Gun Control Analysis

By Team Zeta:

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An analysis on the relationship between mass shootings and political affiliations (2022)

Our Proposal

1. The Problem

We propose a hypothesis indicating a correlation between the **number of mass shootings and political party affiliation** in the states where the incidents occurred.

2. Data Preparation

Cleaning, transforming, and organizing our raw data in a format suitable for analysis.

3. Data cleaning

We number the N/A values (image) and filled the N/A states manually

4. The Project

Conduct a statistical analysis from various mass shooting data into developing a predictive model from the data we found on mass shootings

5. Present

Present findings to the class

The United States' Complicated Relationship With Guns

In the US,

- there are more firearms than people
- gun violence is a significant public health issue

The availability of guns, particularly high-capacity firearms, has been linked to an **increase in gun violence**.

Gun violence has a devastating impact on individuals, families, and communities, and the cost of gun violence in the US is staggering.

Jaqueline Matthews was in the sixth grade on Dec. 14, 2012 when Adam Lanza entered Sandy Hook Elementary, where he shot and killed 26 people. 11 years later she also survived the 2023 Michigan State University shooting

Datasets

State legislative elections, 2022		
Chamber	**Primary date**	**Majority party**
Alabama House of Representatives	May 24	Republican
Alabama State Senate	May 24	Republican
Alaska House of Representatives	August 16	Power-sharing agreement
Alaska State Senate	August 16	Republican
Arizona House of Representatives	August 2	Republican

chamberDf; Source: https://ballotpedia.org/State_legislative_elections,_2022

Incident ID	Incident Date	State	City Or County	Address	# Victims Injured	# Victims Killed	# Subjects-Suspects Injured	# Subjects-Suspects Killed	# Subjects-Suspects Arrested	Operations
2492253	December 31, 2022	Alabama	Mobile	200 block of Dauphin St	1	1		0	1	View Incident View Source
2491656	December 31, 2022	Arizona	Phoenix	4201 N 19th Ave	9	0	0	0	0	View Incident View Source
2491054	December 30, 2022	Tennessee	Memphis	E Brooks Rd	3	1	0	0	0	View Incident View Source

shootingDf;Source: https://www.gunviolencearchive.org/reports/mass-shooting?year=2022

Data preparation

Created **Casualties** columns from shootingDF

- Casualties = Killed + Injured

# Killed	# Injured	Casualties
0	9	9
1	8	9
1	3	4
2	3	5
1	3	4

Extracted name of the **State** from chamber column (chamberDf)

- Alabama State Senate → Alabama

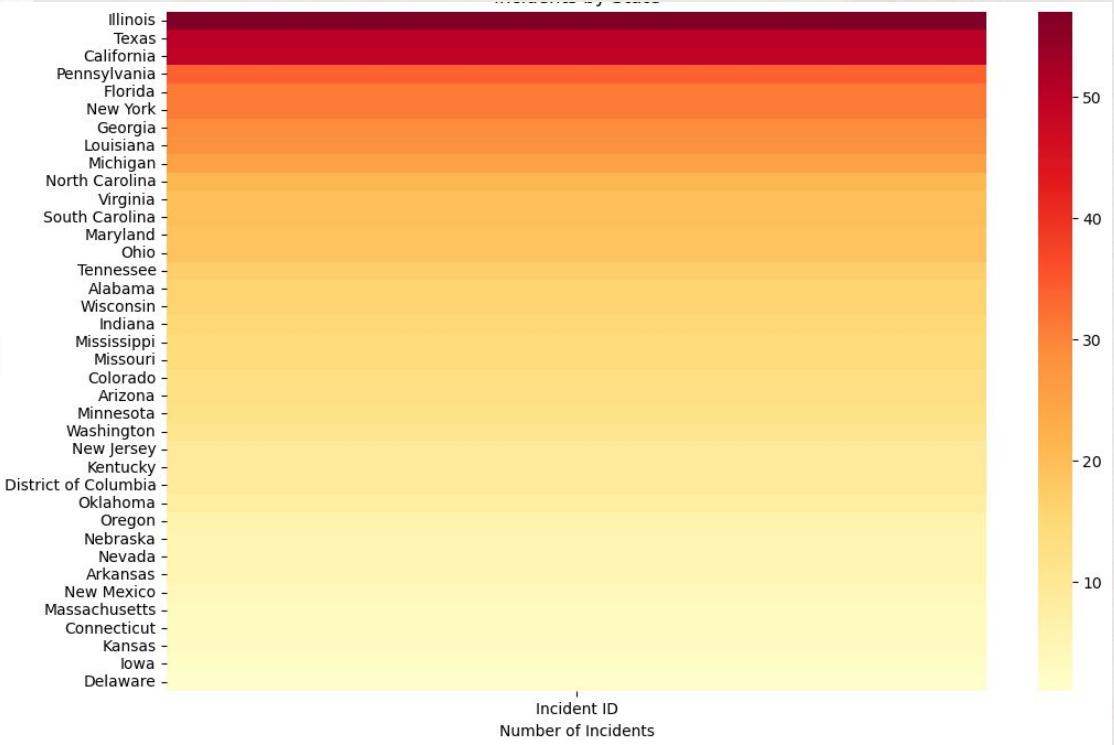
State	Chamber
Alabama	Alabama House of Representatives
Alabama	Alabama State Senate
Alaska	Alaska House of Representatives
Alaska	Alaska State Senate
Arizona	Arizona House of Representatives

