

Guns as Symbols in Political Advertisements

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I. Introduction

- Motivation:** Recent mass shootings and gun related deaths have influenced more discussion about gun control and gun laws. Researchers have found that over time political advertisements are more likely to discuss guns (Barry, et.al, 2020). In addition, it is concerning that Republicans ads seem to be more likely to discuss and picture guns (Bort, 2022).
- Research Question:** How do Democrats and Republicans talk about and picture guns?
- To answer our question, we used computer vision models to detect guns in images and video frames, used logistic regression models to analyze how party affects gun picturing and discussion, and the FightinWords approach to examine how Democrats and Republicans talk about guns differently.

II. Data

- A collection of 2,130 TV ads sponsored by federal candidates from two major parties for the 2020 general election.
- Google's Speech-to-Text was used to obtain video transcripts.
- Using FFmpeg, we extracted all frames in each video for image analysis.

III. Methods

Computer Vision

Object Detection

- Used a pre-trained convolutional neural network (CNN) model based on "You Only Look Once" (YOLOv3) (Metha et al. 2020) to identify and locate guns in our images.
- The predictions are assigned to a confidence level (How much the model believes the prediction represents the real-world object.)
- We used a threshold level of 0.65.

Image Classification

Used a high level deep learning framework – Lightning Flash – to identify whether a gun is in an image or not. To train our model, we used a combination of 12 images from WMP human coded TV ads and 128 images online featuring gun for gun images (Mehta et al. 2020) and WMP TV ads for non-gun images.

Validation

To validate our model we randomly selected 38 positive cases from the Facebook Ad Library and 38 negative cases from our human coded dataset. From these 76 videos, we took out every frame in the video and ran it through our object detection and image classification models. The number of frames for those 76 videos were 99,060 frames.

Object Detection Validation Results

Accuracy – 50%
Precision - 50%
Recall - 71%
F1 - 58%

Image Classification Validation Results

Accuracy - 39%
Precision - 43%
Recall - 68%
F1 - 53%

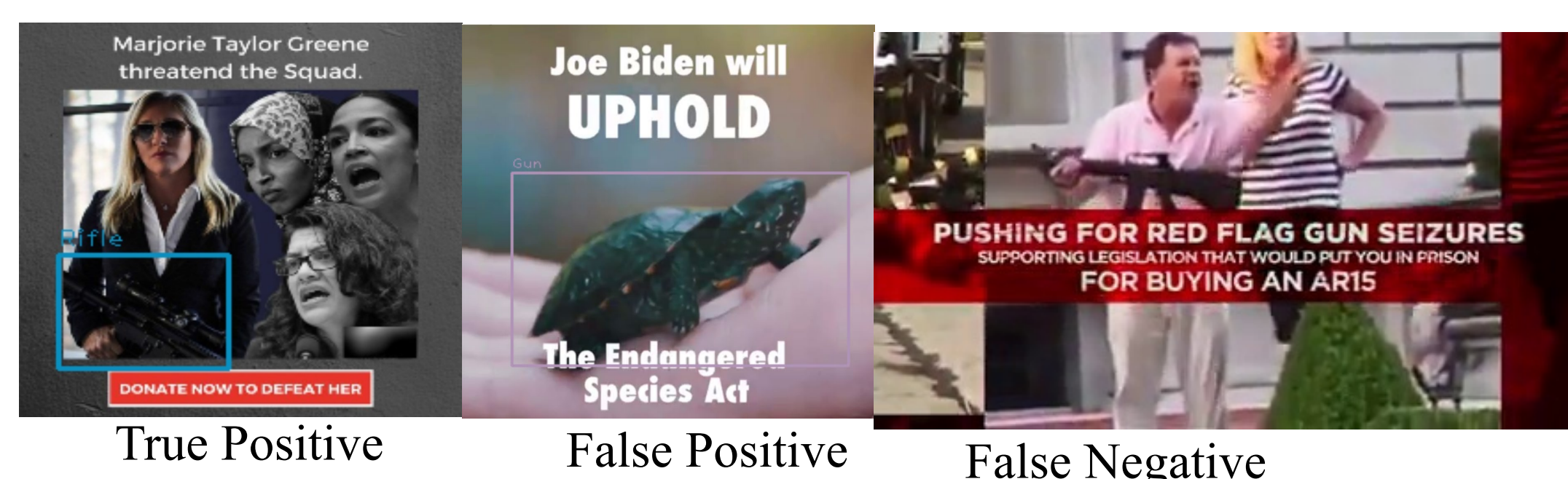


Figure 1: Example of Object Detection results

Logistic Regression Models

Model Specification

- Unit of analysis - Ad creative
- Binary dependent variables: gun mention (human coded) and gun picturing (based on image classification)
- Key independent variables: party affiliation
- Controls: gender, incumbency, office, race competitiveness, log (ad cost), pure rural

Fightin' Words

- For gun ads, Fightin' Word allows us to identify and weight words and features that are used distinctively by Republican and Democrat ads.
- A measure of the difference in proportion on each word. (see Figure 3)

IV. Results

The Use of Gun Mentions and Images by Party

- faster output, though the validation results show that our image classification model performs worse than our object detection model.
- From our data 3% of Democrats talked about guns in their ads and 8% of the Republicans talked about guns in their ads.
- From our data 3% of Democrats and Republicans showed guns in their ads.

Logistic Regression Results

The first two columns in Table 1 shows how party affects whether an ad mentions guns. The next two columns show whether an ad pictures guns.

