



## **Data visualization**

### **Assignment-2**

#### **Crime against Women in India in last Decade**

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## Dataset

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

## Description

The zip file in the above link contains 19 csv files and 1 folder. The dataset contains the statistics of crime record in India from year 2000 to 2010. Only two of the files are used to plot the visualizations.

1. 42\_Cases\_under\_crime\_against\_women.csv  
This file contains 22 columns and 4166 rows containing. The columns that are used are Area\_Name, Year, Sub\_Group\_Name, Cases\_Chargesheeted, Cases\_Trials\_Completed, Cases\_Reported
2. 43\_Arrests\_under\_crime\_against\_women.csv  
This file contains 16 columns and 4166 rows containing. The columns that are used are Area\_Name, Year, Sub\_Group\_Name, Persons\_Arrested, Persons\_Chargesheeted, Persons\_Trial\_Completed

## Preprocessing

1. **Cleaning**
  - Step1:** Zip file is unzipped after setting working directory, loading all the required libraries and clearing the environment pane.
  - Step2:** Two desired files are loaded into R studio.
  - Step3:** Column names ("i..Area\_Name" and "Sub\_Group\_Name") are changed to 'State' and 'Crime' respectively in both (cases and arrest) the dataframes.
  - Step4:** cleaning 'crime' column of both the datasets.
  - Step5:** making a subset of both dataframes with only desired columns.
  - Step6:** Omitting rows with NAs (These rows were not there in the original files, they got added when data is loaded to R studio)
  - Step7:** Modifying values of 'Crime' column of in both dataframes to more short and appropriate values.
2. **Wrangling**
  - Step1:** Primary keys are generated in both (cases and arrest) dataframes by combining values from 'state', 'year' and 'crime' columns separated by '\_'.
  - Step2:** Merging cases and arrest dataframes by primary key into a new dataframe 'record'
  - Step3:** Dropping all the duplicate columns from new 'record' dataframe.
  - Step4:** renaming the columns of 'record' from 'State.x', 'Year.x' and 'Crime.x' to 'State', 'Year' and 'Crime' respectively.

**Step5:** Creating new dataframe 'plot1' by selecting 'year', 'sum(cases\_reported)', 'sum(cases\_chargesheeted)', 'sum(cases\_trials\_completed)' from 'record' dataframe grouping by 'year'

**Step6:** Creating another dataframe 'plot1\_melt' from melting 'plot1' having three columns ('year', 'cases' and 'numbers')

**Step7:** Converting datatype of 'year' column of 'plot1\_melt' dataframe to Date format for better visuals in plot.

**Step8:** Creating plot 'g1'

**Step9:** Creating new dataframe 'plot2' by selecting 'state', 'sum(cases\_reported)' from 'record' dataframe grouping by 'state'.

**Step10:** reading the shape file for India as 'data' from the working directory.

**Step11:** Renaming names of some states in 'plot2' dataframe as the name of these states in 'shape' file of India is different.

**Step12:** creating a new dataframe 'record2' by merging 'plot2' and 'data' by 'state'.

**Step13:** creating another dataframe 'point' from 'record2' which contains columns as 'state', 'cases\_reported' and X and Y coordinates of all the Indian states.

