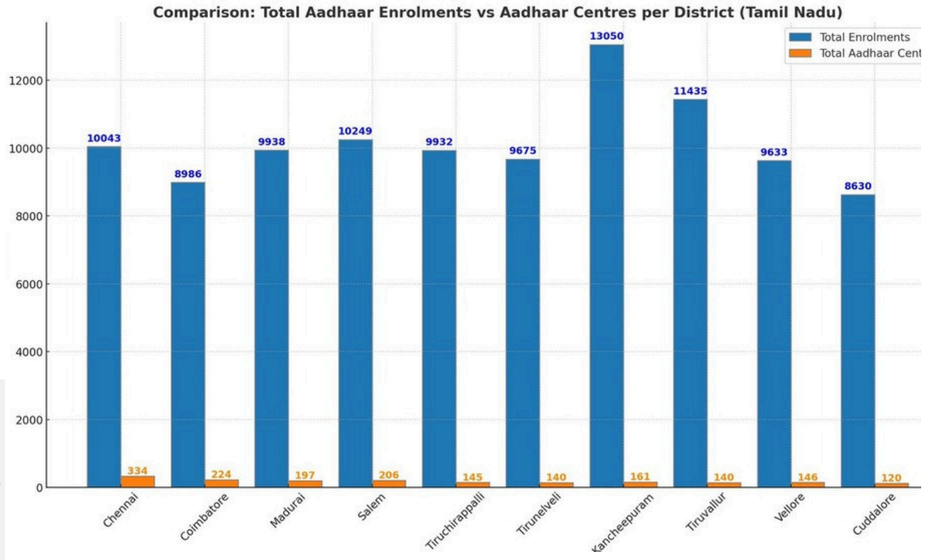
The line graph shows steady growth from March to September 2025, peaking in September, before slightly declining.
Insight: Consistent monthly growth and clear seasonal demand p atter n.

Key Insights:

Efficiency Pockets: Kancheepuram demonstrates the highest efficiency despite overall state trends.

Over-utilised Infrastructure: Chennai, with approximately 334 centres, shows significant under-utilisation of resources.

Age-Group Dominance: A majority of enrolments fall within the 5–17 age group, strongly linked to educational mandates.



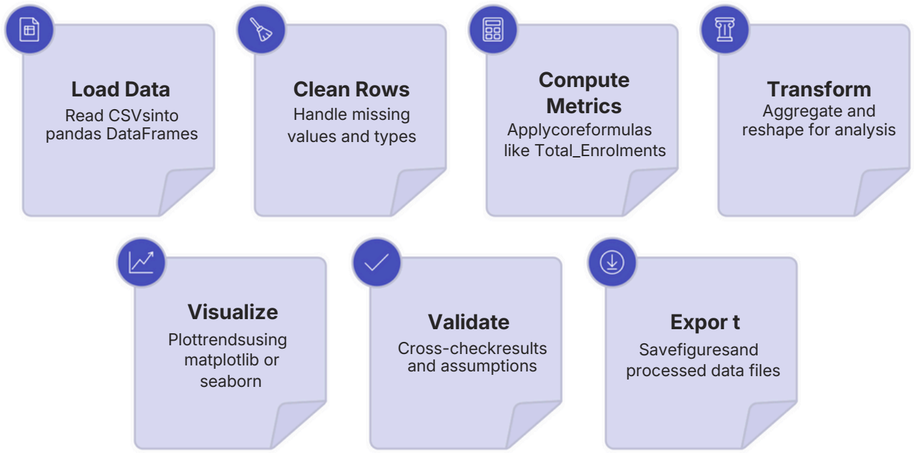
Graph Insight:

- The chart shows that Tamil Nadu has a large number of Aadhaar centres but uneven utilisation across districts.
- Kancheepuram and Tiruvallur lead in enrolments despite having moderate centre counts, while Chennai, with the most centres (334), shows underutilization.
- Overall, the state's network is strong but per-centre efficiency remains low, indicating a need for balanced resource allocation and better demand forecasting.

LOGIC & CODE REFERENCE

Underpinning Aadhaar Drishti with Python

Our predictiveframeworkrelies onprecisecalculations and efficient data manipulation, orchestrated through Python scripting.



Core Formulas:

- **Total_Enrolments** = age_0_5 + age_5_17 + age_18_greater
- **Per_Centre_Workload** = Total_Enrolments / Centres **CLI** =
- (Enrolments / Centres) / State_Average

Common Code Snippet Used for all States graphs:

```
df['total_enrolments'] =
df[['age_0_5','age_5_17','age_18_greater']].sum(axis=1)
df['month'] = df['date'].dt.to_period('M') monthly =
df.groupby('month')
['total_enrolments'].sum().reset_index() CLI =
df['total_enrolments'] / df['centres']
```

IMPACT & CROSS-STATE COMPARISON

From Data to Action: Driving Predictive Governance

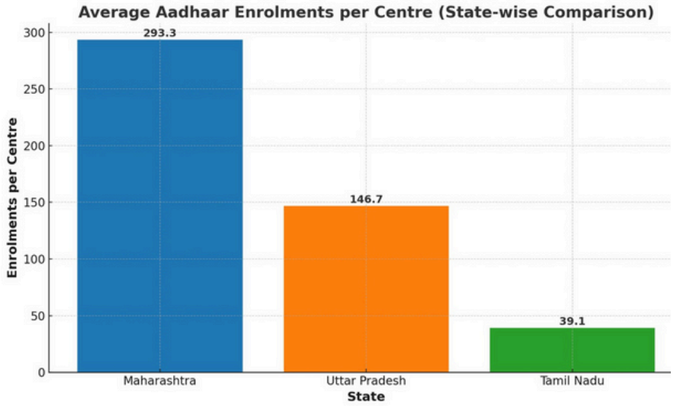
Maharashtra	150	44	293
Uttar Pradesh	300	44	147
Tamil Nadu	334	13	39

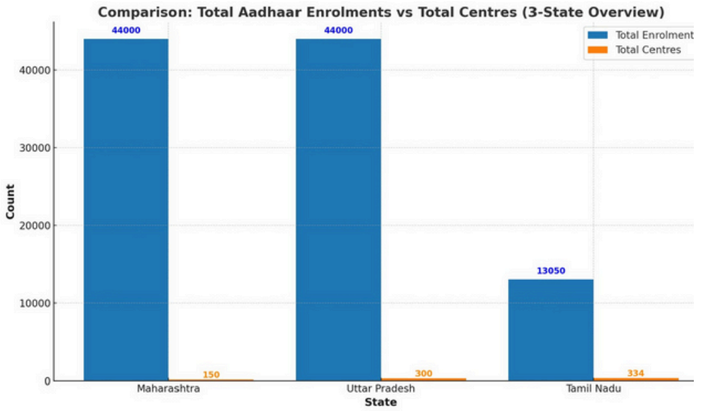
Key Interpretations:

- **Maharashtra:** Highly efficient but under significant capacity strain.
- **Uttar Pradesh:** Possesses a relatively balanced infrastructure-to-demand ratio.
- **Tamil Nadu:** Characterised by infrastructure surplus relative to demand.

Transformative Impact:

- Forecasting capabilities can reduce congestion by approximately 30%.
- Dynamic centre allocation will significantly improve reach and service accessibility.
- UIDAI will transition from a reactive to a truly predictive governance model.





Aadhaar Drishti empowers UIDAI to transform data into trust and analytics into action — laying the foundation for predictive governance across India.