

Seasonal Flu Vaccine Prediction

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Overview

- Business Problem
- Data & Methods
- Models
- Final Model Evaluation
- Conclusion



Business Understanding

- Provide recommendations about what could be done to increase the number of vaccinated people
- Find out which characteristics lead people to be more or less prone to have taken the seasonal flu vaccine
- Train and run a model that can correctly identify the likelihood that an individual has received the seasonal flu vaccine or not



Data

- 2009 National H1N1 Flu survey
- Over 26000 samples
- 35 Features

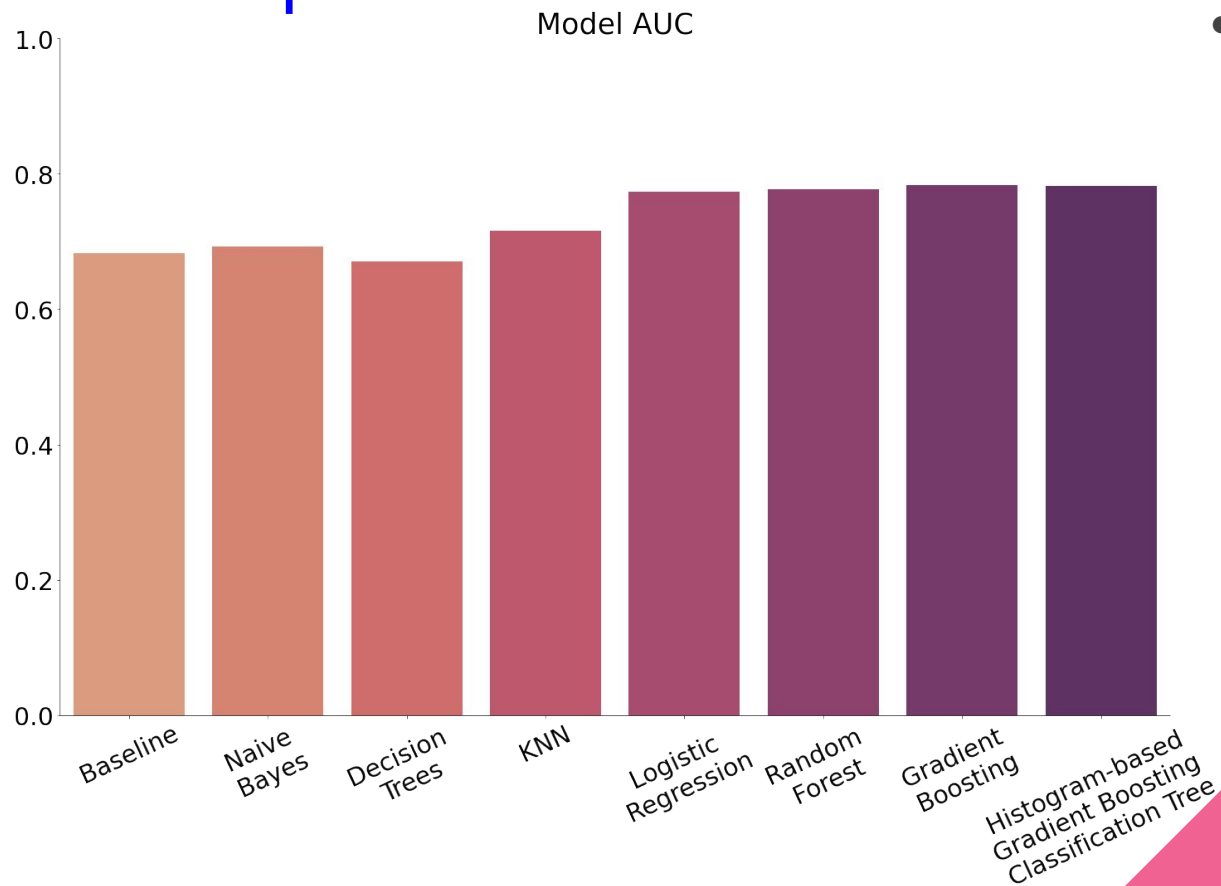


Summary

- Final Model Accuracy & Precision
 - Model Performance & Meaningful Metric
 - Precision: ~79%
 - Accuracy: ~76%
 - Over 10% increase in accuracy and precision from our baseline
- Recommendations
 - Personal Opinions Matter
 - Age Matters
 - Professional Opinions Matter