Predictors	Gun Issue		Gun Image	
	Odds Ratios	p	Odds Ratios	p
(Intercept)	0.10	0.006	1.25	0.767
Party Affiliation [REPUBLICAN]	1.94	0.020	1.15	0.626
Female Candidate	0.96	0.885	2.74	0.006
Candidate Race [Presidential]	1.09	0.937	752608.88	0.979
Candidate Race [Senate]	1.34	0.320	0.55	0.058
Incumbent [I]	0.59	0.081	0.85	0.588
Incumbent [O]	0.99	0.978	1.12	0.821
Pure Rural	4.81	<0.001	1.24	0.555
Race Competitiveness	1.08	0.459	0.97	0.796
Log Ad Cost	0.85	0.022	1.34	<0.001
Observations	2091		2048	
R ² Tjur	0.038		0.019	

Table 1: Logistic Regression Results

Here are our findings:

- Political parties only matter for gun mentioning.
 - Compared to Democrats, Republican candidates are more likely to talk about guns in their television ads.
 - However, we do not see party difference in terms of having gun images in political television ads
- Candidate gender only matters for gun picturing
 - Female candidates are more likely to have gun images in their political ads, than males.
- Television ads for pure rural constituencies are more likely to mention guns than other types of constituencies.
- We found that the higher the cost for the ad, the more likely that it will mention guns and picture guns.

Most Popular Words Used in Gun Ads by Party

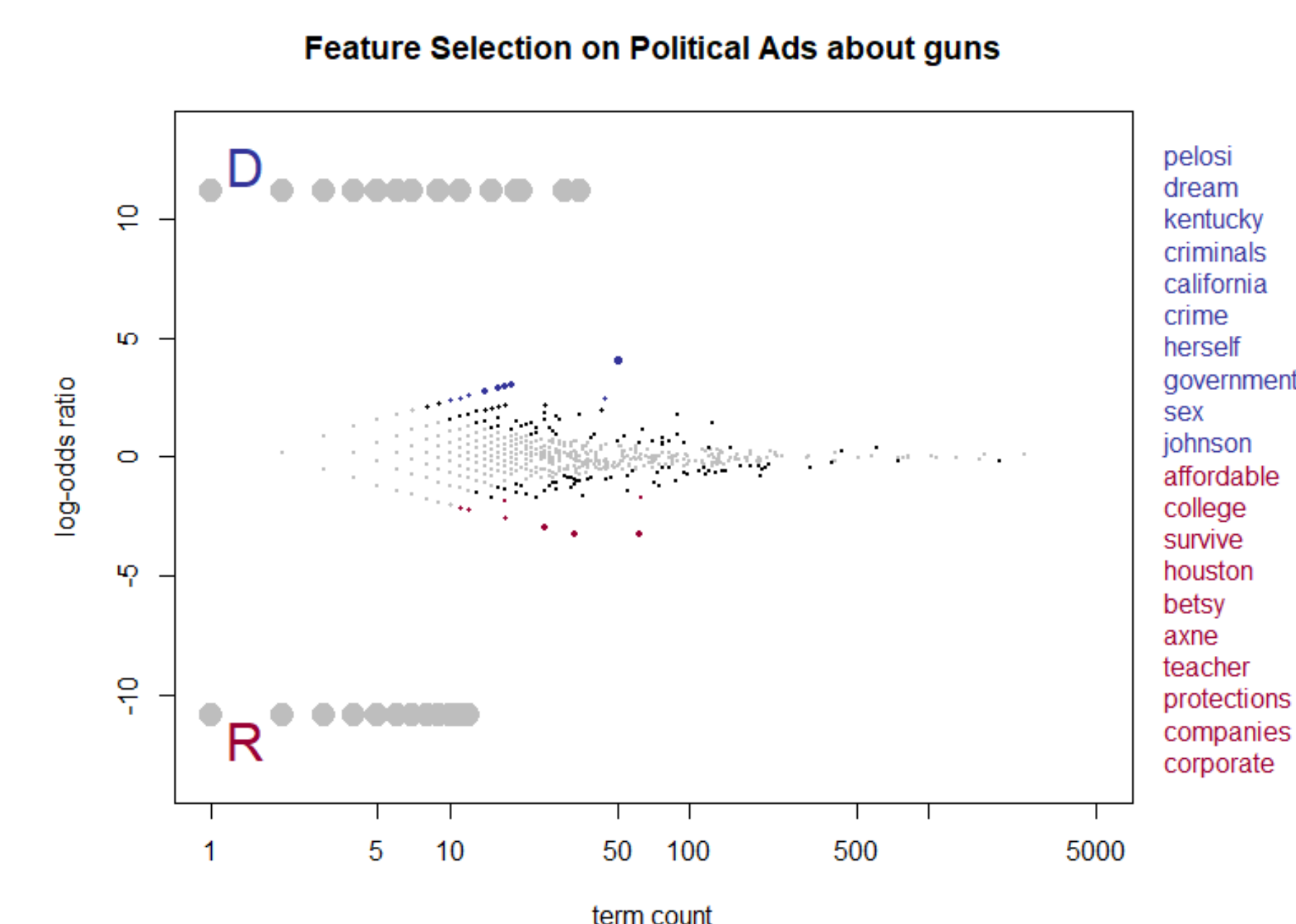


Figure 3: Most popular words used by Democrats (blue) and Republicans (red).

V. Conclusive Discussion

- While party affiliation has a significant impact on mentions, there is not a party difference regarding gun pictures.
- Republicans and Democrats talk about guns in different ways.

Future Work

- To improve our model that identifies guns in images we will increase the number of the training images for our image classification model by including more positive cases from WMP advertisements data and tune our model hyperparameters.
- We would want to include the interaction between party and gender to see whether Republican women are more likely to picture guns than other groups.
- We would like to add more controls and to assess how these patterns change at the airings-level, in the 2022 midterms, and online.

References

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