

Crime Trend and Risk Analysis

Across Indian States (2001–2012)

SECTOR : LAW AND JUSTICE

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Context & Problem Statement

Sector Context

The Law & Justice sector is responsible for crime prevention, investigation, and public safety. Efficient resource allocation is critical due to limited personnel, funding, and infrastructure.

Decision-makers:

- Law enforcement agencies
- State governments
- Police Commissioners
- Policy Planners

Problem Statement

India has large volumes of crime data across states and districts, but identifying trends and high-risk regions is challenging without structured analysis.

Objective

Provide an executive decision tool to allocate police resources and interventions to reduce crime and improve response efficiency.

Data Engineering.

Sources

<https://www.kaggle.com/datasets/rajanand/crime-in-india>

No of rows: 8596

Time Period: 2001-2012

Cleaning

- Standardized column names
- Removed duplicates
- Corrected state/district names
- Datatype corrections
- Merged districts where required
- Removed rare crime columns

Dictionary (key columns)

- Year
- State/UT
- District
- Crime categories

(Murder, Rape,
Robbery, etc.)

- Total Crimes

Table 1: Data Beginning January 1st 2001

KPI & Metrics Framework

KPI Tracked

- Total Crimes
- Violent Crimes
- Property Crimes
- Crimes Against Women
- YoY Crime Growth %
- Top Crime States/Districts

What we measure

Total Crimes, Crime rate growth (YoY CAGR), Crime by state , Offense mix share, Violent crimes and property crimes.

Why These KPIs?

They help:

- Identify crime hotspots
- Monitor crime growth trends
- Support policy decisions
- Allocate policing resources

Key Insights (EDA)

National trend patterns

Notable patterns across 2001–2012
(see national trend chart).

Concentration

Small set of states/districts account
for disproportionate share (Top 10
concentrate large %).

Offense mix shift

Offense mix changed over time,
shifting intervention priorities toward
specific crime types.

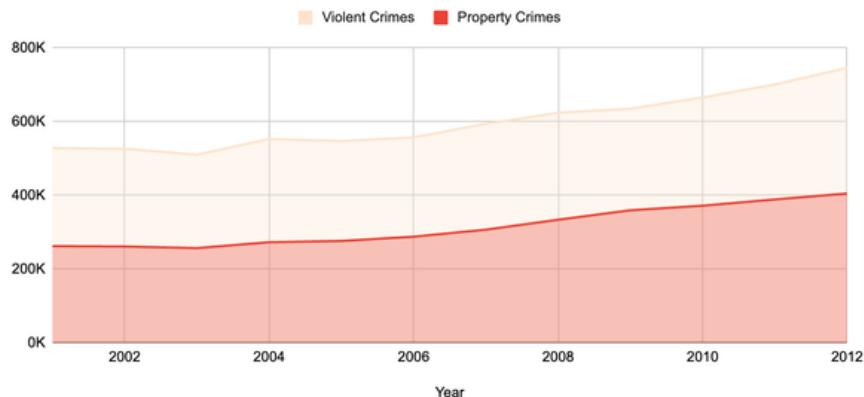
Persistent hotspots

Some districts are chronic high-intensity hotspots across
years.

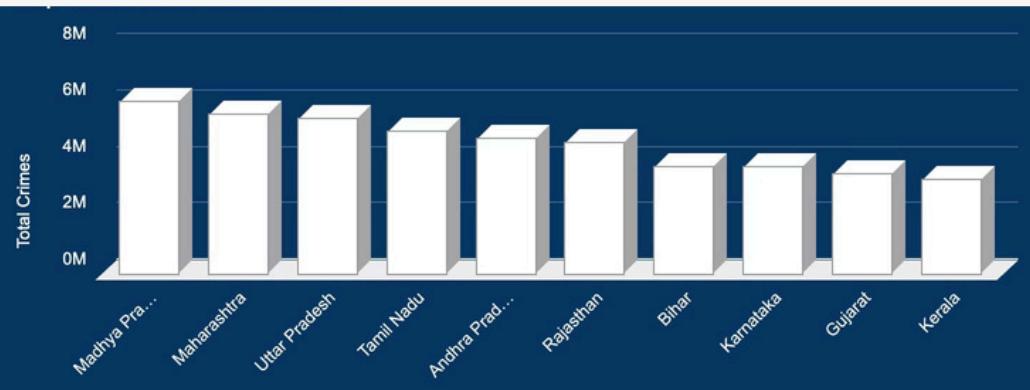
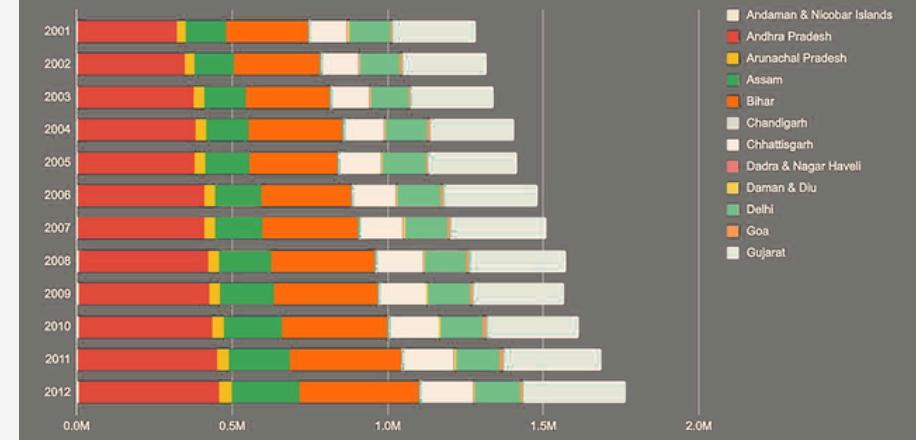
Growth signals

