



Predicting Perceptions of The Justification of Officer-Involved Shootings Using Decision Trees



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INTRODUCTION

- Predicting people's reactions in cases where police officers use deadly force poses a challenge and can be applied to contexts such as jury selection.
- During jury selection, lawyers seek to select jurors who will be sympathetic to their case in court (Costanzo & Krauss, 2021).
- Lawyers often use surveys or questionnaires to help predict views of jurors, in many cases with limited success.
- Results of jury selection research often show that the more specific a factor is, the better a predictor it is. Ex: Attitudes towards civil liberties are better predictors than general measures of authoritarianism (Narby et al., 1993).
- Prosecutors, defense lawyers, and jury consultants may be interested in tools that can make predictions in officer involved shooting cases.
- Machine learning is the use of data and algorithms to make predictions and improve decision making. Machine learning may be useful to apply in a variety of psycho-legal contexts.

CURRENT RESEARCH

- The purpose of this study was to apply a type of machine learning algorithm, decision trees, to the prediction problem of viewing an officer involved shooting as justified or not.
- Decision trees are a type of supervised machine learning that visually represent if-else statements. The goal is to represent relationships between predictors and outcomes by partitioning data in branching structures to reduce heterogeneity.
- The present study used secondary data to develop a decision tree to create a practical tool to predict people's views of the justification of a real police shooting.

METHOD

Data

- Participants were gathered by Reynolds (2023), which developed a shorter version of the Attitudes Towards Police Legitimacy Scale. This involved participants completing measures of Right-Wing Authoritarianism, Social Dominance Orientation and a short version of the Attitudes Towards Police Legitimacy Scale.
- Some participants viewed a video of a real officer-involved shooting and then rated whether they felt it was justified or not.
- Participants were recruited through Prolific Academic, and this current study examined only participants who saw the police shooting video, $n=319$, mean_{Age} = 37.8, most common race = White.

METHOD

Decision Tree

- The data was split randomly at 80% for the training set and 20% for the test set.
- The training set was explored using the caret package in R. The algorithm used was rpart, which uses recursive partitioning and regression trees.

