Seasonal Flu Vaccine Prediction

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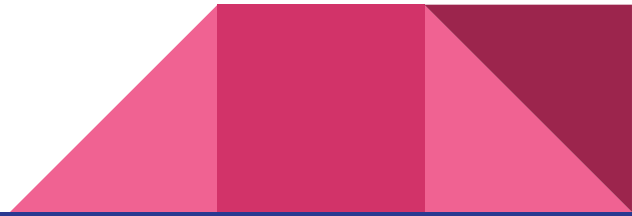
Overview

- 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

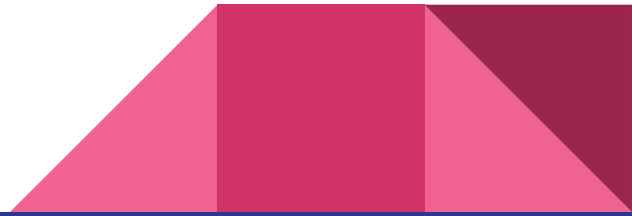
Data

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

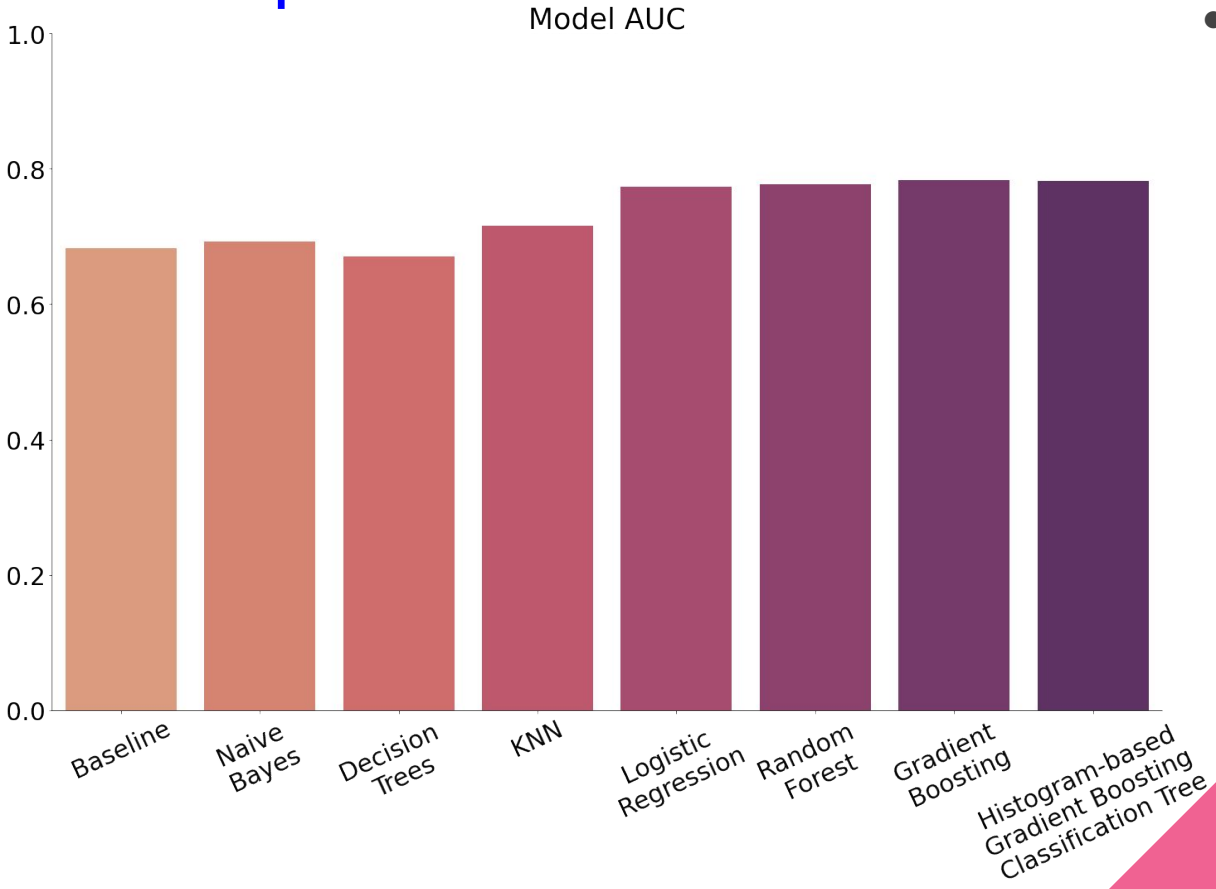
