

Predicting H1N1 & Seasonal Vaccines



Presented by:

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Outline



BUSINESS
OVERVIEW



DATA &
METHODS



H1N1
MODEL



SEASONAL
MODEL



CONCLUSION



Business Overview

SCENARIO

- We have been hired by the CDC as a part of their campaign to increase awareness of the safety and effectiveness of vaccines and to encourage more individuals to get vaccinated.

PROBLEM

- Which factors most influence whether a person receives a seasonal or H1N1 flu vaccine?



Business Overview

QUESTIONS

- Which model is the most effective in predicting whether a person received a H1N1 flu shot?
- Which model is the most effective in predicting whether a person received a seasonal flu shot?
- Which features are the most important in predicting whether a person received a H1N1 flu shot?
- Which features are the most important in predicting whether a person received a seasonal flu shot?

RECOMMENDATIONS

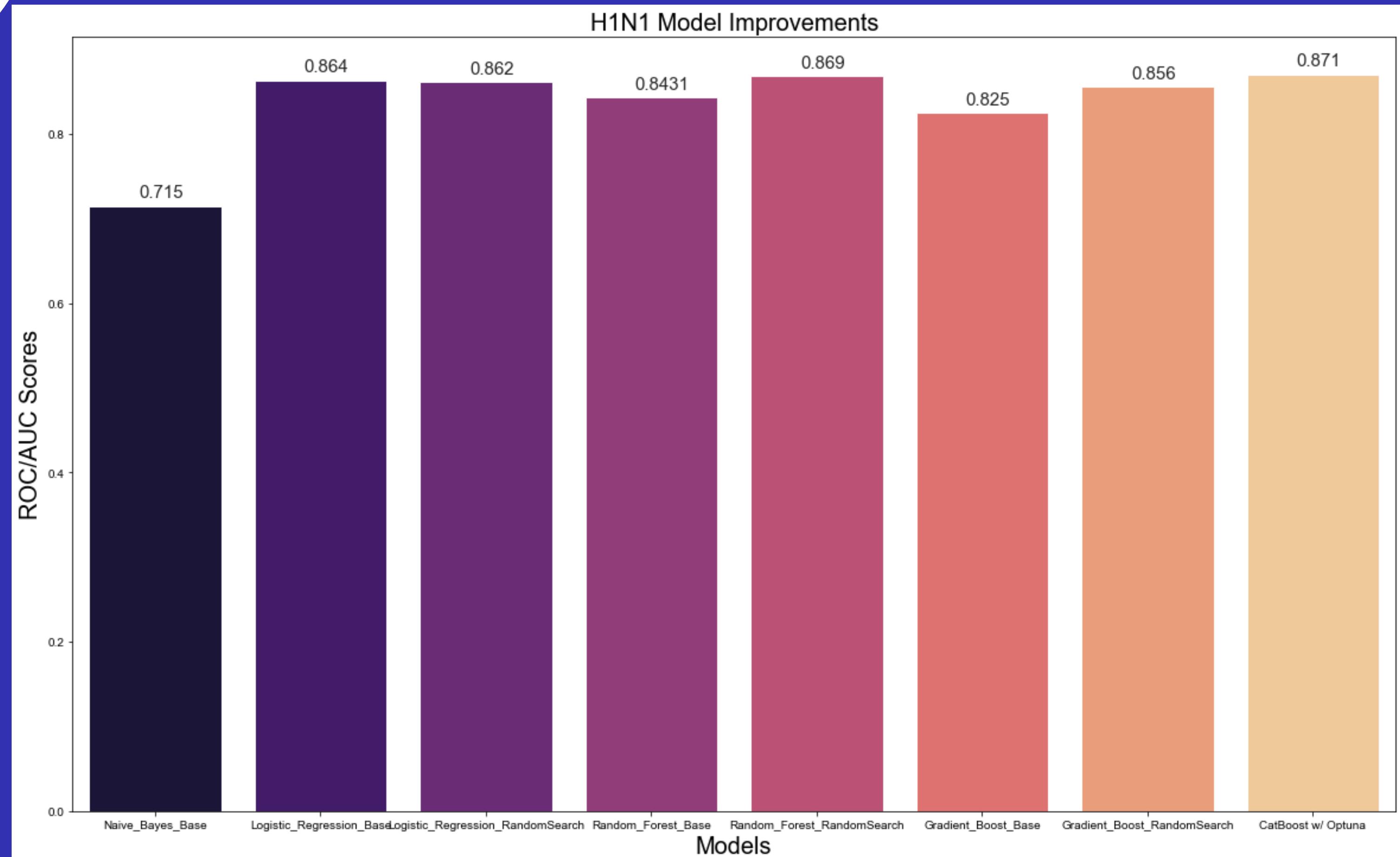
- Doctor recommendation of vaccines
- Opinion of vaccine effectiveness
- Opinion of flu risk
- Health insurance