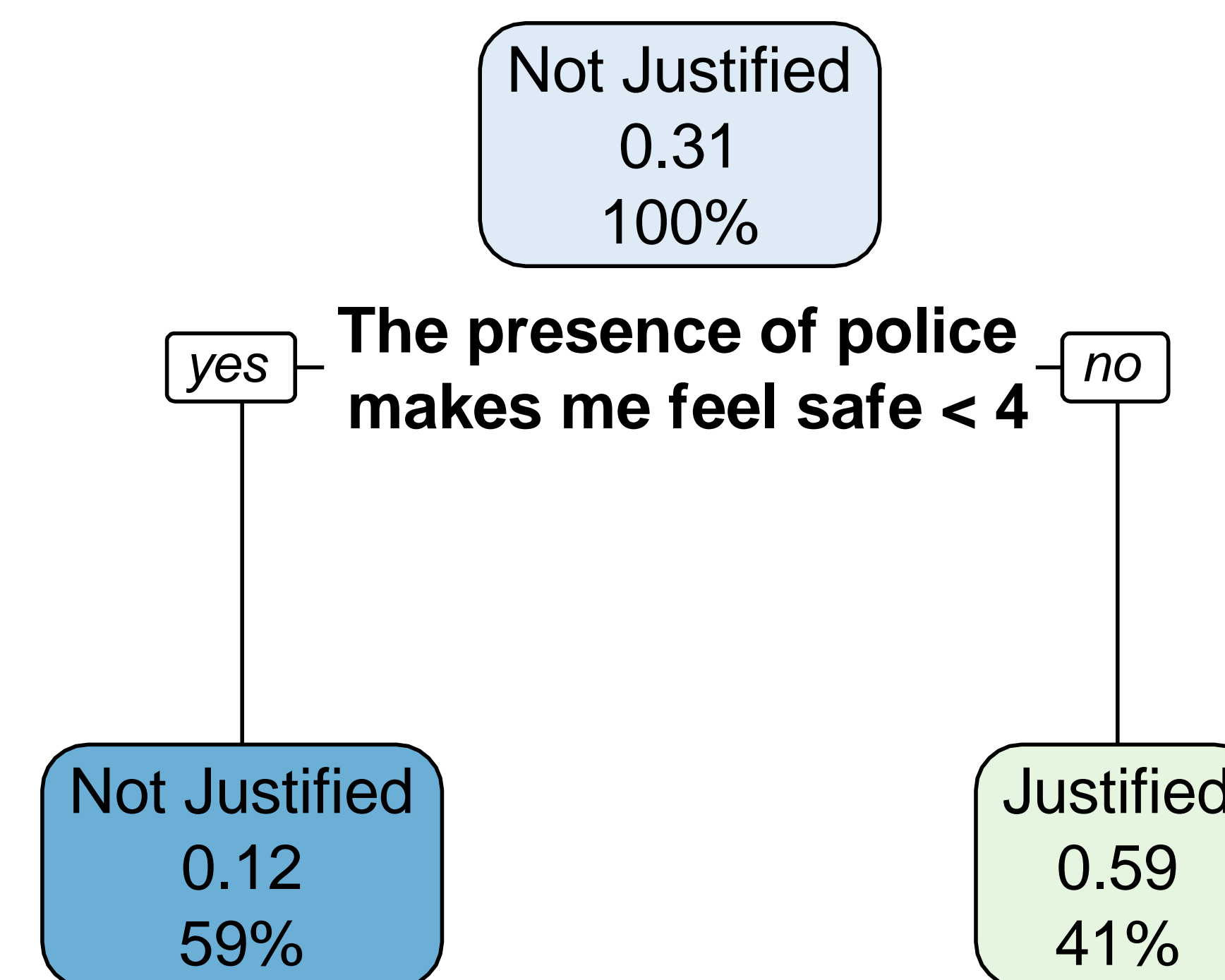
Features

- Demographics including sex, age, and race.
- Right-Wing Authoritarianism (Altemeyer, 2004; Zakrisson, 2005) (15 items)
- Social Dominance Orientation (Pratto et al., 1994) (16 items)
- Attitudes Towards Police Legitimacy Scale Short Form (Reynolds, 2023) (11 items)
- Individual items as well as the scale averages were included as features, for a total of 51.
- Kappa was chosen as the comparison metric with K-fold of 3.
- Based on the training results a final complexity parameter of .168 was chosen (the Kappa dropped dramatically as the complexity increased beyond this).

Final model

- The final model was created using the rpart package based on the results of the training set. This model was then used on the test set to calculate several classification indices.

RESULTS



Sensitivity	Specificity	Pos Pred Value	Neg Pred Value	Precision	Recall	F1
0.73	0.95	0.90	0.84	0.90	0.73	0.81

RESULTS

- The algorithm that was created used only one feature and contains only two branches.
- The algorithm predicts that those who answer APLS-SF item 2 – “the presence of police makes me feel safe” with 1-3, on a scale of 1-5, will perceive a shooting as not justified. Those who answer with 4 or 5 will view it as justified.
- With just this item, the tree achieves a balanced accuracy of .84, an accuracy of .86, 95% CI[0.75, 0.93], an AUC of .84, and a Kappa of .70.

DISCUSSION

- The goal was to create a simple decision tree algorithm that might predict how individuals, such as jurors, view the justifiability of an officer involved shooting. These initial results are very promising as this tree suggests reasonably accurate classification with a highly simple structure.
- However, the study was limited in size, only examining 319 participants. Gathering more participants might allow for adjusting the training and test set ratios and mitigate potential issues with overfitting.
- Another limitation was that participants only viewed a video of an officer-involved shooting and did not read a full case.
- Exploring other types of machine learning algorithms, like random forests, or ensemble models, may increase the classification rate; however, the trade-off is that they become less transparent and require greater expertise for non-experts to understand and apply.
- Therefore, although more complex algorithms could be used, decisions tree algorithms like rpart or C5.0 should also be pursued while examining additional features.

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