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Do Americans Trust Scientific Experts?

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ABSTRACT

This report presents the results from an analysis of Americans' Mistrust in Scientific Experts. PEW Research conducted a survey asking the general American public questions about their views and opinions regarding their level of trust in scientific experts. The data includes variables such as demographics, responses to survey questions intended to measure the level of trust, and responses to factual questions to assess knowledge. The various categories of scientific experts used in this study were the following: Medical Doctor; Medical Research Scientist; Dietician; Nutrition Research Scientist; Environmental Health Specialist and Environmental Research Scientist. This report presents results from descriptive analyses that highlight trends based on the responses given. Predictive models are also presented which can take responses from an individual and predict their level of trust in a scientific expert of a certain category. This report highlights variables that are most important in predicting a person's opinion of a scientific expert.

INTRODUCTION

Do American's trust scientists? If so, how much? Are there any indicators that would help predict a person's level of trust? This project focuses on the average American's confidence in a scientific expert to possess the skill it takes to do their job in conjunction with having the individual's best interest at heart. This project aims to portray potential relationships between various types of demographic attributes and imply the highest and lowest levels of trust in specific categories of scientific experts.

BACKGROUND AND DATA PREPARATION

PEW Research conducted a survey asking individuals questions regarding various categories of scientific experts. PEW Research Center is a nonpartisan fact tank that informs the public about the issues, attitudes and trends shaping the world. PEW Research does their best to remain unbiased by refraining from taking stances on policies. The Center conducts public opinion polling, demographic research, content analysis and other data-driven social science research. This organization is known for studying U.S. politics, policy as well as social and demographic trends. Data is drawn from the panel wave (American Trends Panel) conducted Jan. 7 to Jan. 21, 2019. A stratified random sample of 5,817 panelists was selected from the full panel. Of these, 4,464 (77%) panelists responded. Case weights are considered for the panelists and are used to represent the distribution in the real population. The questions were broken up into four facets:

1. The general opinion about an expert
2. Trust in the expert
3. Familiarity with the expert's field

4. Belief in the likelihood of misconduct from the expert

This questioning was carried out for six categories of scientific expertise. The data is comprised of 4,464 responses and contains 208 columns. Every person in the data was assigned case weights as per their population distribution based on demographics.

DATA CLEANING

The data has very few missing values. All the variables in this dataset are classified as nominal. Data cleaning was performed in SAS Enterprise Miner. The missing values were handled by using a default imputation node. By default, missing values are replaced by mean for interval variables and mode for categorical variables. For validation, the data was split into 70% training and 30% testing datasets.

EXPLORATORY DATA ANALYSIS

The goal of this exploratory data analysis was to identify trends between certain demographics and the levels of trust in each category of expert. In general, Medical Experts have the most positive responses and the least negative responses. This shows the people seems to trust them. It's not the same case for Environmental Research Scientists. Around 14% of people have a negative opinion towards them. People generally seem to have a more positive attitude toward practitioners than researchers of same domain.