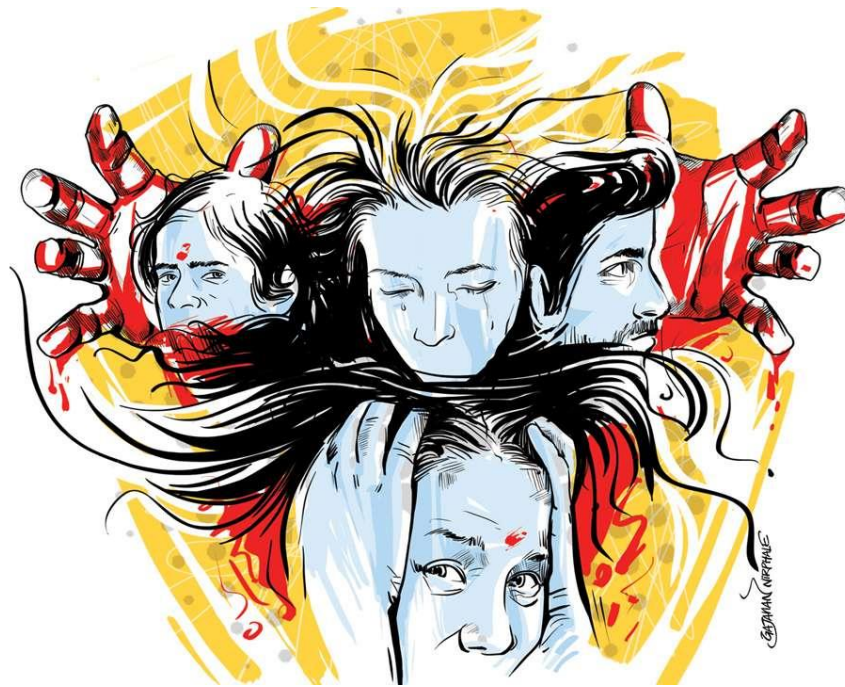
**Step14:** Creating plot 'g2'

**Step15:** creating new dataframe 'plot3' by selecting 'crime', 'sum (Cases\_Reported)' from 'record' grouping by 'crime'.

**Step16:** modifying 'plot3' by putting some values with low values of 'crime' in as 'others'.

**Step17:** adding new column to 'plot3' containing percentage of cases.

**Step18:** Creating plot 'g3'



## Introduction

Even today women in various spheres of life are treated sexual objects and are commonly viewed as inferior to men in India. Domestic violence, torturing unmarried girls is a common practice in remote rural areas. Due to the incredibly large sum of money needed for dowry in marriages, girls are regarded as a family burden. In general, girls are not encouraged to attend high education. In the field of education, there is substantial inequality between men and women and the cause of gender prejudice lies in the sense that girls should be confined to the home. Women's humiliation, bullying and criminalization are as old as history. In India, men in the field of social legislation are well ahead of women, the implementation of the law granting women rights was so slow, sluggish and haphazard that women lag behind men in social, economic and political terms. Violence against women is more common in India than may occur at first sight, as many expressions of violence are not considered crimes, and because of some Indian cultural values and beliefs, violence may otherwise not be registered or undocumented.

In order to hold the family together, 65% of Indian men believe women need to endure abuse, and women also deserve to be beaten. The International Men and Gender Equality Survey (IMAGES) Questionnaire showed that 24% of Indian men had committed sexual abuse at some stage in their lives. It is very difficult to obtain precise statistics about the scope of incidents, since many cases are not published. This is largely due to the possibility of shame and disgracefulness it brings to family as well as the tremendous pressure not to harm the honor of the family. Officers in law enforcement are more inclined to similar reasons to consider bribing offers of the accused's relatives, for example, Honor Killings, or in fear of severe consequences.

## **Problem**

The numbers of crimes in India against women that are reported in official statistics have increased in the last decade. To tackle the issue, it is important to figure out the types of crimes adding to the numbers and the regions experiencing more number of cases. Moreover, whether the women getting justice is also an important question. The problem is long due in the Indian society and right statistics and visualizations could help in framing the strategy to cope up this problem.

## **Audience**

There are several NGOs (like CREA, MAKAAAM, SEWA, AZAD FOUNDATION etc.) in India working for the welfare of women. Their representatives often feel the need to put right statistics in front of the public to expose the inefficiency and ignorance of the political system and government to tackle issues regarding women safety. With the help of correct statistics and visualization they attempt to aware society about the current status of women safety in the country which in turn build pressure on the government to take measures to ensure women safety.