Summary

- 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



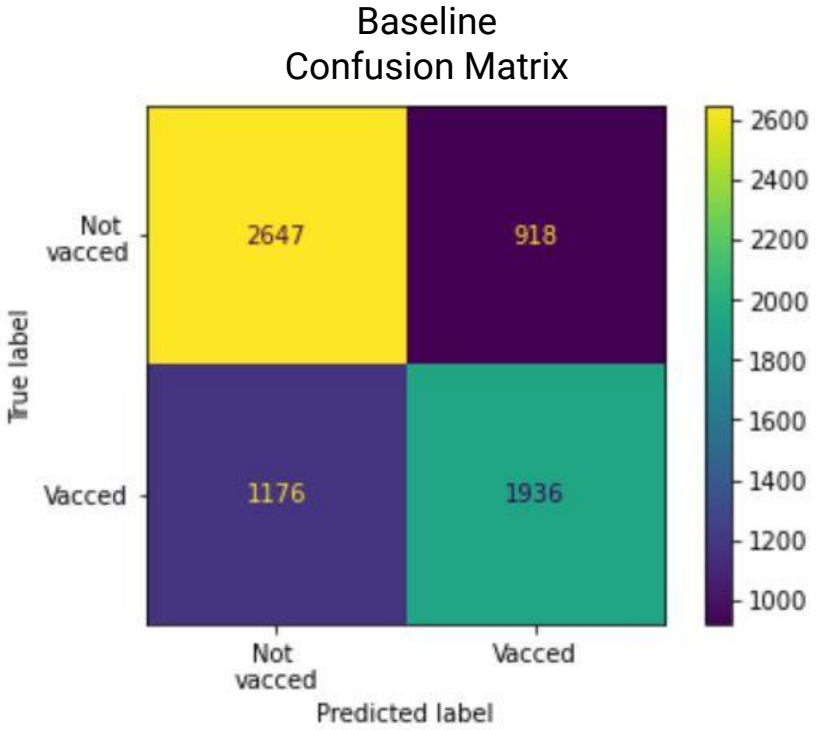
Model Comparisons



- 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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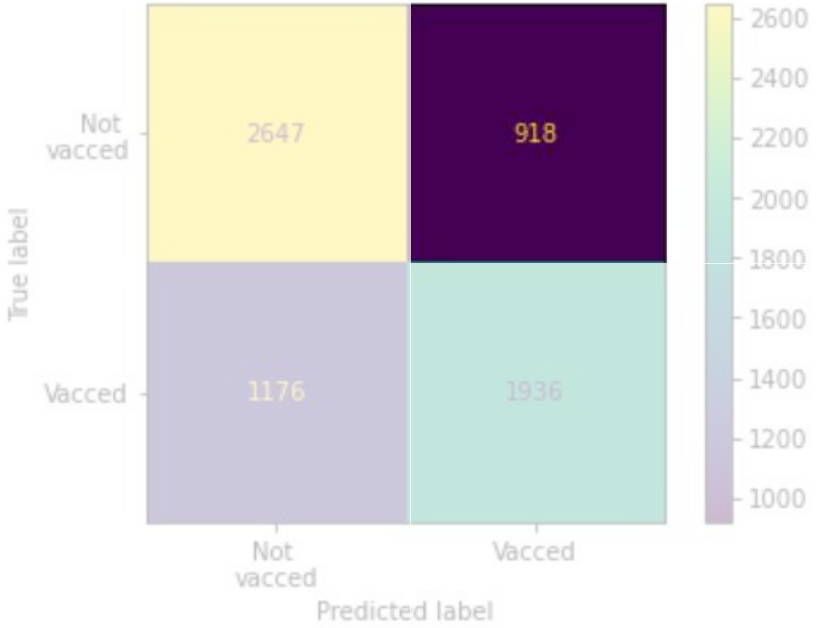
Baseline
Confusion Matrix