YoY growth highlights fastest-rising regions needing early
intervention.

Violent Crimes and Property Crimes



State-wise Crime Trend Over Years



Advanced Analysis & Methods

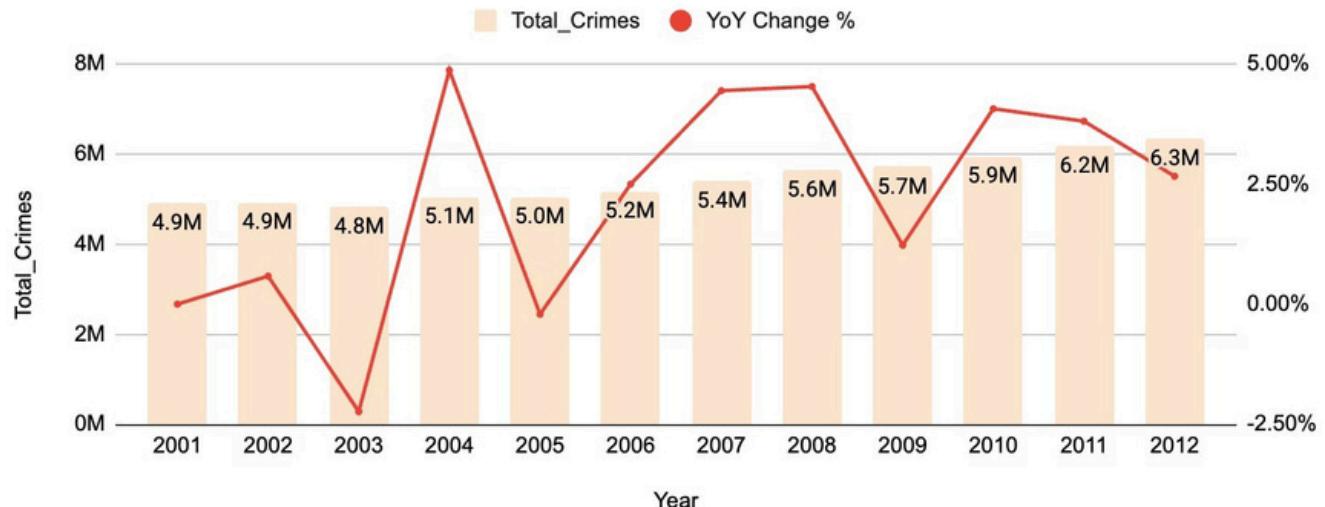
Methods

CAGR and YoY growth, offense-share decomposition, hotspot ranking, combined trend vs growth charts.

New Understanding

Lower-volume states can show highest growth (early-warning targets); offense-share analysis identifies crime types driving totals.

Yearly Crime Trend



Combined trend vs YoY change chart shows periods of rise and short dips; useful for strategic timing of interventions.

