Crime against Women in India

Bhavya Jha
185001035
CSE-A

Introduction

Criminal Law Amendment Act 2013 has been one of the most concrete steps taken by the Indian government to curb violence against women. The Act is deemed to be one of the most important changes that have been made in the existing criminal laws namely the Indian Penal Code, the Code of Criminal Procedure and the Indian Evidence Act.

2012-13 was the period of country wide agitation because of the Nirbhaya incident. This was also why the Act was called the Nirbhaya Act.

We wish to find out if such a law, with harsher punishment, has any visible effect on the number of crimes in the country.

Upon seeing the data, the question that arose was whether the numbers were affected by events in the country. One such influential event was about Nirbhaya. It was also accompanied by the Act that promised a better future for the women of the country. I wanted to test if this would indeed be the case.

Literature

1. Ramu Rawat and Tadapatri Masthanaiah, Explosion of Rape Cases in India: A study of last one decade
2. Aashish Gupta, Reporting and incidence of violence against women in India
3. Tamilarasi and Umarani, Diagnosis of Crime Rate against Women using k-fold Cross Validation through Machine Learning Algorithms
4. Shivani Mishra, Suraj Kumar, A comparative study of crimes against women based on Machine Learning using Big Data techniques

1- Trends and dynamics of rape cases by age group in India during last one decade (2004-13) depicted the rise in cases even after the Criminal Amendment Act

2- This analysis over-estimates the reporting of violence, under-estimates the incidence of violence. The study was of survey-based estimate to account for social relationships and legal forms.

3 - This aimed to predict crime rate and accuracy using different types of ML algorithms while preprocessing using feature scaling and k-fold cross validation.

4 - This project mainly focuses on machine learning in pattern recognition for analysis of the patterns through Indian states for crime against women.

Scope

Figuring out indicators of future crimes and what events affect the trends in crime rates.

Dataset

This report has used National Crimes Record Bureau (NCRB) India data for the years 2001-2015. These are compiled from records of police stations of the country and refer to the reported and registered crimes.

The datasets are from data.gov.in collated in this and from NCRB in this. These cover the numbers related to statewise crimes against women in India.

Along with the state and year, the categories I have chosen to analyse are

- Rape
- Kidnapping and Abduction
- Dowry Deaths
- Assault on women with intent to outrage her modesty
- Insult to modesty of Women
- Cruelty by Husband or his Relatives
- Importation of Girls

The dataset consists of 11529 rows as it has been collected district wise. This has been summed for each state in my analysis.

Initial data cleaning involved

- picking the required fields
- making the state and union territory names same across the datasets
- Dropping unwanted columns
- Checking for null valued rows
- Appending the dataframes into one
- Taking into account the pre-existing rows that had total values for states and the country
- Reshaped the dataframe into variables of State/UT and Year and values for each crime category. Now I had data in the form shown below. Each state, with every year, every crime and the value for that crime in the respective year, state, category.

Tools

Numpy

Pandas

Scipy

Altair

Similar tools

Matplotlib

Plotly

	STATE/UT	DISTRICT	Year	Rape	Kidnapping and Abduction	Dowry Deaths	Assault on women with intent to outrage her modesty	Insult to modesty of Women	Cruelty by Husband or his Relatives	Importation of Girls
0	andhra pradesh	ADILABAD	2001.0	50.0	30.0	16.0	149.0	34.0	175.0	0.0
1	andhra pradesh	ANANTAPUR	2001.0	23.0	30.0	7.0	118.0	24.0	154.0	0.0
2	andhra pradesh	CHITTOOR	2001.0	27.0	34.0	14.0	112.0	83.0	186.0	0.0
3	andhra pradesh	CUDDAPAH	2001.0	20.0	20.0	17.0	126.0	38.0	57.0	0.0
4	andhra pradesh	EAST GODAVARI	2001.0	23.0	26.0	12.0	109.0	58.0	247.0	0.0