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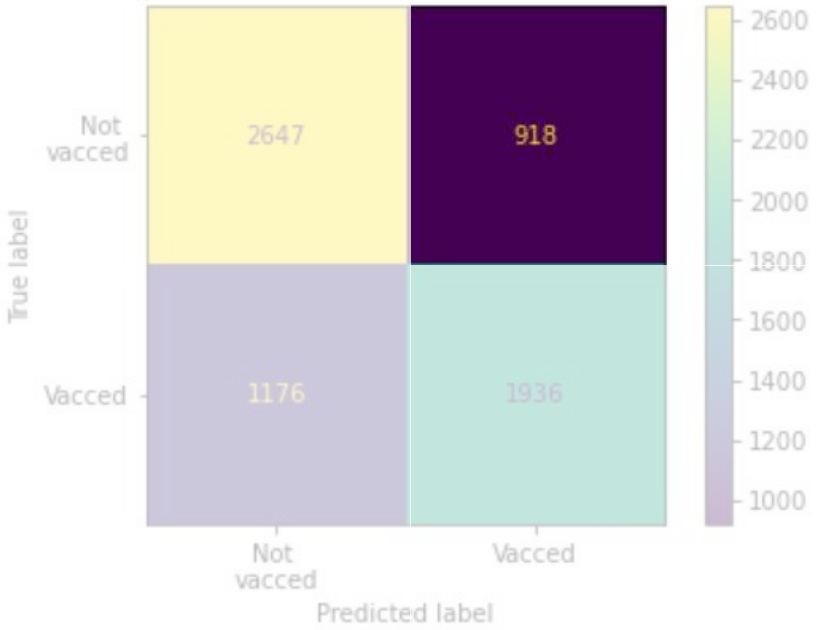

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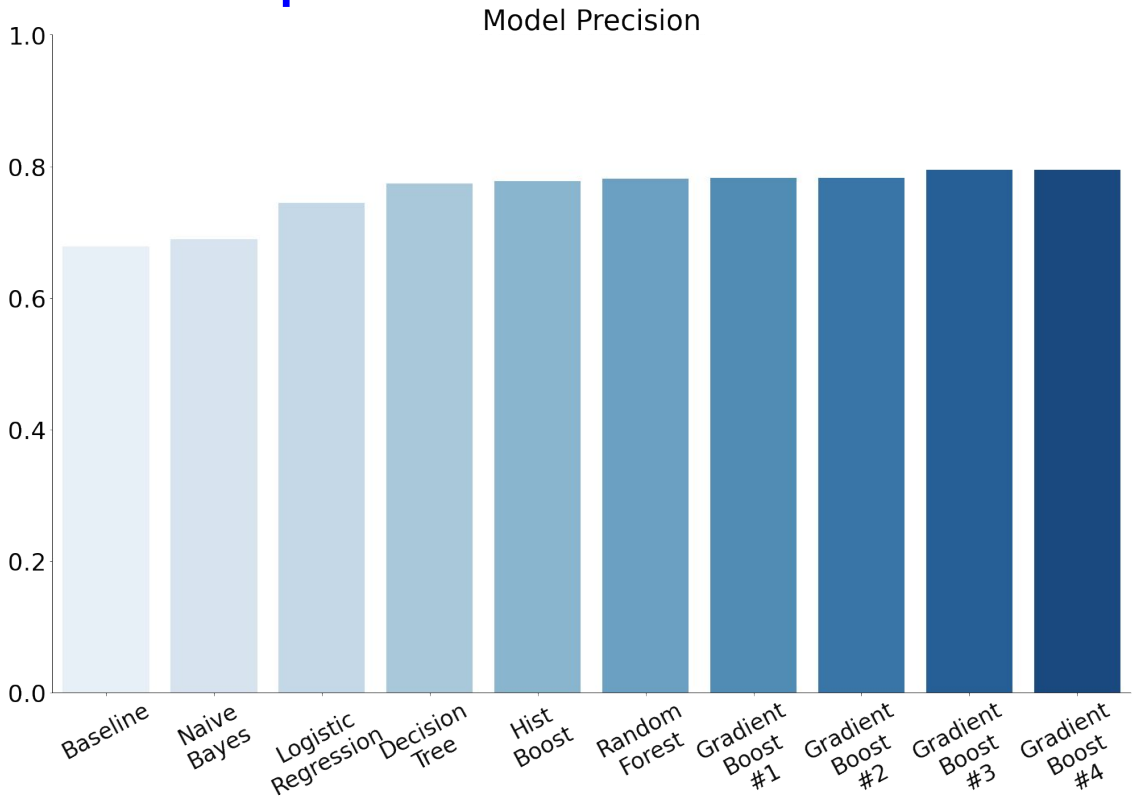