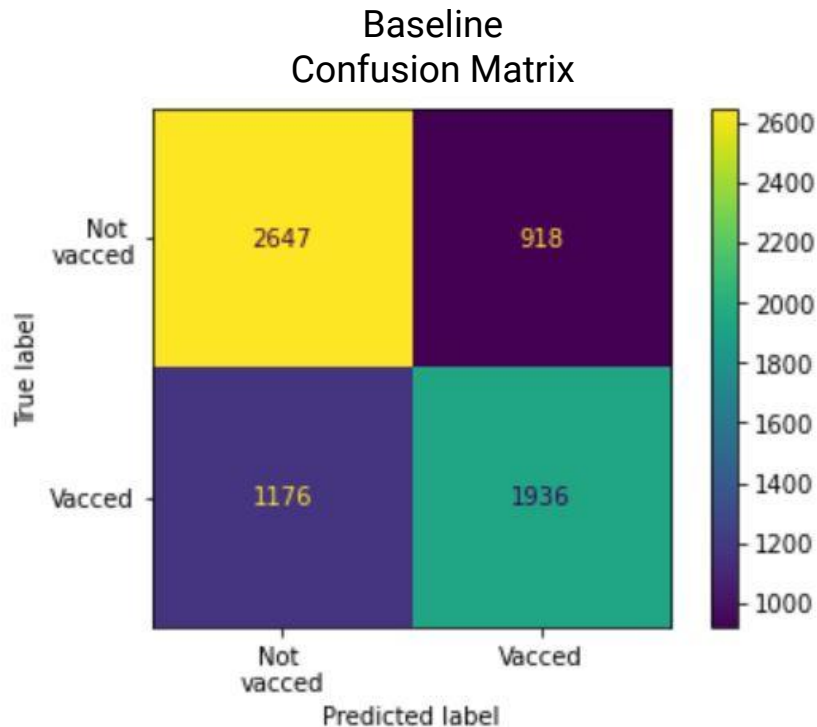
Model Comparisons



- Metric to evaluate different models

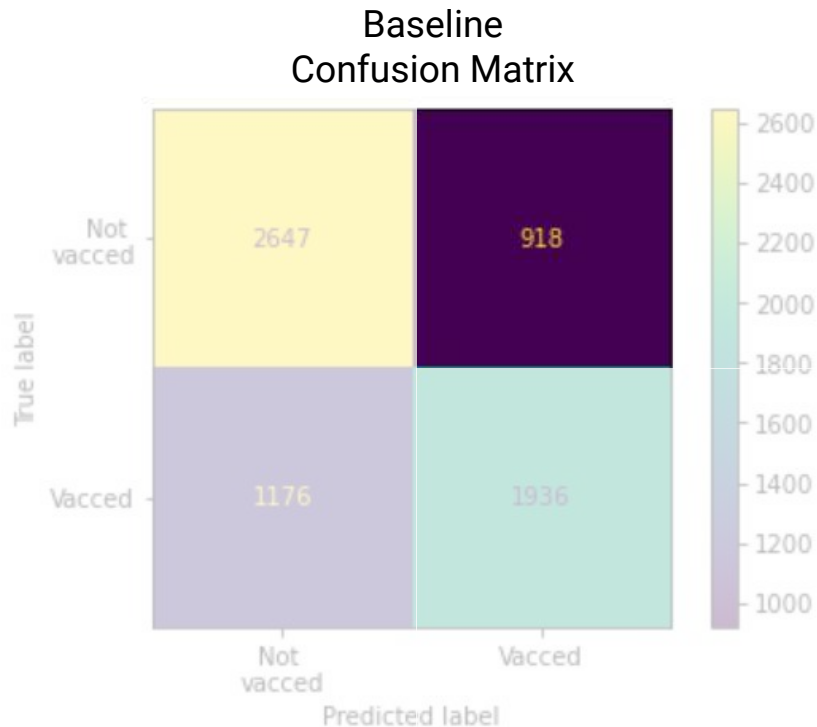
Baseline Model

- We chose precision over other metrics for our models' evaluations because we'd rather focus on the individuals who have not received the vaccine but the model predicts they did (false positives)
- Accuracy & Precision
 - Model Performance & Meaningful Metric
 - Precision: ~67%; Accuracy: ~68%