Dataset Overview

Districts Covered

803

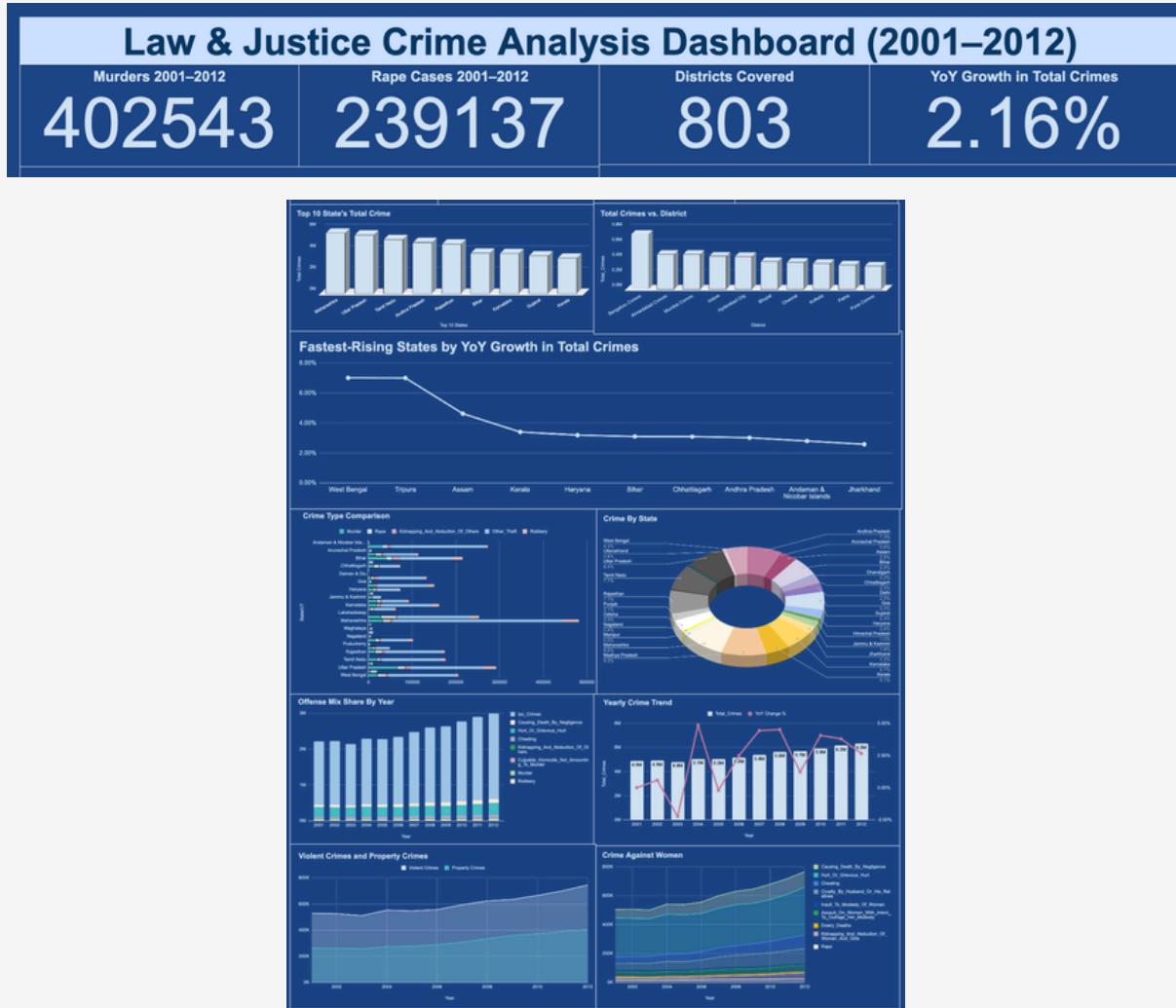
Murders 2001–2012

4,02,543

Rape Cases 2001–2012

2,39,137

Dashboard Walkthrough



Executive View (High-Level Summary)

- Provides a high-level overview of national crime trends.
- Displays key KPIs such as total crimes, murders, rapes, and YoY growth.
- Highlights overall crime patterns across years.
- Helps decision-makers quickly understand the big picture.

Operational View (Detailed Drill-Down)

- Enables deeper analysis by filtering data by year and state.
- Shows state-wise and district-wise crime distribution.
- Identifies high-crime regions and crime-type patterns.
- Supports detailed investigation for targeted action and planning.

Recommendations



Prioritize Top 10 Districts for Resource Allocation

Concentration insight shows small set of districts account for disproportionate share. Allocate 60% of enforcement resources to top 10 hotspots (Thane, Bangalore, Pune, etc.) for maximum impact.



Implement Early-Warning System for Fast-Growing States

Growth signals insight identifies fastest-rising regions. Deploy predictive monitoring in West Bengal, Punjab, Odisha to catch emerging crime waves before they escalate.



Shift Intervention Strategy by Offense Type

Offense mix shift insight shows changing priorities. Tailor prevention programs: focus on theft/burglary prevention in high-volume districts; targeted violence reduction in concentrated hotspots.



Establish Quarterly Monitoring Dashboard

Use combined trend vs YoY change analysis to track real-time shifts. Enable rapid tactical response when growth rates spike or patterns change.



Pilot Data-Driven Allocation in 2–3 Districts

Test cost-neutral reallocation model in Thane, Bangalore, and one fast-rising state. Measure incident reduction and response time improvements over 6 months before full rollout.

Impact & Value

Estimated Impact

Targeted efforts on top hotspots could reduce incidents in those districts by a measurable percentage and improve response times.

Why approve

Data-prioritized allocation improves efficiency and outcomes versus blanket coverage; enables cost-neutral reallocation and measurable pilots.

Limitations & Next Steps

Limitations

- Historical data only (2001–2012)
- Possible reporting bias Limited
- socio-demographic/contextual features

Next Steps

- Integrate recent year and population denomination.
- Add arrest/outcome data Implement near-real-time feed .
- Run pilots with preprint measurement.