Divided chamberDf into **two dataframes**

- chamberDf → senateDf & HouseDf
- Reason: There are duplicated records for each state.

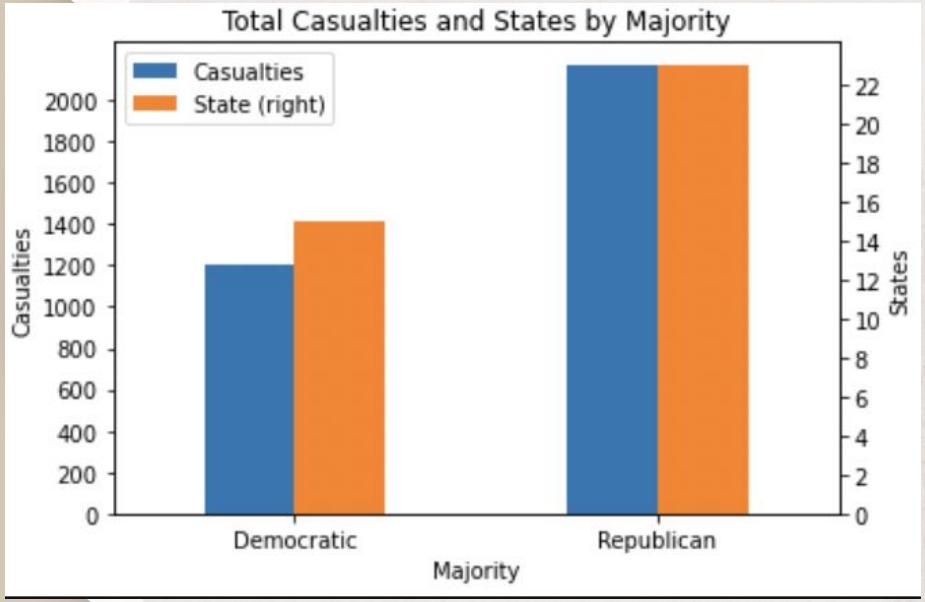
Merged shootingDf with senateDf & houseDf

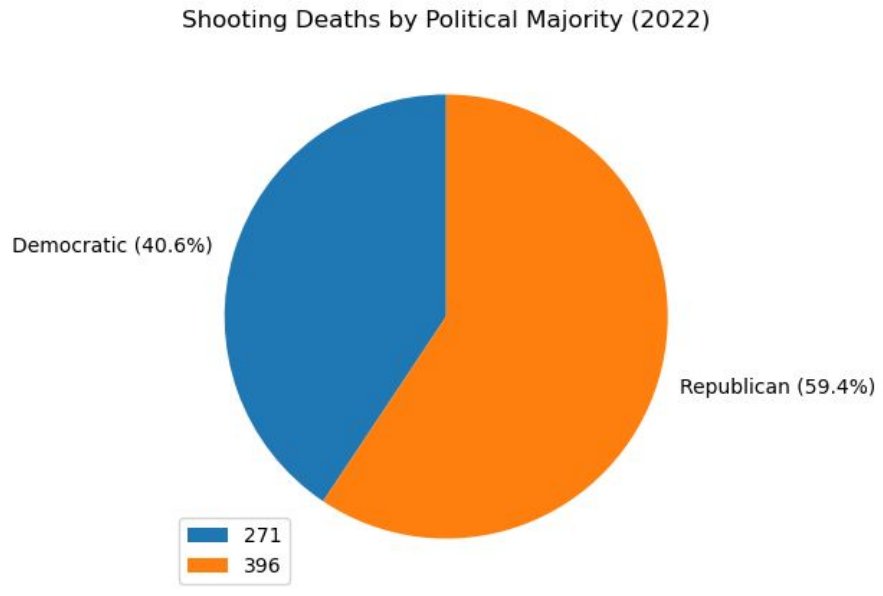
EDA: Which state has the highest number of shootings?