Before ^

	STATE/UT	Year	variable	value
0	andhra pradesh	2001.0	Rape	871.0
1	arunachal pradesh	2001.0	Rape	33.0
2	assam	2001.0	Rape	817.0
3	bihar	2001.0	Rape	888.0
4	chhattisgarh	2001.0	Rape	959.0

< After

Null hypothesis: Harsher punishment has an effect in decreasing the number of rape crimes

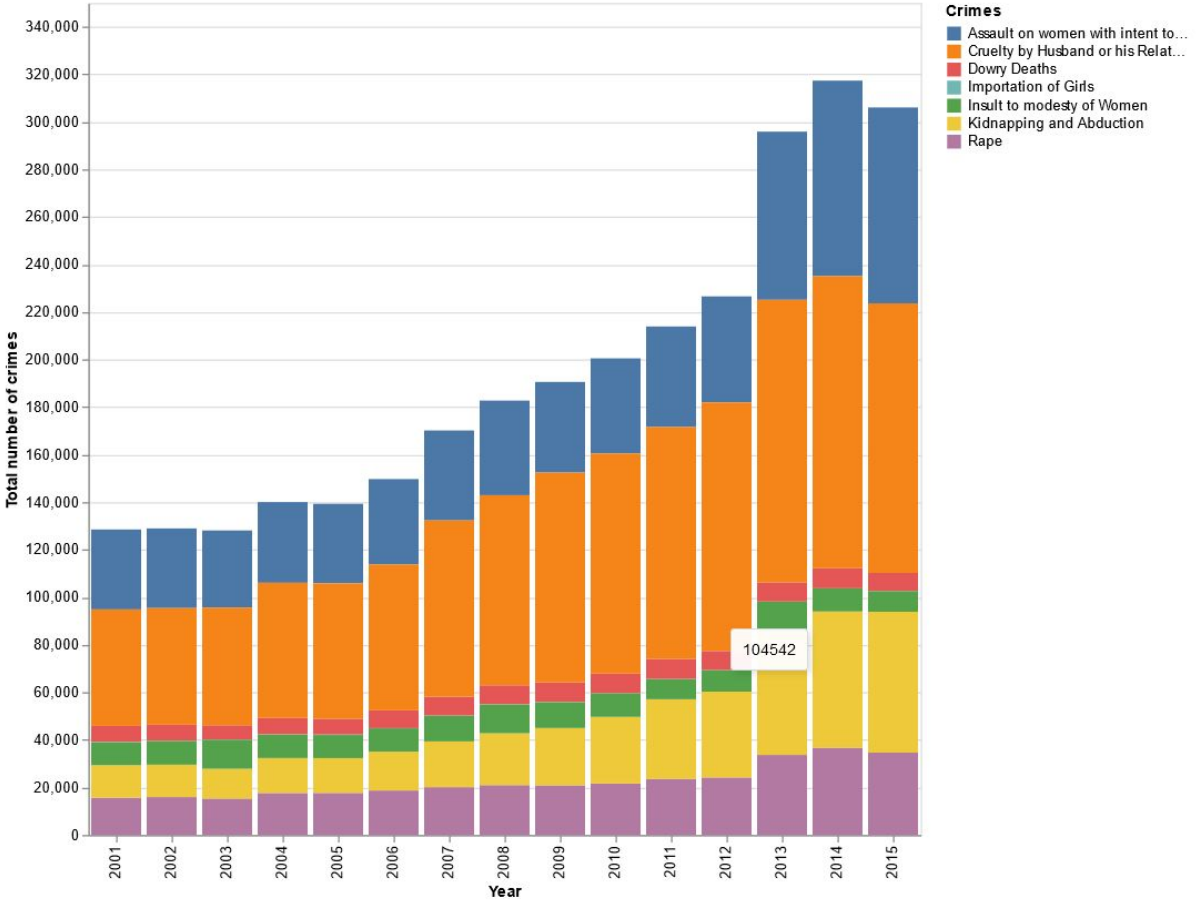
Alternate hypothesis: Harsher punishment has no effect in decreasing the number of rape crimes

In hypothesis testing, we reject the null hypothesis if there is sufficient evidence to support the alternate hypothesis. If there is no sufficient evidence for the alternate hypothesis, we fail to reject the null hypothesis.