- Baseline Model:

  ~68%

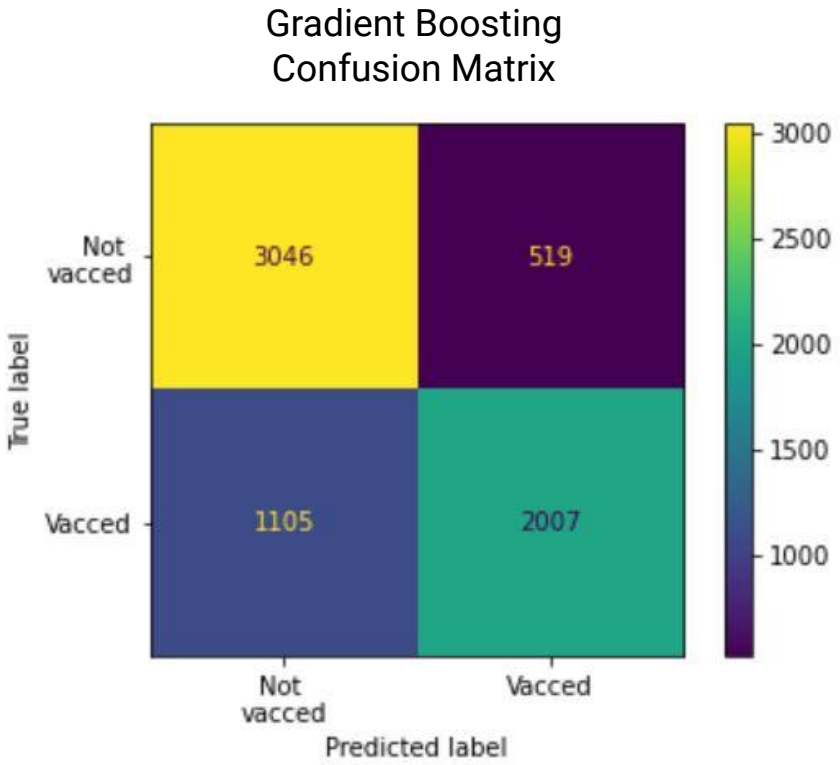
- Tuned Gradient Boosting:

  ~79%

Final Model

- Precision: ~79%
- Accuracy: ~75%

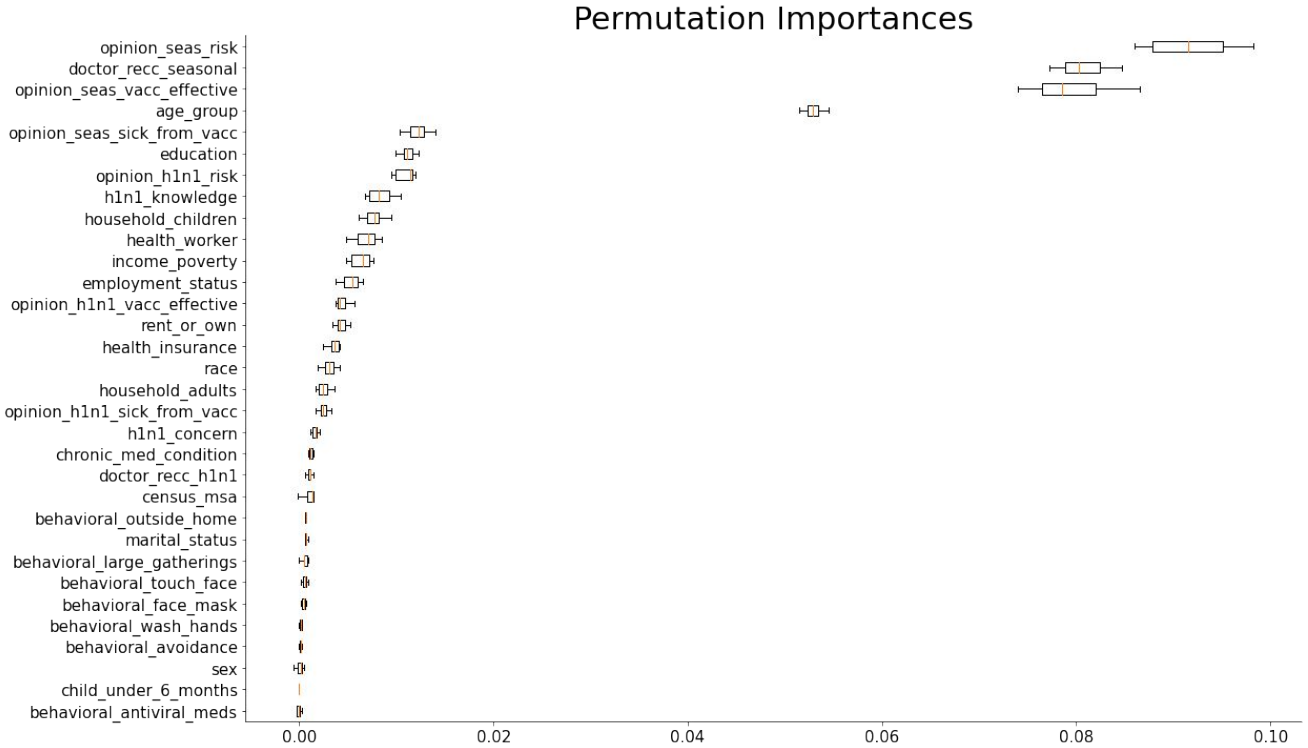
- Over 17% increase in precision
- Over 10% increase in accuracy
- Over 40% decrease in False Positives