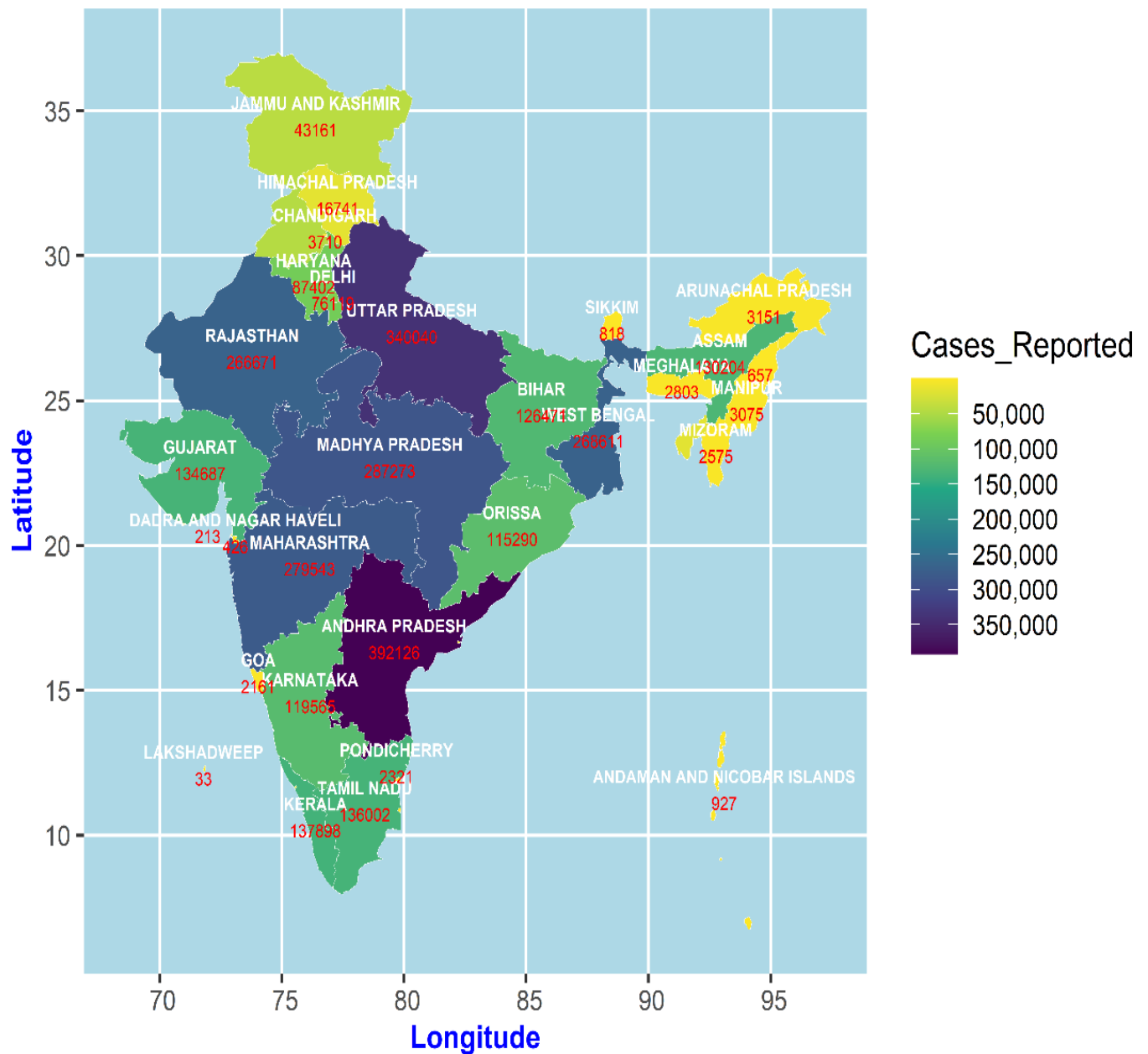
Whenever incidents of violence against women are reported, these statistics and visualizations are also used by print and broadcast media to showcase the status of women safety in the country. Many journalists working in the field of women welfare and women empowerment uses these fact and data in their articles and journals to report the status of women safety. Also, the government bodies can use these visualizations to figure out the crime distribution across various regions and the types of crimes taking place to frame strategy to tackle these problems by either law enforcement or infrastructure improvement or by spreading awareness across the marginalized sections of society against old traditions customs and practices which lead to the oppression of women and often results in violence.