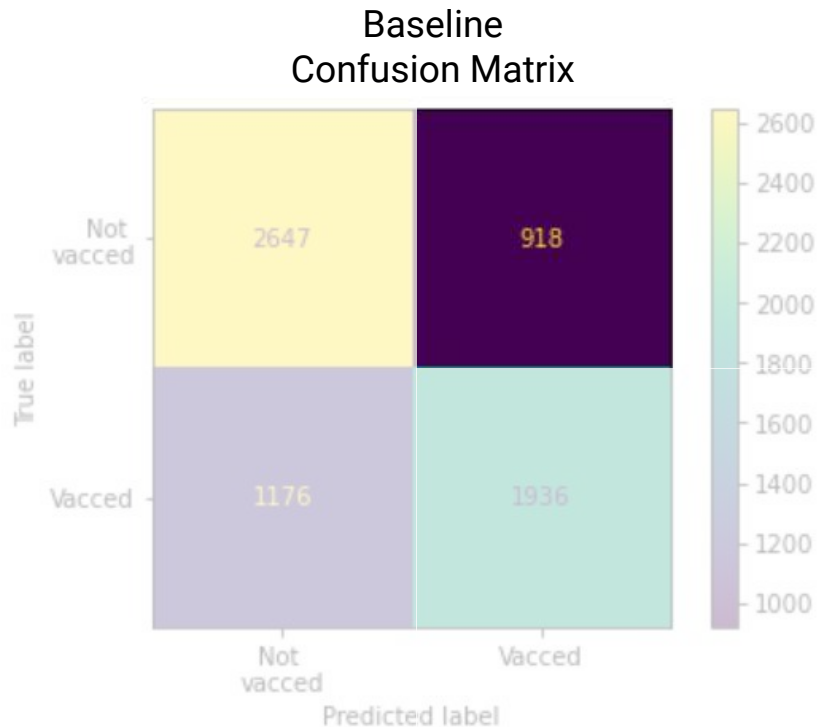
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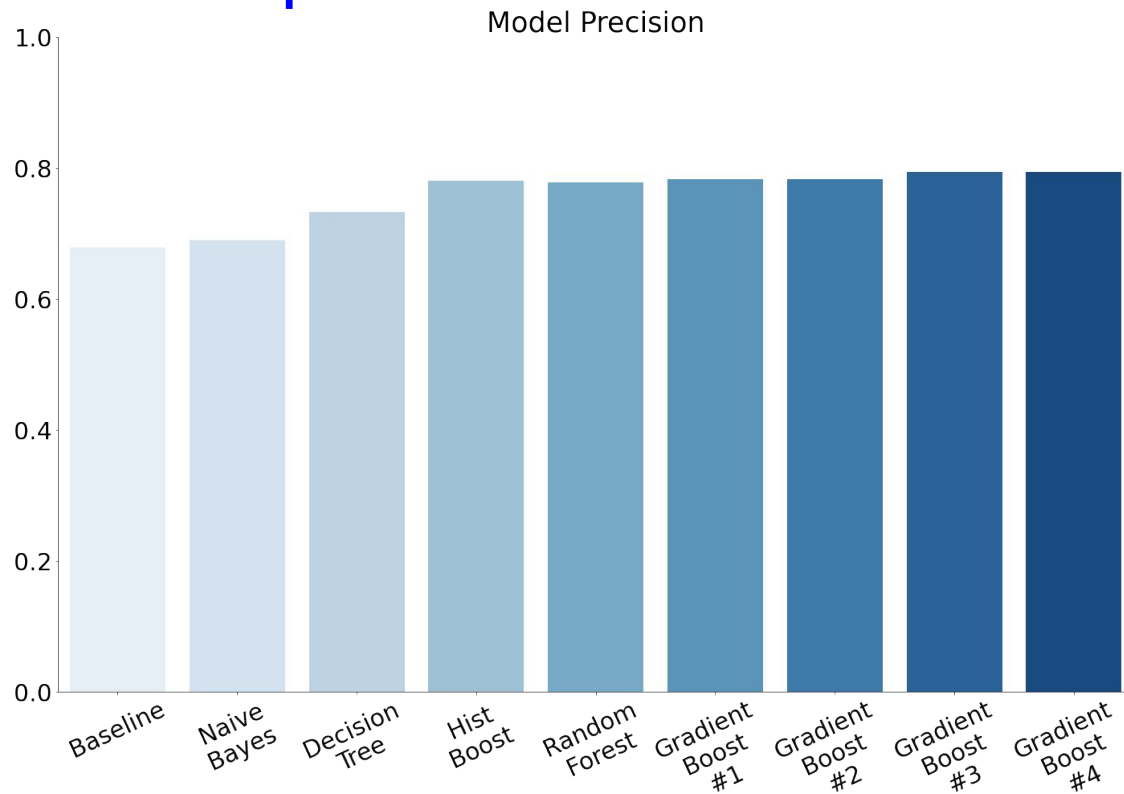