Exploratory data analysis

Crimes

Sum of all crimes in each year while showing what part of the total (coloured differently) is because of that particular crime. Overall the total number of crimes have risen slowly and then very fast over the years.



Year wise Crimes

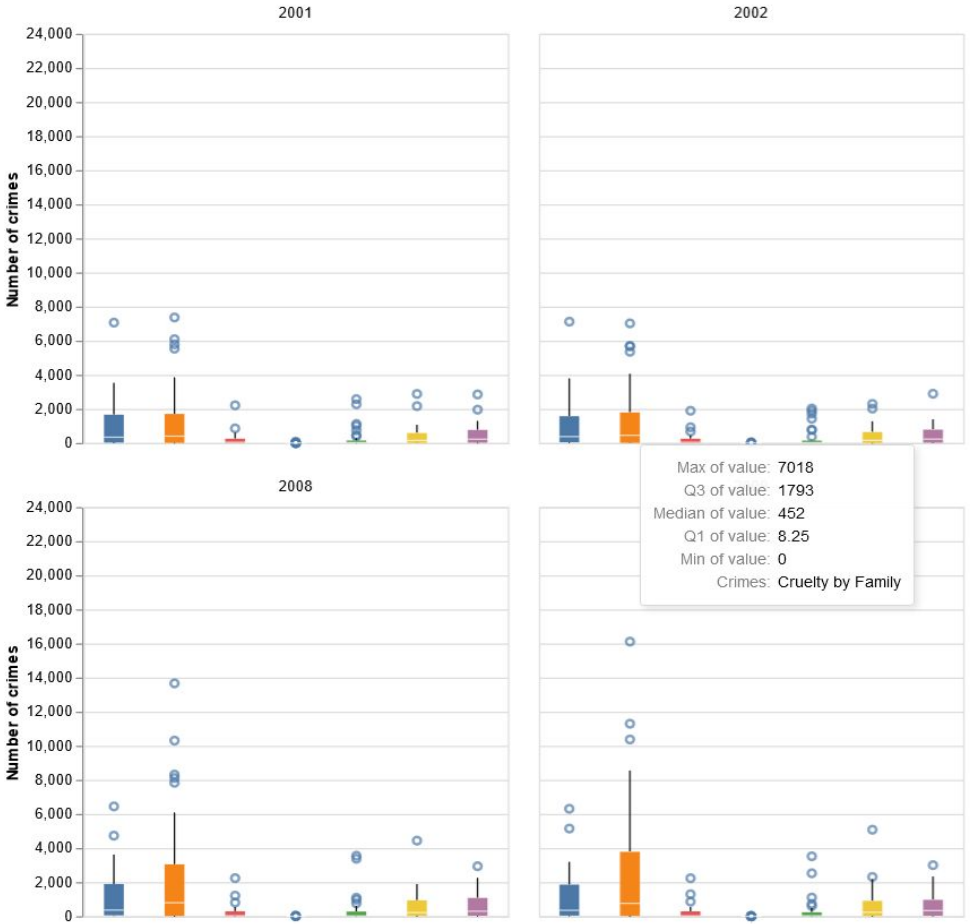
Boxplot of the number of crimes across the categories, for every year. Max, median, Q1, Q3 have increased over the years, as seen for the Cruelty by Family category.

Number of crimes recorded in India for Cruelty by Family in 2014 was 122877. Max is found from the set of total number of crimes for each state.

Median of the set of values consisting of total number from each state.