## **Visualizations**

### **Crime against women across states of India**

The constitution of India enshrines the principle of gender equality. To implement and uphold the constitutional mandate, all the states have taken various measures in attempt to check gender-based discrimination, forms of violence and atrocities and ensuring equality. still there are several states which underperform in ensuring women security. In the below shown map, the states filled with darker color have more women crime cases reported and vice versa. The northeastern states are the safest haven for women while the central India along with west Bengal and Andhra Pradesh are least safe states. In fact, Andhra has the highest number of cases, i.e., 392126 and Lakshadweep is the best performing state with just 33 cases in last decade.

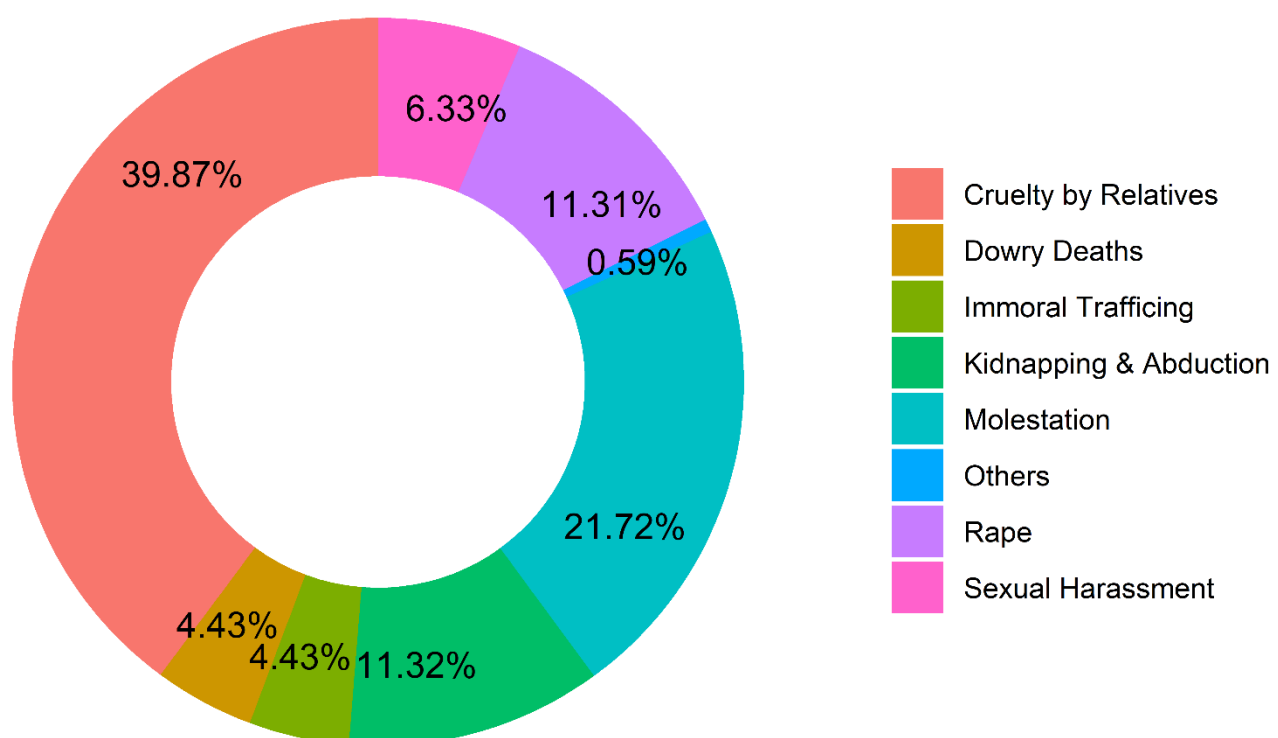
# Crime against women across states of India