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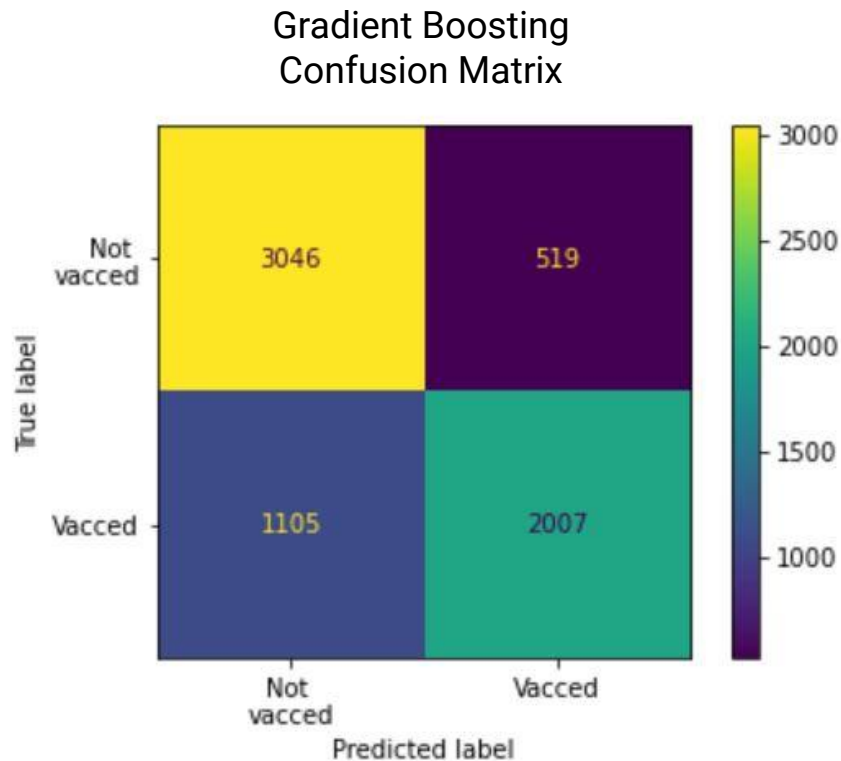
Model Comparisons



- Baseline Model:
~68%
- Tuned Gradient Boosting:
~79%

Final Model

- Precision: ~79%
- Accuracy: ~75%
- Over 17% increase in precision
- Over 10% increase in accuracy
- Over 40% decrease in False Positives