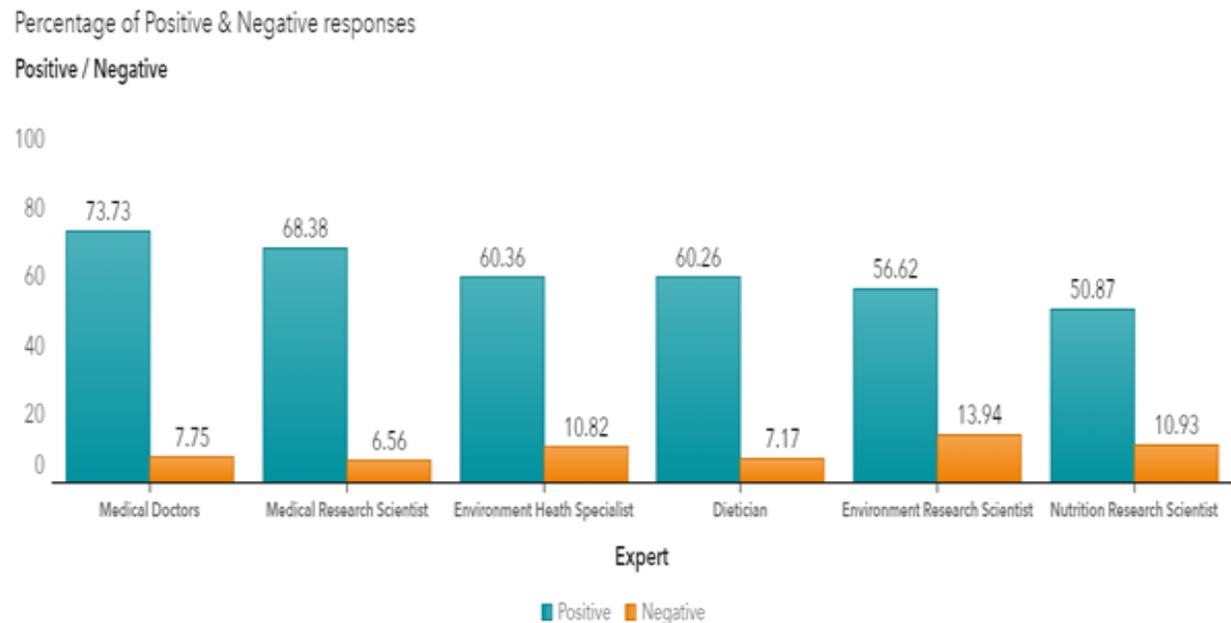


Figure 1: Attitude towards various scientific experts

Figure 2 shows that African American's trust in medical doctors is less than that of other races.

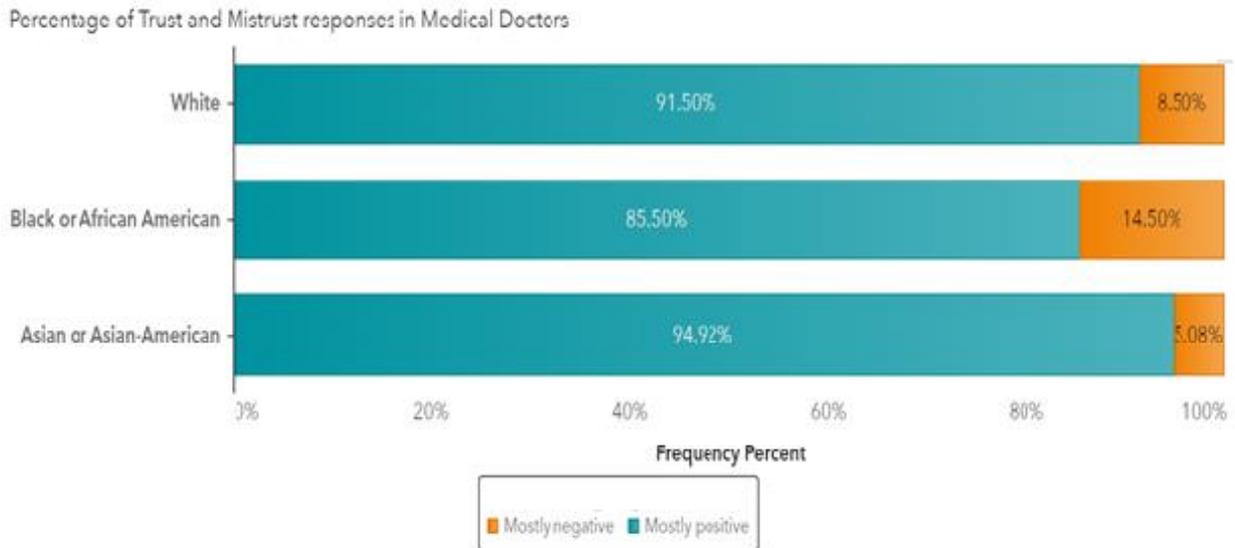


Figure 2: Percentage of Trust and Mistrust responses in Medical Doctors

Figure 3 shows males trust medical research scientists more than females.