## Distribution of types of crimes

It is obvious from the below shown donut chart that women are most unsafe in their homes. Highest percentage of crime against women is cruelty by relatives. There has been a tradition of dowry in India since ages and it is still prevalent across the country. Dowry is one of biggest reason of cruelty on women by their relatives, sometimes this even led to deaths which is separately accounted as dowry deaths. Second most common crime is molestation, this can be of different forms and can take place at different places, be it workplace, public places etc. These kinds of cases are often unreported. Kidnapping and Molestation is another huge problem in the marginalized section of the society, often teenager girls are abducted and sold for money as a part of sex trafficking. Rape is another most heinous crime which is quite widespread and is actively reported by the media, rather other sort of crimes which are more prevalent often go unreported.

## Distribution of types of crimes

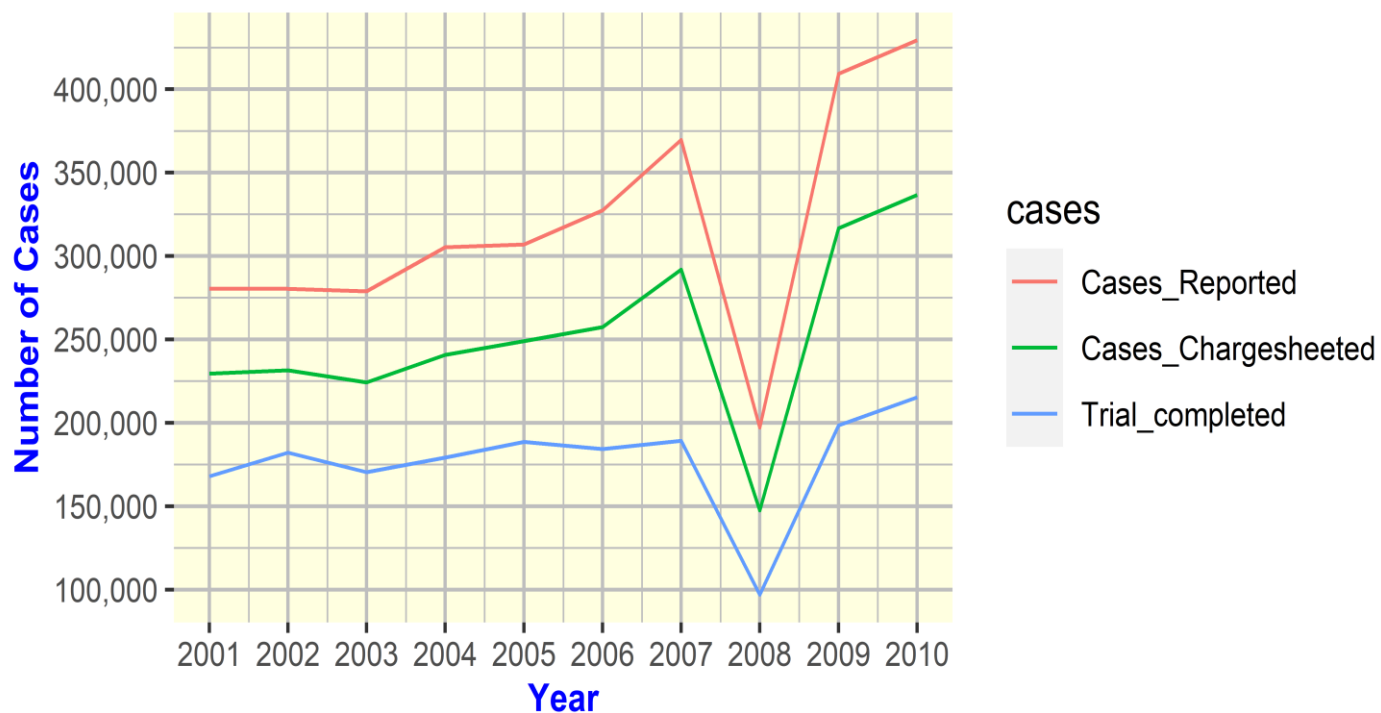