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 found that the following features are the most impactful to our model:
  a. People's opinions on the likelihood of getting sick from the vaccine,
  b. People's opinions on how likely they'd be sick without the vaccine,
  c. Doctor's recommendations,
  d. Age

Feature Permutation Importance



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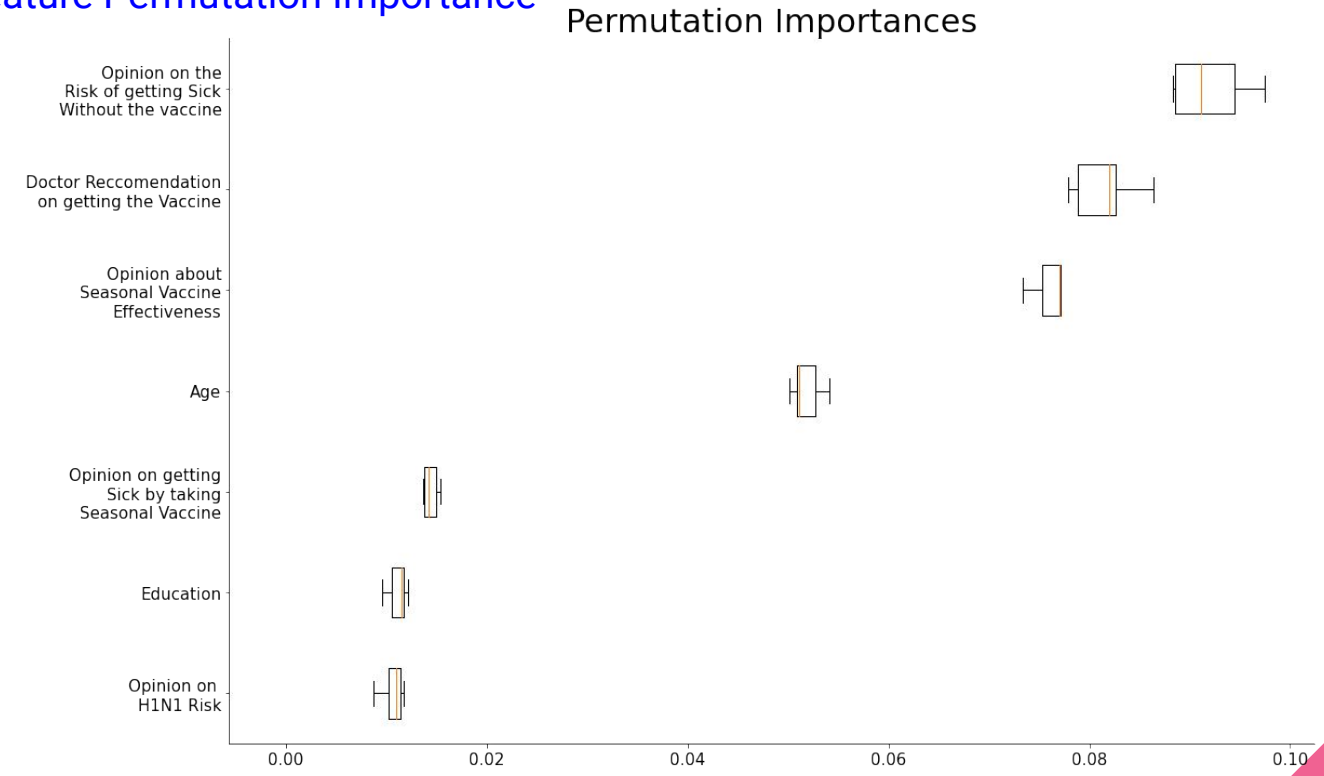