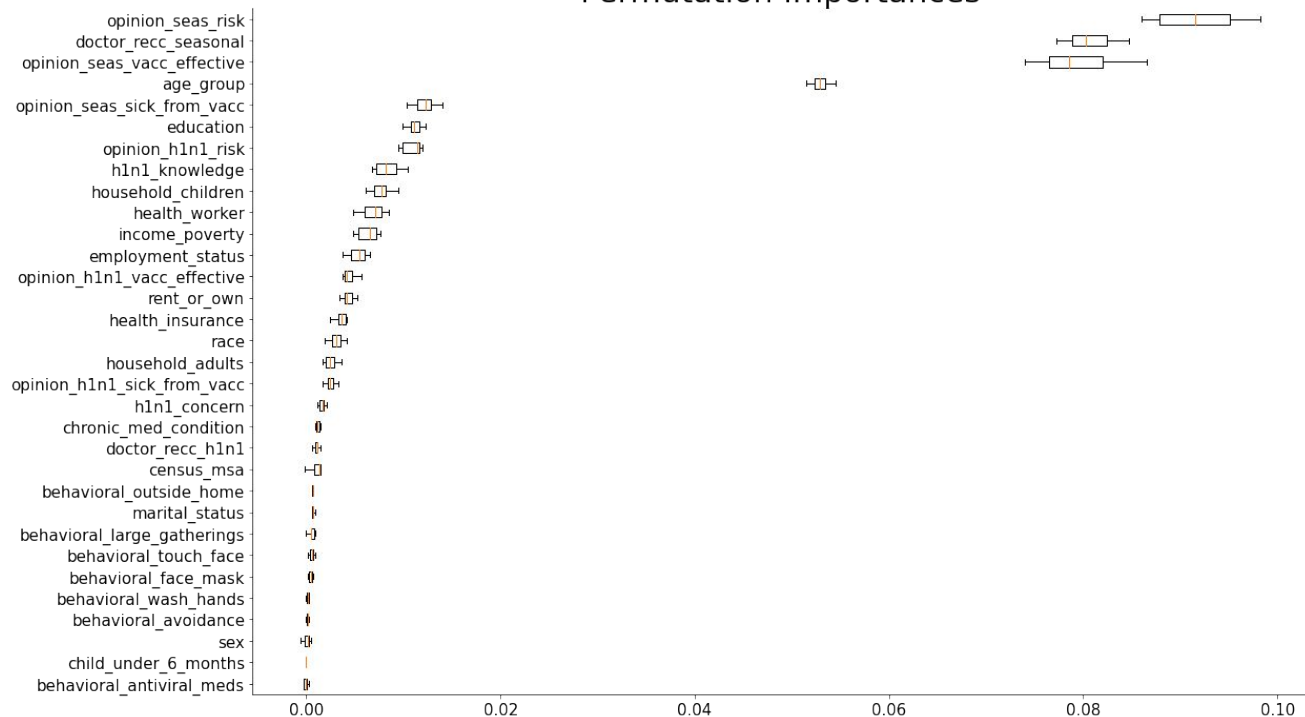
Feature Permutation Importance

- Ranking metric that allows us to determine the features/variables that are the most impactful to the accuracy of our classifier model.
- We noticed that opinions on the vaccine risk, likelihood of getting sick from the vaccine, and doctor's recommendations are the strongest indicators to determining our model's accuracy.