Q1 of value: 25th percentile of the data. (splits off the lowest 25% of data from the highest 75%)

Q3 of value: 75th percentile of the data. (splits off the lowest 75% of data from highest 25%)

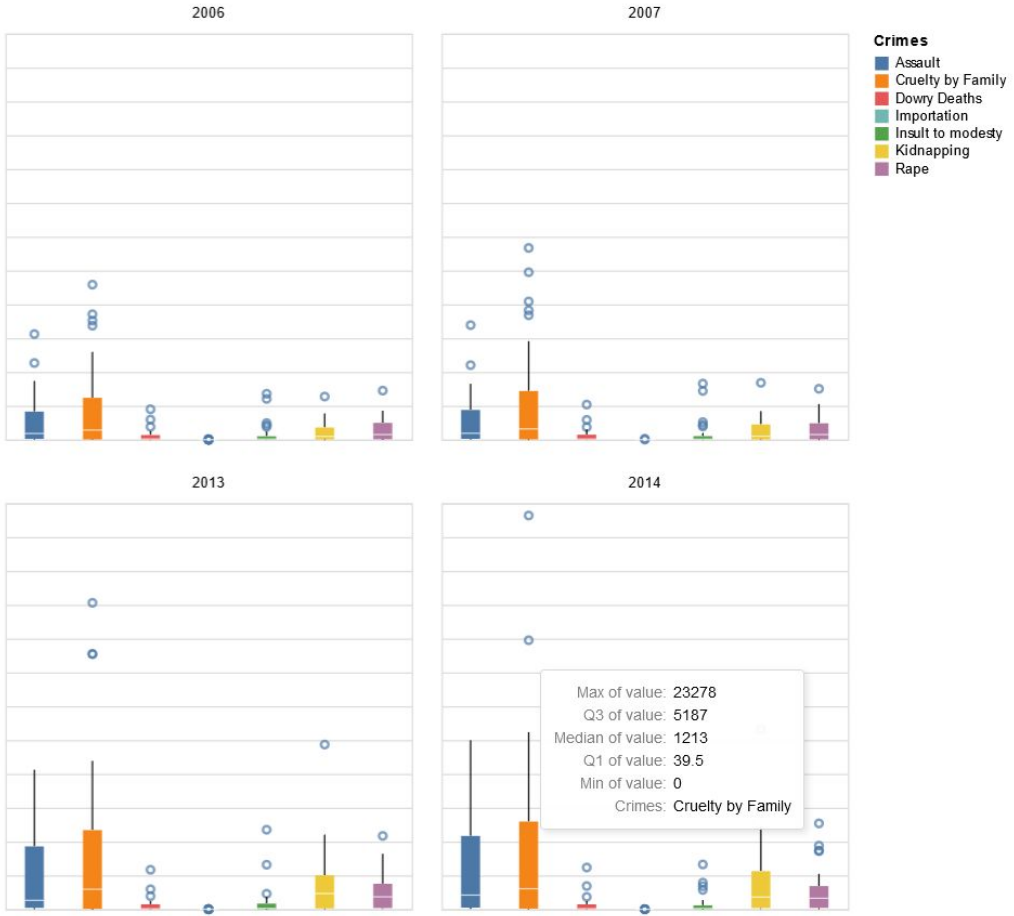


Year wise Crimes (cont'd)

Highest number of crimes against women is because of cruelty by the husband or relatives. Assault with an intention to outrage modesty of the woman, kidnapping and rape follow.