	State	count
0	Illinois	57
1	Texas	50
2	California	49
3	Pennsylvania	34
4	Florida	31
5	New York	31

EDA: Relationship Between Political Parties and Shootings





Data Analysis

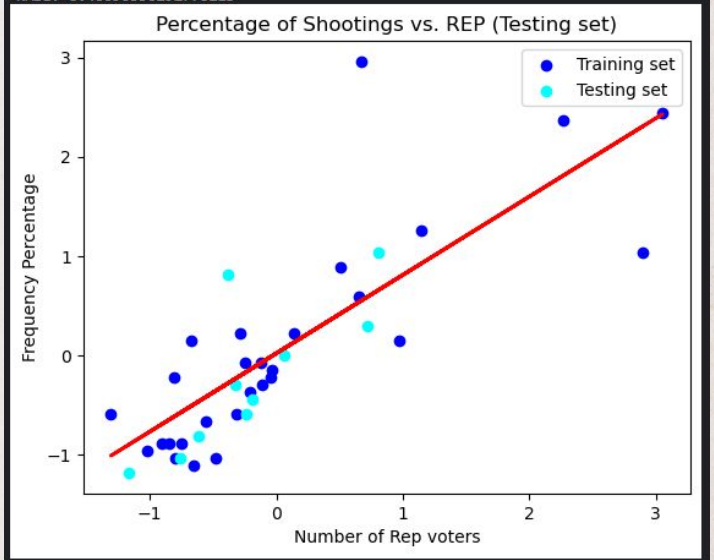
senateMajority	State	Incident ID
Democratic	California	49
	Colorado	13
	Connecticut	3
	Delaware	1
	District of Columbia	9
	Illinois	57
	Maryland	19
	Massachusetts	3
	Mississippi	14
	Nevada	5
	New Jersey	9
	New Mexico	4
	New York	31
	Oregon	6
	Washington	11

VS

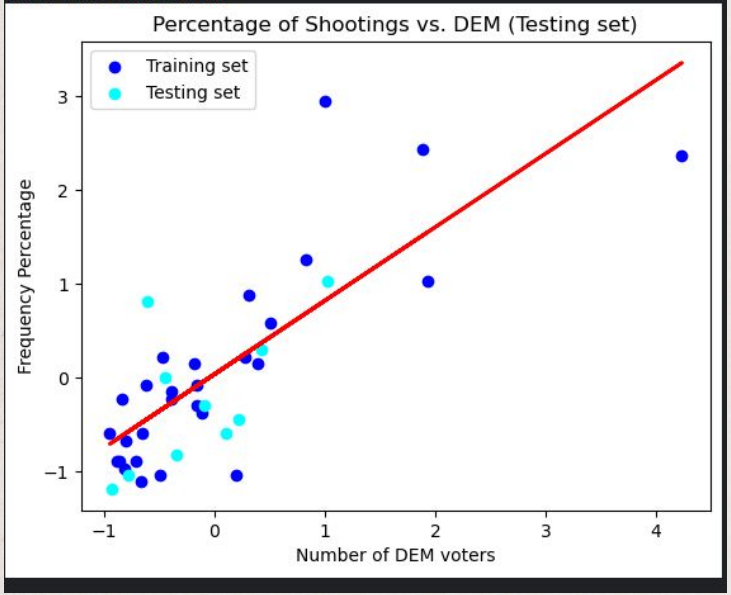
Republican	Alabama	16
	Arizona	13
	Arkansas	5
	Florida	31
	Georgia	29
	Indiana	15
	Iowa	2
	Kansas	3
	Kentucky	9
	Louisiana	28
	Michigan	25
	Minnesota	12
	Missouri	14
	Nebraska	5
	North Carolina	21
	Ohio	19
	Oklahoma	8
	Pennsylvania	34
	South Carolina	20
	Tennessee	17
	Texas	50
	Virginia	20
	Wisconsin	16