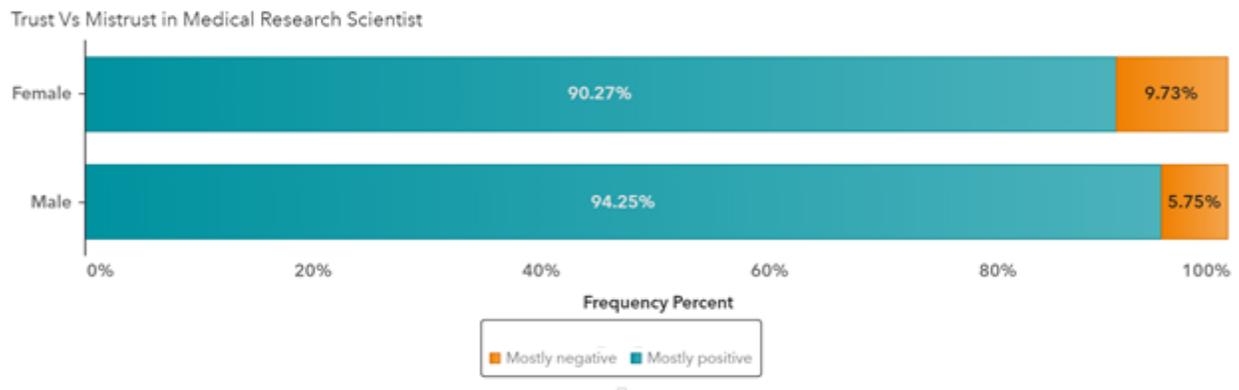


Figure 3: Trust vs Mistrust in Medical Research Scientist

PREDICTIVE MODELLING AND RESULTS

There are three types of research scientists considered in this analysis. Predictive models were built separately for predicting the overall opinion towards these scientists. The Figure No 5 in the appendix shows the distribution of the target variable, namely the distribution of people’s opinion of medical research scientists.

Most people have a positive opinion regarding medical research scientists. There is a mere 6% with a negative opinion and about 23% of people responded with neutral opinions. About 60% of people have a positive opinion of environmental research scientists. 10% responded with negative opinions and 30% responded as neutral. The final category is nutrition research scientist. Approximately 50% of people agree with the work performed and 40% of the people remain neutral and the remaining being negative towards them. Most of the distributions of the target variable are skewed. The target variable has been balanced by adding case weights from the survey data as frequency variables. Two types of

models for each type of research scientist were built. The first set of models use demographic variables. The second set of models use both demographic variables and questions from the survey referencing familiarity, trust, knowledge of misconduct and overall opinion.

RESULTS:

Misclassification rate was used as the metric for selecting the champion model. Results indicated that models that used demographic variables and other variables in the questionnaire performed best for predicting trust in research scientists in all three categories.