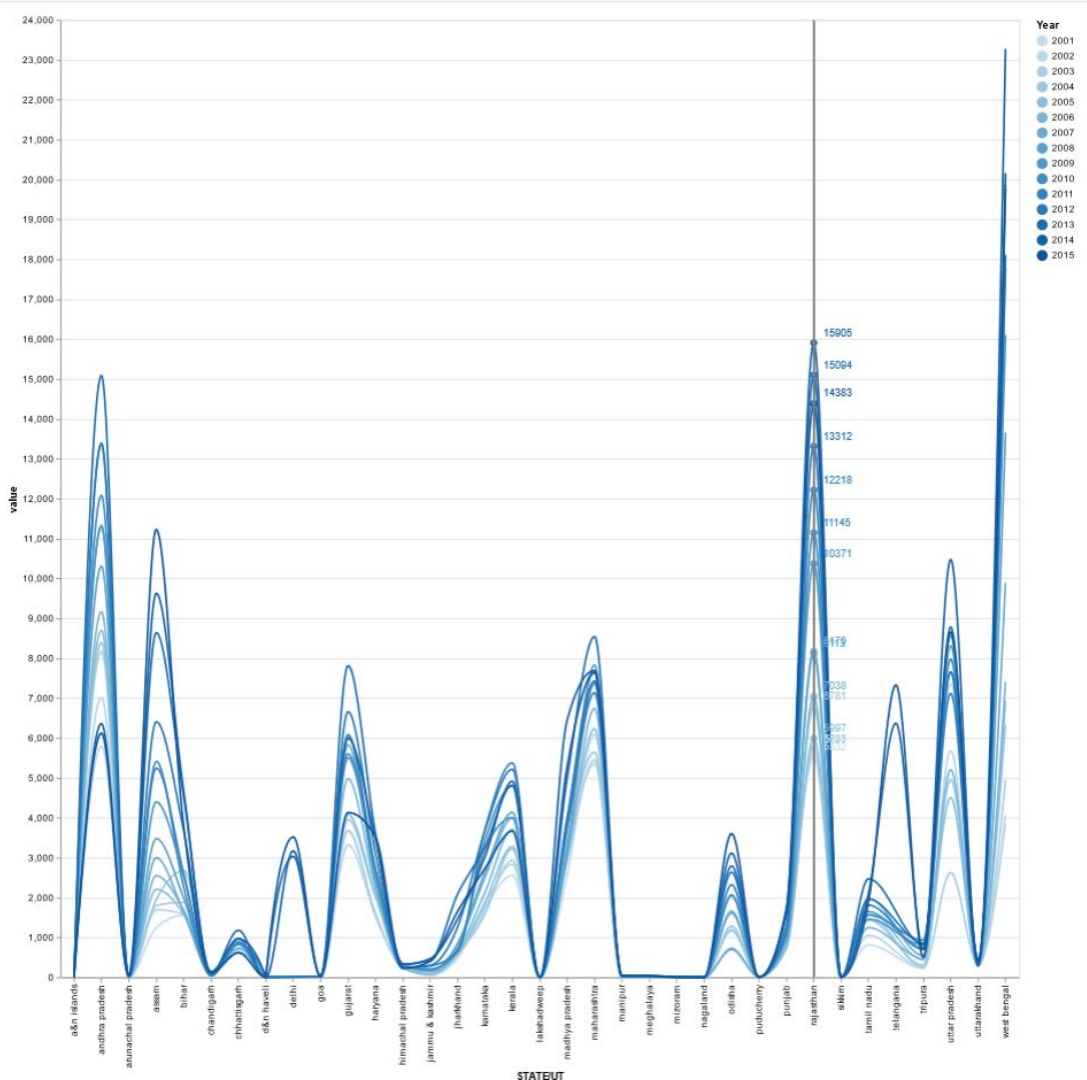
Cruelty by Family has the highest number of outliers throughout the years.

WB, Rajasthan and Andhra Pradesh have the highest values for most of the years in the range given, as seen in the next graph.



State wise Crimes

The total number of crimes against women recorded in each state is shown in this graph. Each shade of blue corresponds to a year, going from the lightest blue for 2001 to the darkest for 2015. The darker curves are usually the higher ones, signifying that the number of crimes has gone up as the years progress.



Result

Split point: 2013 (Act came in March 2013)

I took 3 years before and after the Act to check if my hypothesis was correct. So the total rape crimes from 2010, 2011, 2012 was compared with the total during 2013, 2014, 2015.

```
Ttest_indResult(statistic=-10.036128581467946,
pvalue=0.0005542104071428713)
```

If the years from 2001 are considered to be in the *before 2013* set, the p-value becomes even lower.

|-10| = 10 > 0.1% significance level given in 2 sample t test for degrees of freedom=(3+3-2=4)

p-value is ~ the probability that the null hypothesis will not be rejected

So the Null hypothesis is rejected.

Found no significant difference in the number of rape cases before and after 2013 with a p-value 0.0005 which is consistent with our hypothesis that harsher punishment has no effect in decreasing number of crimes.

The reporting of rape crimes increased even during and after the criminal amendment act of 2013.

THANK YOU