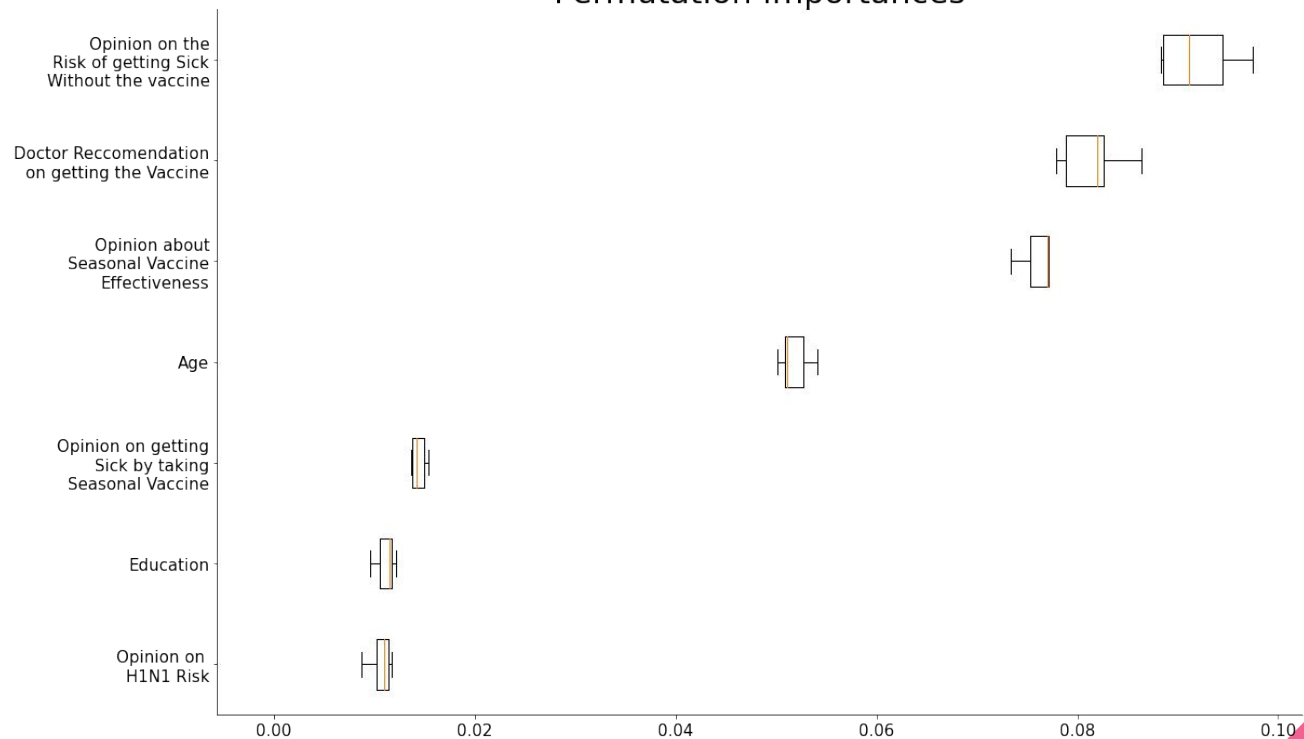
Feature Permutation Importance

Permutation Importances



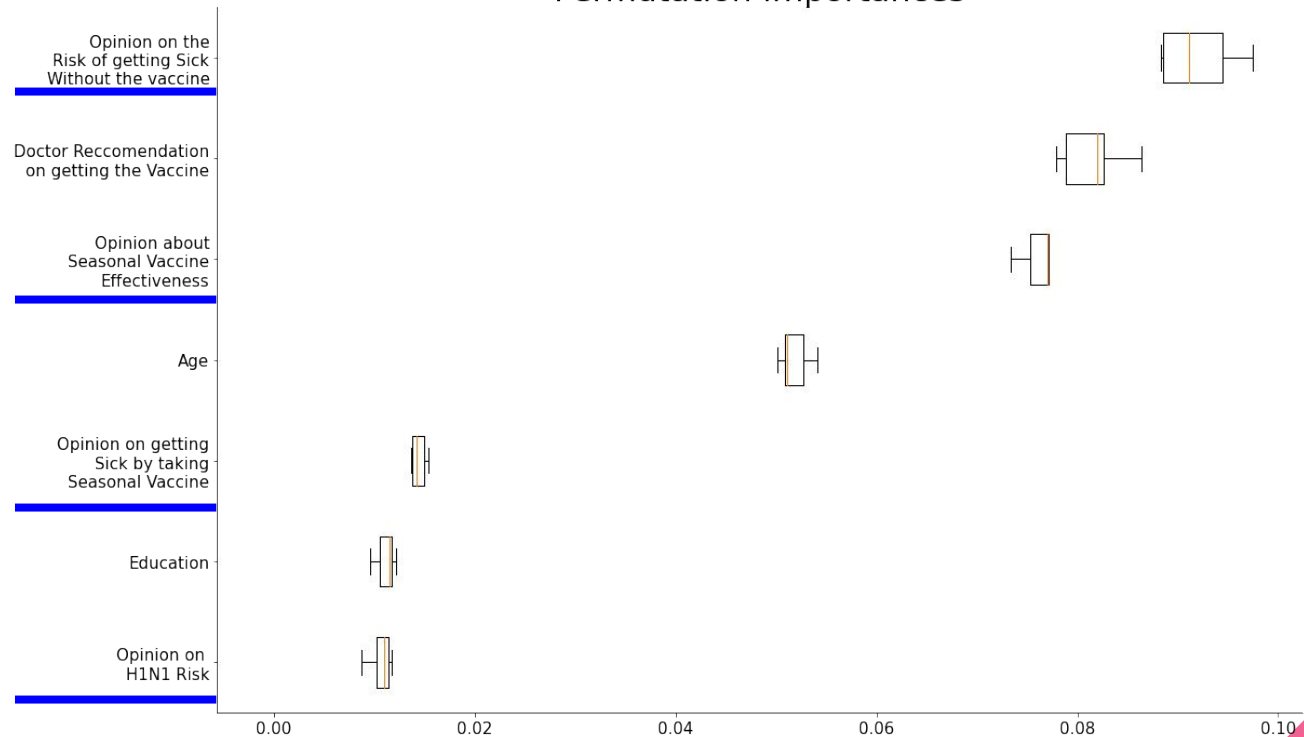
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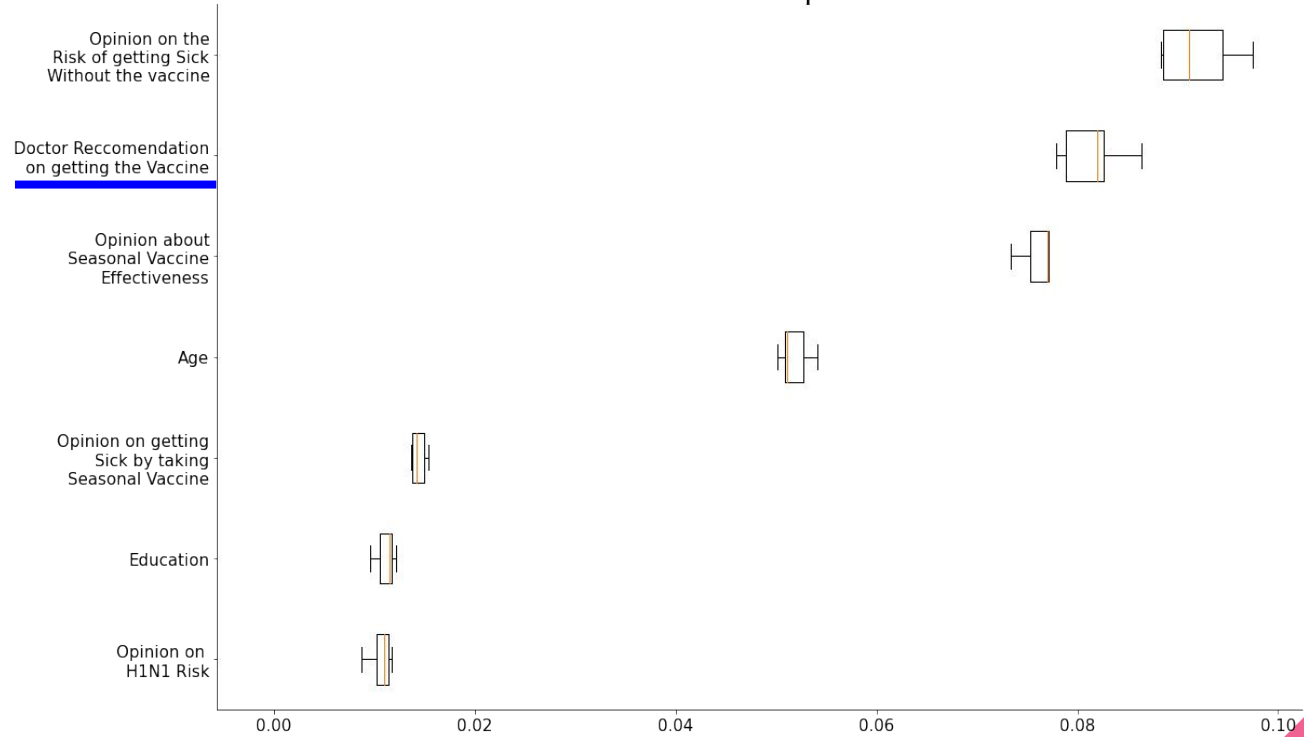
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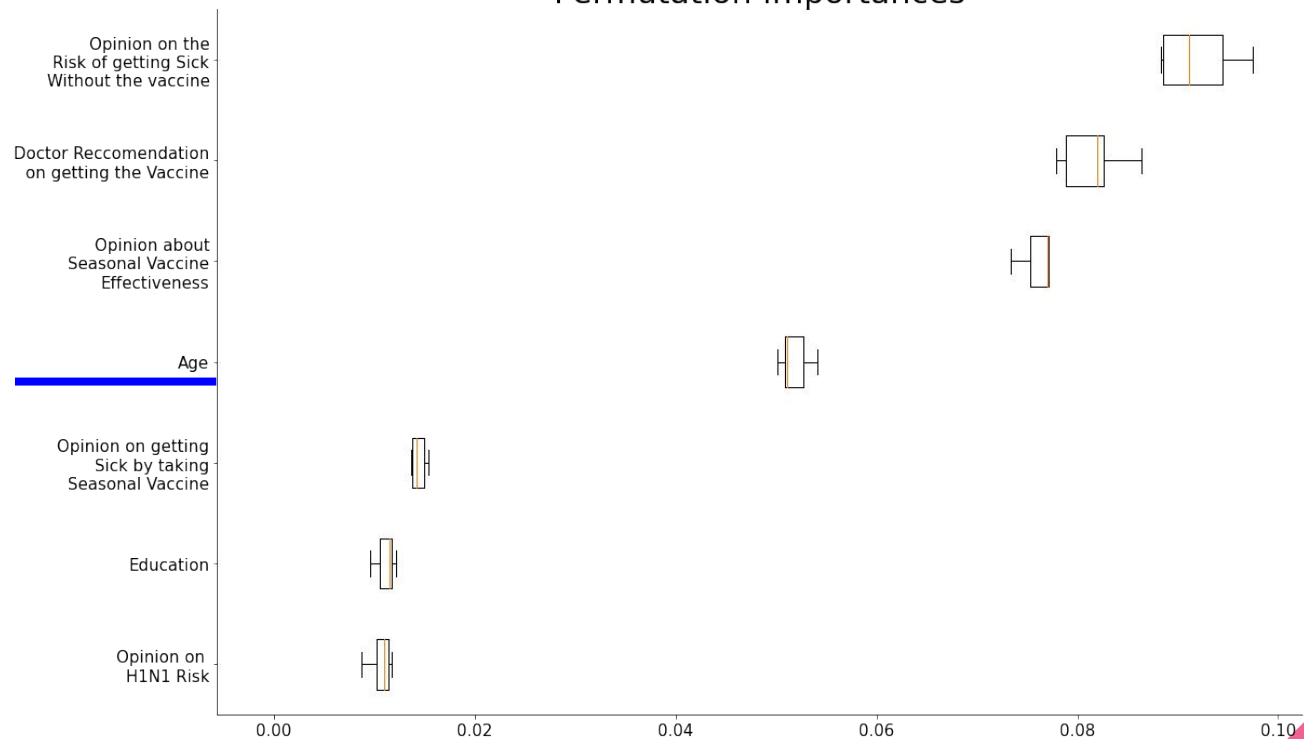