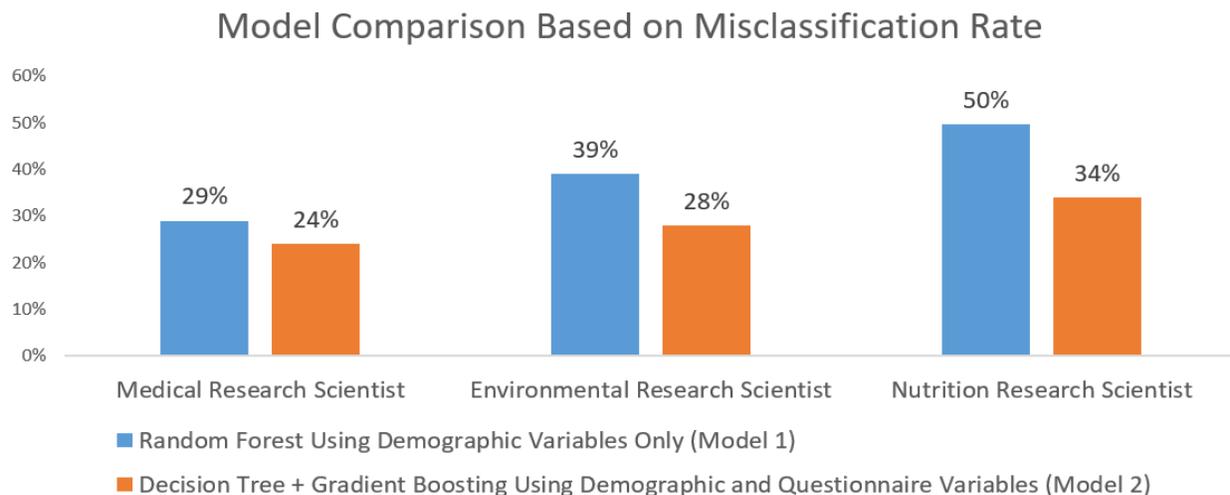


Figure 4: Model Comparison

For the first set of models that use only demographic variables, the results show an individual’s ideology plays a part in predicting trust. People who claimed to be more conservative tend to have a higher trust rate in scientists. The second key factor is political party. In general, people who affiliated with the Democratic Party tend to trust scientists more than those affiliated with the Republican Party. The third variable is whether the individual had access to the Internet or not. Those who had available Internet had higher trust scores.

For the second set of models that use demographic variables and other variables, the important common variables were primarily made up by questions from the survey. People who had knowledge about the research scientist from their education had a more positive attitude towards them, implying higher trust levels. People who believe scientists do a good job conducting research as well as people who believe that scientists care for the interest of the public reported having a higher regard for those scientists morale. This comes as no surprise considering the questions were directly related to a person’s opinion of a scientist.

CONCLUSION

In conclusion, there are clearly some relationships between demographic characteristics, knowledge of the subject with the citizen’s level of trust in Scientific experts. The predictive models were able to predict trust levels based on different combinations of variables which includes demographics and survey question answers.

Generalization

In summary, some insights from the analysis:

1. Practitioners receive more positive trust ratings. Perhaps this is due to the fact they are in direct contact with general public. Doctors are a great example.
2. Political parties play a role in the level of trust. Democrats tend to trust experts more.
3. Income is a significant determining factor. Higher income correlates with increasing trust.
4. Women trust environmental specialists and nutrition scientists while men trust medical scientists more.
5. Race is also a significant factor. African Americans tend to trust medical doctors and medical researchers less.
6. Older generations trust medical experts while younger generations trust them less. It's the reverse in regard to environmental experts.

Recommendations

- Programs that are grant-funded rely on public perception. This means that organizations that depend heavily on grants for operation must maintain a positive opinion from outsiders. Using these methods for a study on a regular basis could allow them to identify areas of improvement from their current funders as well as untouched areas for potential funding
- Public Relations Firms could benefit by using this type of analysis to help with brand management of the companies that hire them. They would be able to do regular studies and identify areas of potential positivity growth by assessing a population's opinion.
- Non-profit organizations could use this by observing the opinions of the population around them to help increase donations in their existing donators as well as identifying population areas of potential donators.

Future Scope

For the future of this analysis specifically, it could be expanded to predict a trust score based on a 1 to 10 scale which could strengthen our predictive models. Expanding the selection of data to include geographical indicators like zip-code could give a more granular look at people's opinions. The models can be enhanced by introducing more advanced missing value techniques, various selection metrics and model parameters.

REFERENCES

Funk, Cary; Hefferon, Meg; Kennedy, Brian; Johnson, Courtney. "Trust and Mistrust in Americans' Views of Scientific Experts." Accessed December 4, 2020. [pewresearch.org/science/2019/08/02/trust-and-mistrust-in-americans-views-of-scientific](https://www.pewresearch.org/science/2019/08/02/trust-and-mistrust-in-americans-views-of-scientific).

CONTACT INFORMATION

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APPENDIX

RQ1_F1A_W42 – Target (People view on the medical research scientists)

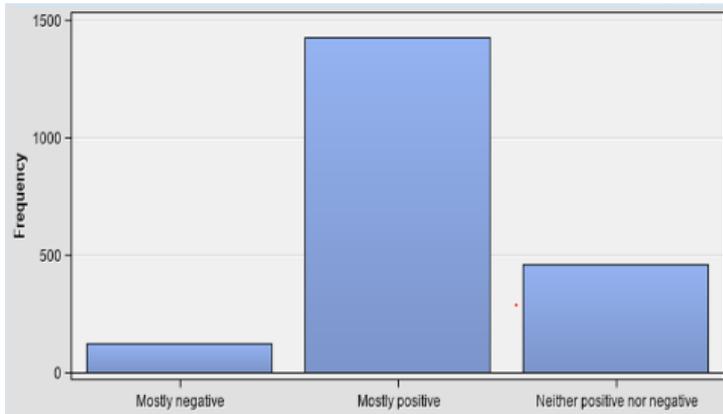


Figure 5: Target variable distribution

RQ1_F1B_W42 – Target (People view on the Environmental Research scientists)