Linear Regression: Correlation between number of DEM vs REP voters with percentage of mass shootings

```
Training Set Evaluation:
R^2 :  0.6572859946154166
MAE : 0.4245008643141432
RMSE: 0.628112481558009

Testing Set Evaluation:
R^2 :  0.5833620814502135
MAE : 0.3711767325101219
RMSE: 0.46090536292776213
```

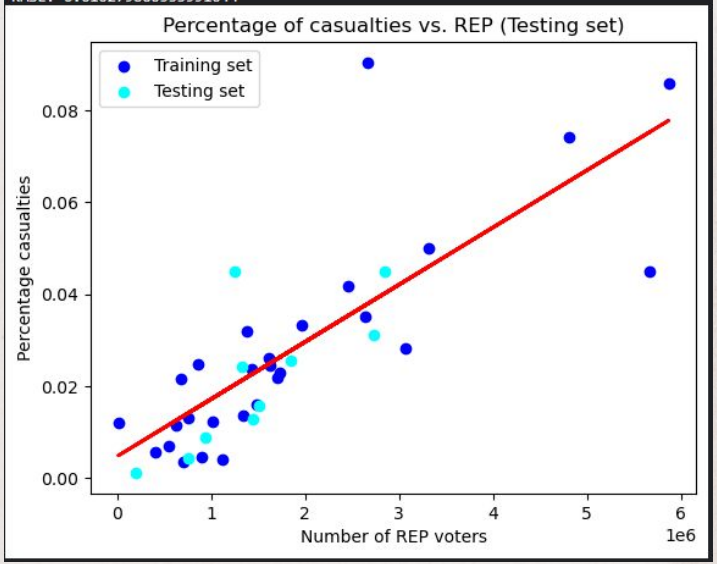



```
Training Set Evaluation:
R^2 :  0.6583040129848934
MAE : 0.44546707500880606
RMSE: 0.6271788961321952

Testing Set Evaluation:
R^2 :  0.3098563292638895
MAE : 0.501131858027889
RMSE: 0.5932013349813373
```

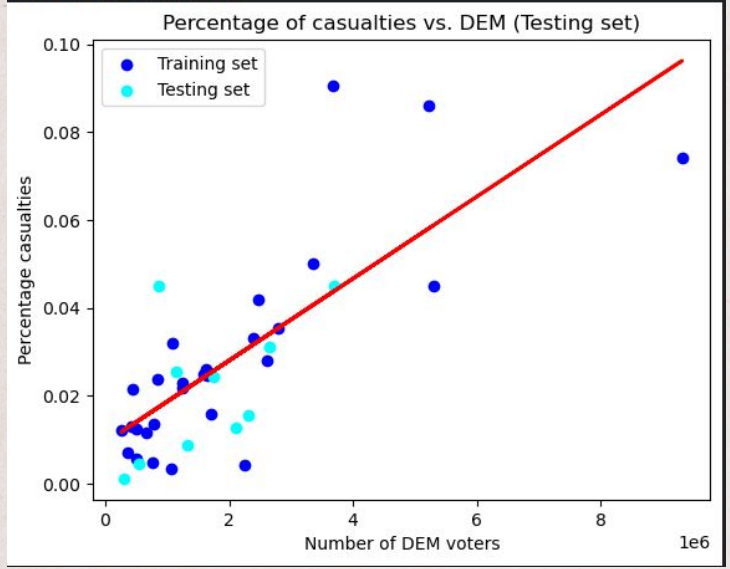


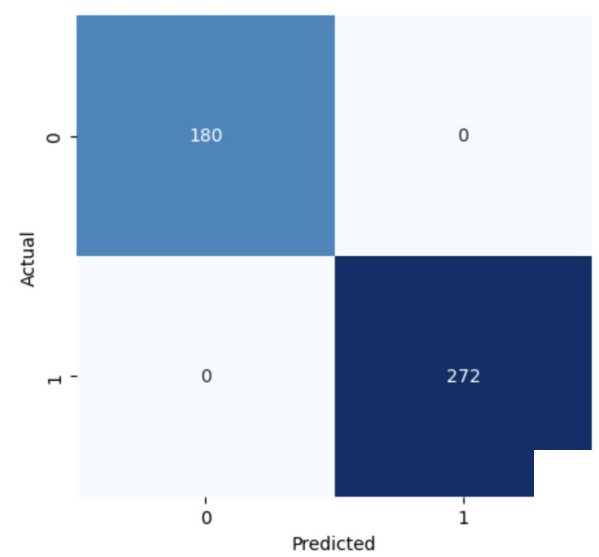
Linear Regression: Correlation between number of DEM vs REP voters with percentage of casualties in shootings

```
Training Set Evaluation:
R^2 :  0.6518118656828691
MAE : 0.008716630847054986
RMSE: 0.013464344526123915

Testing Set Evaluation:
R^2 :  0.5195374573610914
MAE : 0.008370088612035476
RMSE: 0.010279886533991044
```