## Justice to women in Indian judicial system

Rarely justice is delivered to the victims in women related cases, many factors are responsible for this. The following plot shows the bitter truth of Indian judicial system when it comes to justice for women. In only 50 percent of the reported cases trials are completed. Not even all the cases which are charge sheeted complete the trials. The patriarchal nature of the society is responsible for this, as there are a smaller number of women representatives in the system which makes the system biased against women. Also, the pathetic condition of Indian judicial system which is overburdened by the heaps of pending cases, shortage of employees adds fuel to the fire. Specially when it comes to crimes like domestic violence, dowry cases or any other kind of crimes which takes place in families and homes are often suppressed and withdrawn because of the fear of embarrassment it brings to the family.

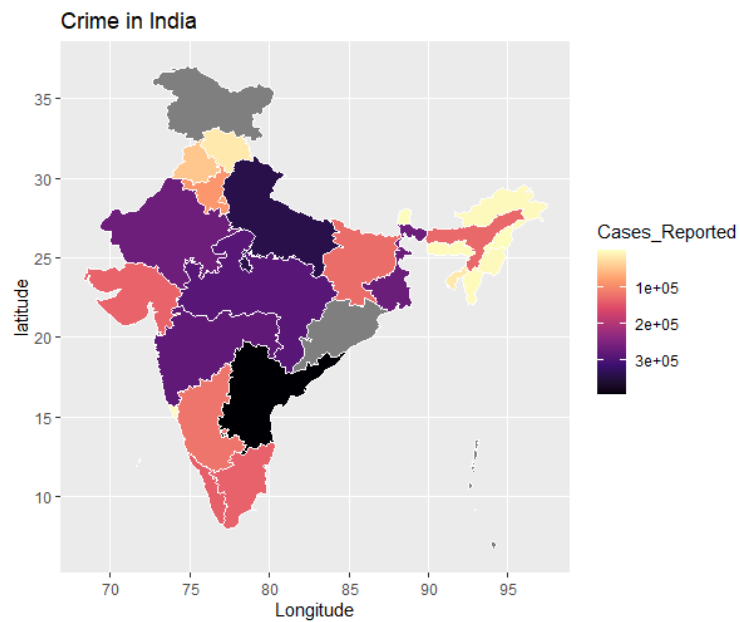
## Justice to Women in Indian Judicial system