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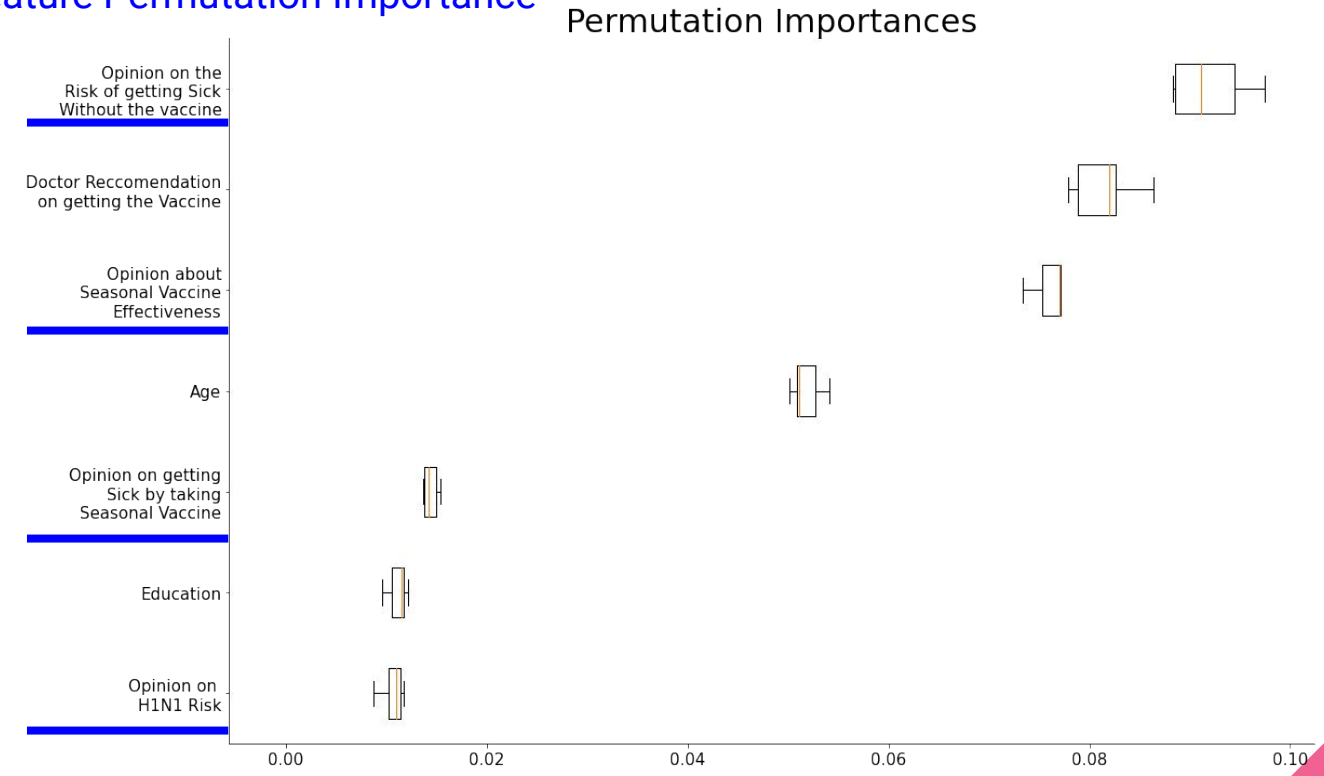