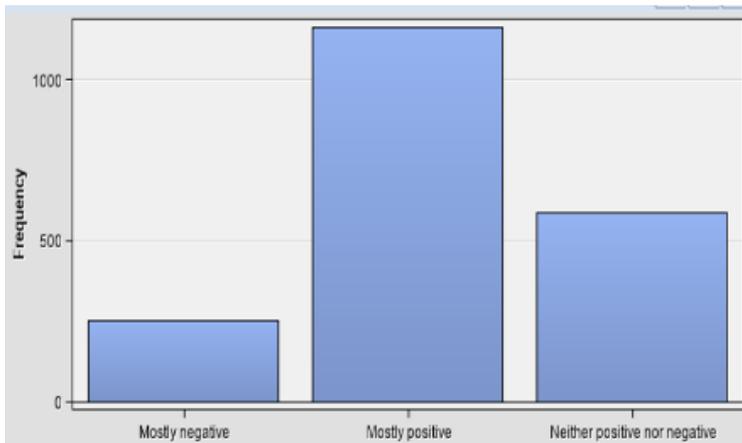


Figure 6: Target variable distribution

RQ1_F1C_W42 – Target (People view on the Nutrition Research scientists)

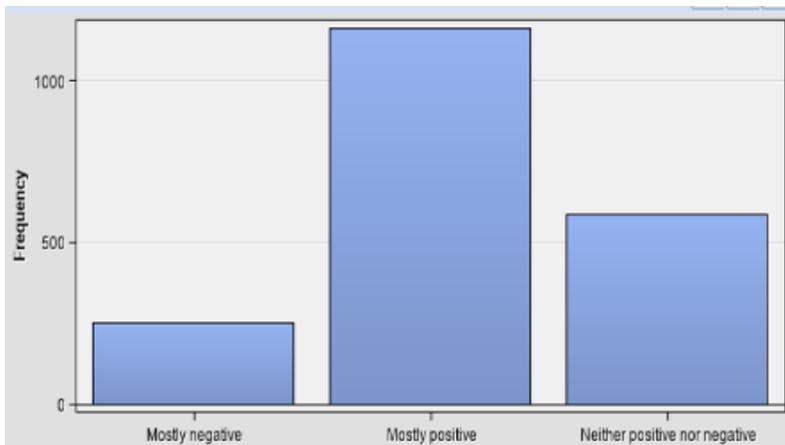


Figure 7: Target variable distribution

Model Description	Variables Used	Misclassification Rate
Gradient Boosting	Demographics	0.29
Decision Tree	Demographics	0.31
Regression	Demographics	0.31
Auto Neural	Demographics	0.32
Gradient Boosting	Demographics + other questions	0.24
Decision Tree	Demographics + other questions	0.24
Regression	Demographics + other questions	0.33
Auto Neural	Demographics + other questions	0.31

Table 1: Predicting Trust / Mistrust in case of Medical research scientists

Model Description	Variables Used	Misclassification Rate
Gradient Boosting	Demographics	0.37
Decision Tree	Demographics	0.39
Regression	Demographics	0.45
Auto Neural	Demographics	0.42
Gradient Boosting	Demographics + other questions	0.29
Decision Tree	Demographics + other questions	0.3
Regression	Demographics + other questions	0.42
Auto Neural	Demographics + other questions	0.42

Table 2: Predicting Trust / Mistrust in case of Environmental research scientists

Model Description	Variables Used	Misclassification Rate
Gradient Boosting	Demographics	0.5
Decision Tree	Demographics	0.49
Regression	Demographics	0.51
Auto Neural	Demographics	0.47
Gradient Boosting	Demographics + other questions	0.36
Decision Tree	Demographics + other questions	0.33
Regression	Demographics + other questions	0.49
Auto Neural	Demographics + other questions	0.49

Table 3: Predicting Trust / Mistrust in case of Nutrition research scientists