## Previous iterations

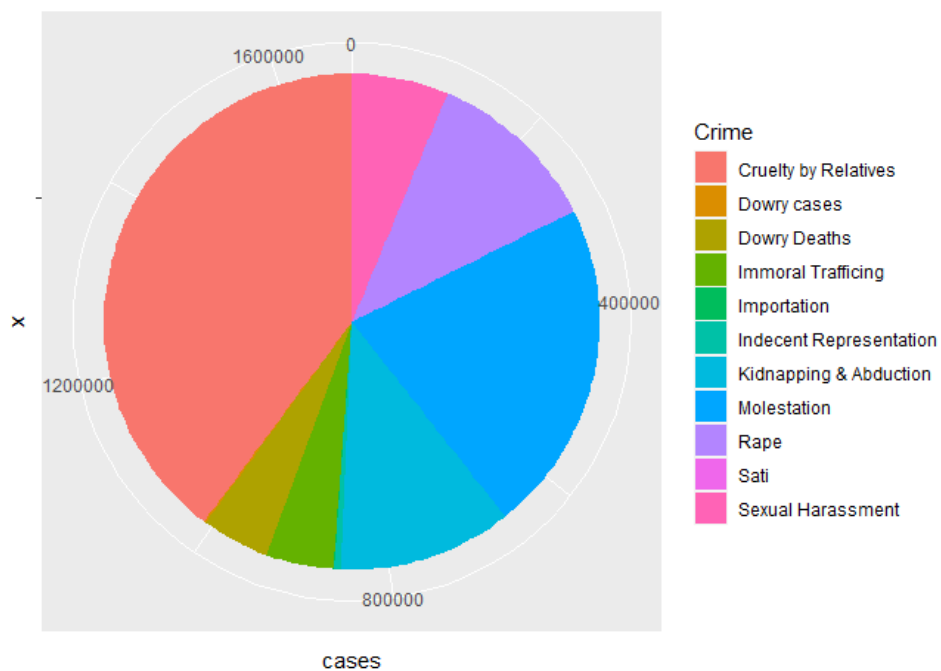
### Iteration 1

The plot shown below lack proper legend, color, guide and labelling of states and the reported cases. All these features were added later.



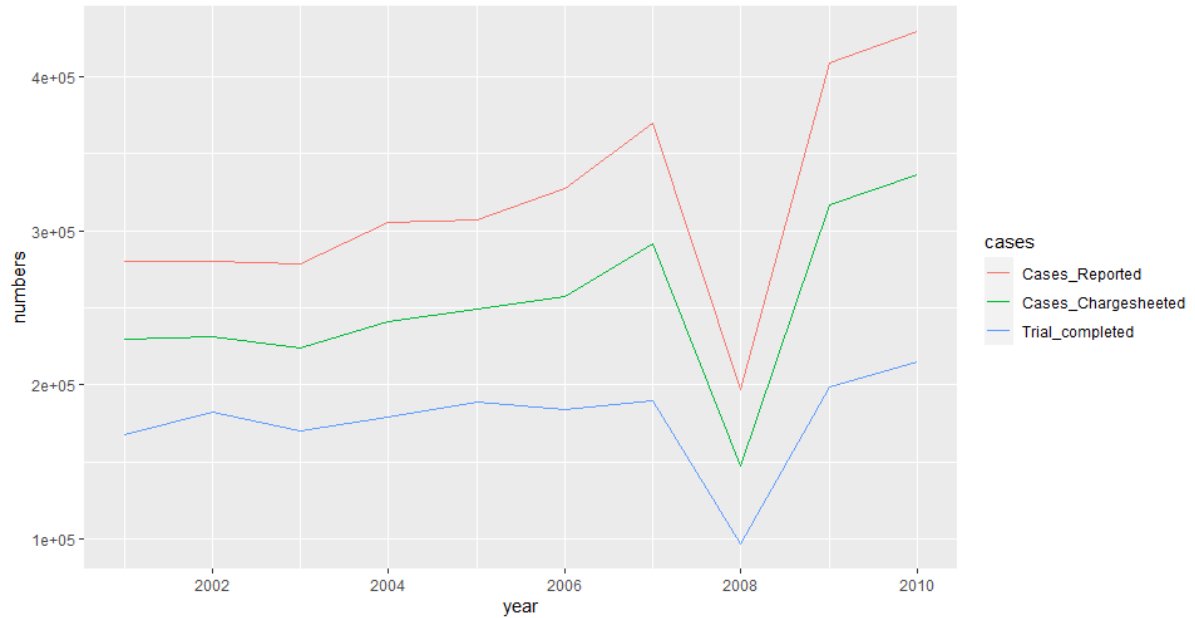
### Iteration 2

Pie chart shown below was later converted to the donut chart. Later percentage labels were added and x and y axis and background were removed.



### Iteration3

The following line graph has grey background and y axis ticks are in e notation. These issues were later addressed and the background color was changed to light yellow with grey grid lines. The labelling of x and y axis was beautified.



### Appendix