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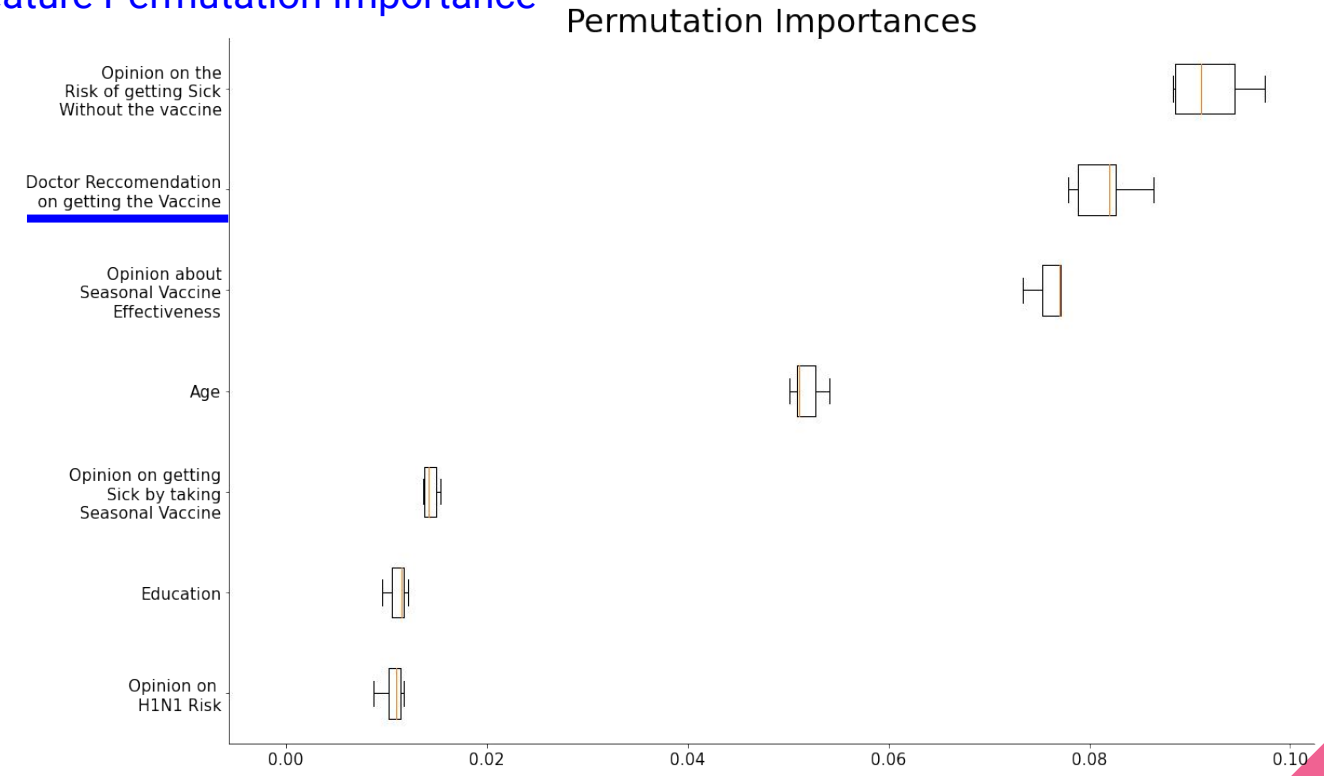