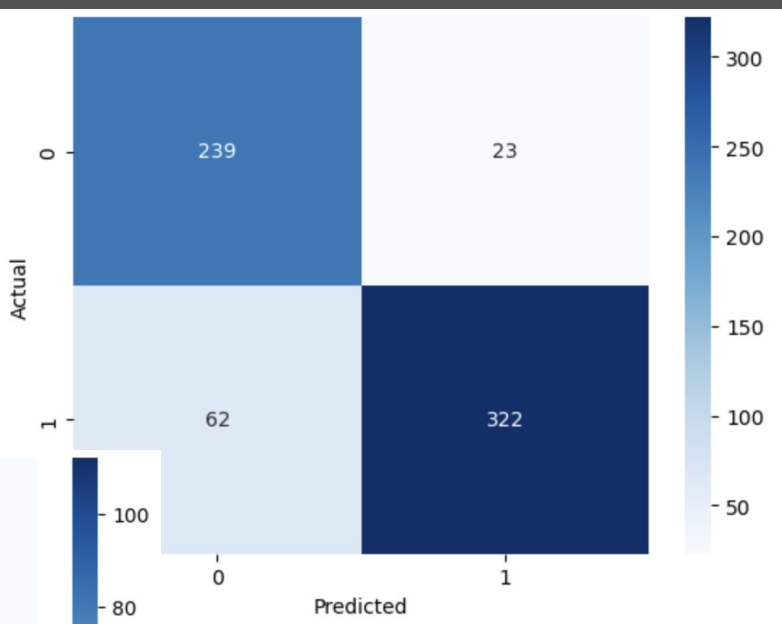



```
Training Set Evaluation:
R^2 :  0.6284227181427346
MAE : 0.009111900743716258
RMSE: 0.013909221048878975

Testing Set Evaluation:
R^2 :  0.23192143433262224
MAE : 0.010406430395650475
RMSE: 0.012997546393602481
```

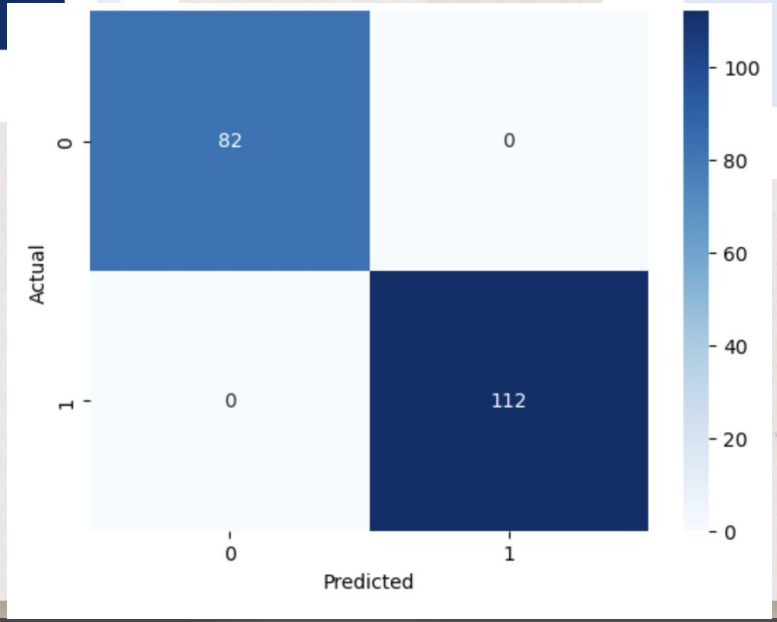




RF Testing



RF Training



RF with Cross validation

What can we conclude?

- **Is there a correlation between political affiliation and the number of occurrences in mass shootings?**

  Yes, with the models that we tested, there was a correlation between states that had more republican voters and higher counts of mass shooting incidents as well as mass shooting casualties.

- **Can we classify state senate majorities?**

  Yes, random forest had a training and testing accuracy of 100%, with cross validation to prevent overfitting, had a 87.5% accuracy

- **Anything else?**

  Besides testing our hypothesis, also tested other factors like poverty levels, and race- which came to show that there were no correlation.

Thank You!