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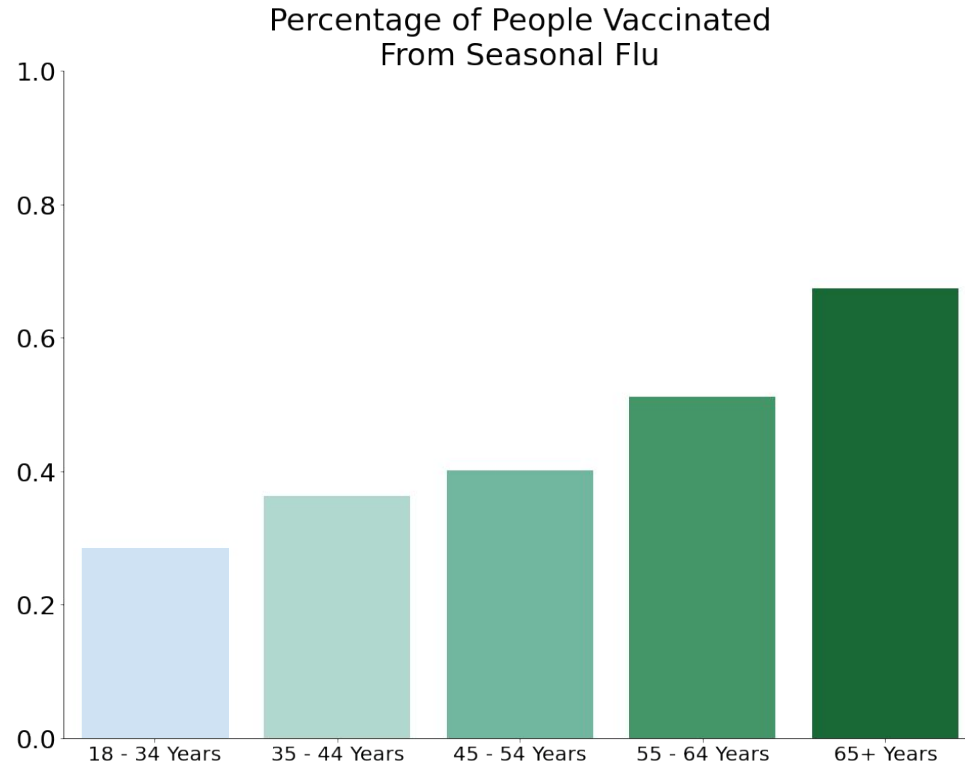


Feature Permutation Importance

Permutation Importances



Seasonal Flu Vaccination Rates by Age



Recommendations

- Personal Opinions Matter
 - Raise awareness of dangers of the seasonal flu via new campaigns to everyone
- Age Matters
 - A more specific campaign towards young folks below their mid thirties could be more beneficial as they are the least likely age groups to be vaccinated
- Professional Opinions Matter
 - Have doctors and practitioners reach out to patients to take the vaccine



THANK YOU



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