*Predicting Outcomes for Adjudication Appeals through Machine Learning*

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*Abstract*—Individuals who wish to work in or with the United States Government are required to undergo a background investigation. These investigations focus on investigating an individual and any and all aspects of their personal life and behavior going back 5-10 years. Some of these cases are denied and then later appealed. Of the cases that are appealed, another investigation is done and a final decision is made on whether or not the individual is granted or denied a security clearance.

Keywords—machine learning, predict, model, adjudicative guidelines, scikit-learn, Jupyter Notebooks

# Introduction

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# Adjudicative Appeals

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# Machine Learning

Machine Learning techniques attempt to mimic human thought and make complex decisions on input using advanced statistics. There are many models that handle different forms of input and use different statistical models to predict the desired type of outcomes. In this case, Logistic Regression was used to predict outcomes due to the data input – Boolean values (true/false). Logistic Regression works by \*\*\*. The data that was used for the training data consisted of yes/no values for various attributes and predicted whether or not the input data warranted a decision of denied or rejected.

There are also many different ways to calculate the accuracy of the model in terms of fit and how well the model has correctly predicted the value. In this case only the accuracy score was done in which the original outcomes were compared to the predicted outcomes.

# Tools

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# Predicting Outcomes

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## Outcomes and Analysis

# Use Cases and Limitations

# Future Work

The models used were limited to the type of input data available. In this case, only Logistic Regression was used on a subset of input fields. Logistic Regression model does not handle text input, and since many of the other fields are not just yes/no values, branching out into more powerful models that handle more robust input is top priority on the list of things to continue to research.

Another aspect of future work is adding the most current years of data to the dataset. The current data only has information up through 2016 – adding the data from years 2017 and 2018 enhances the data points in the training data and heightens the chances for a more successful model prediction.

##### Acknowledgments

##### References

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