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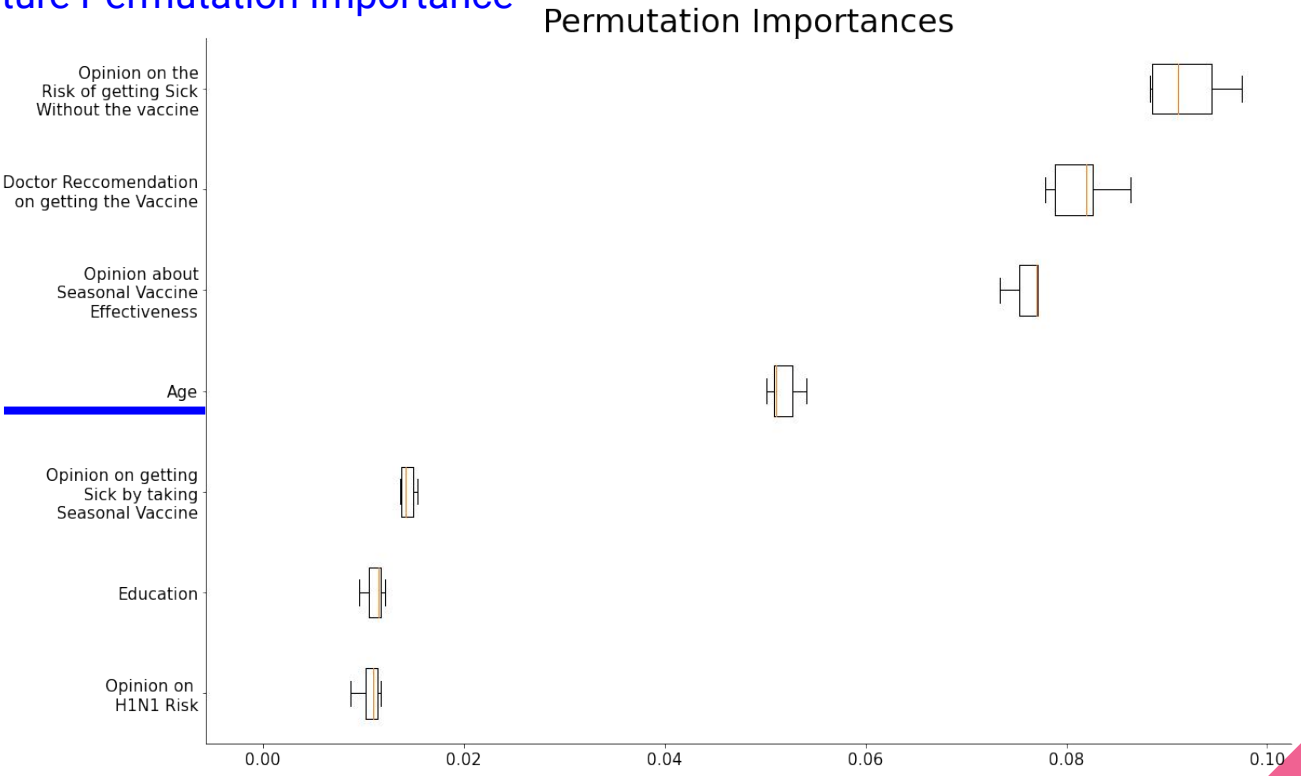
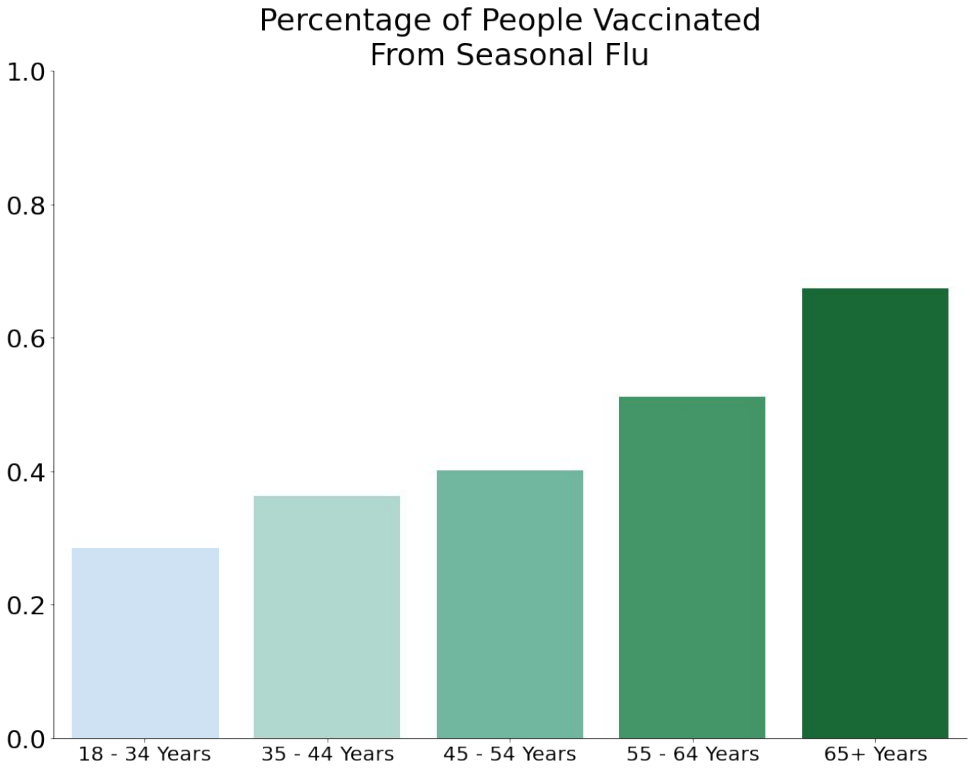


Seasonal Flu Vaccination Rates by Age



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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