Data & Methods

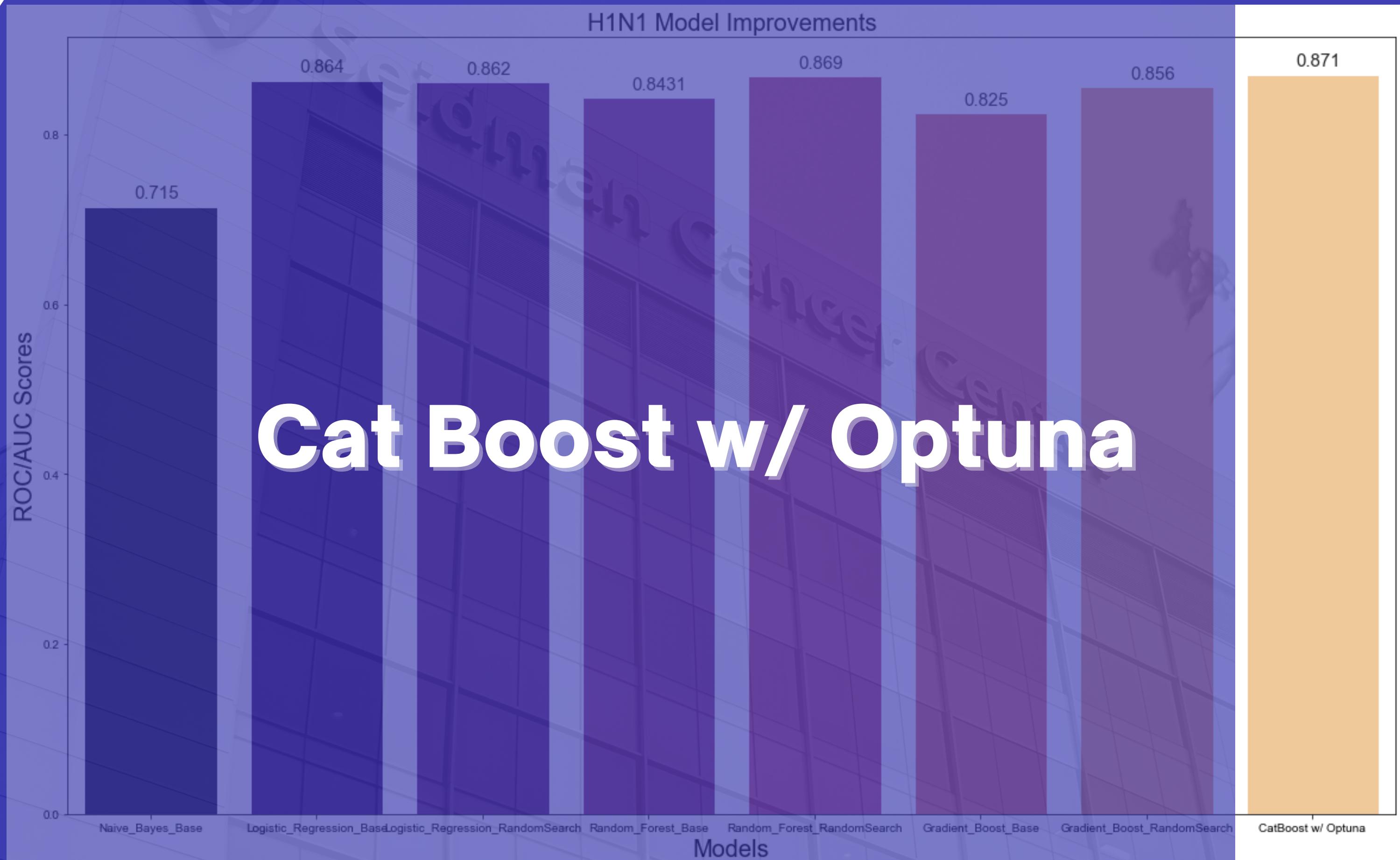
- National 2009 H1N1 Flu Survey
- 26,000+ sample size
- Modeling
- Optimization



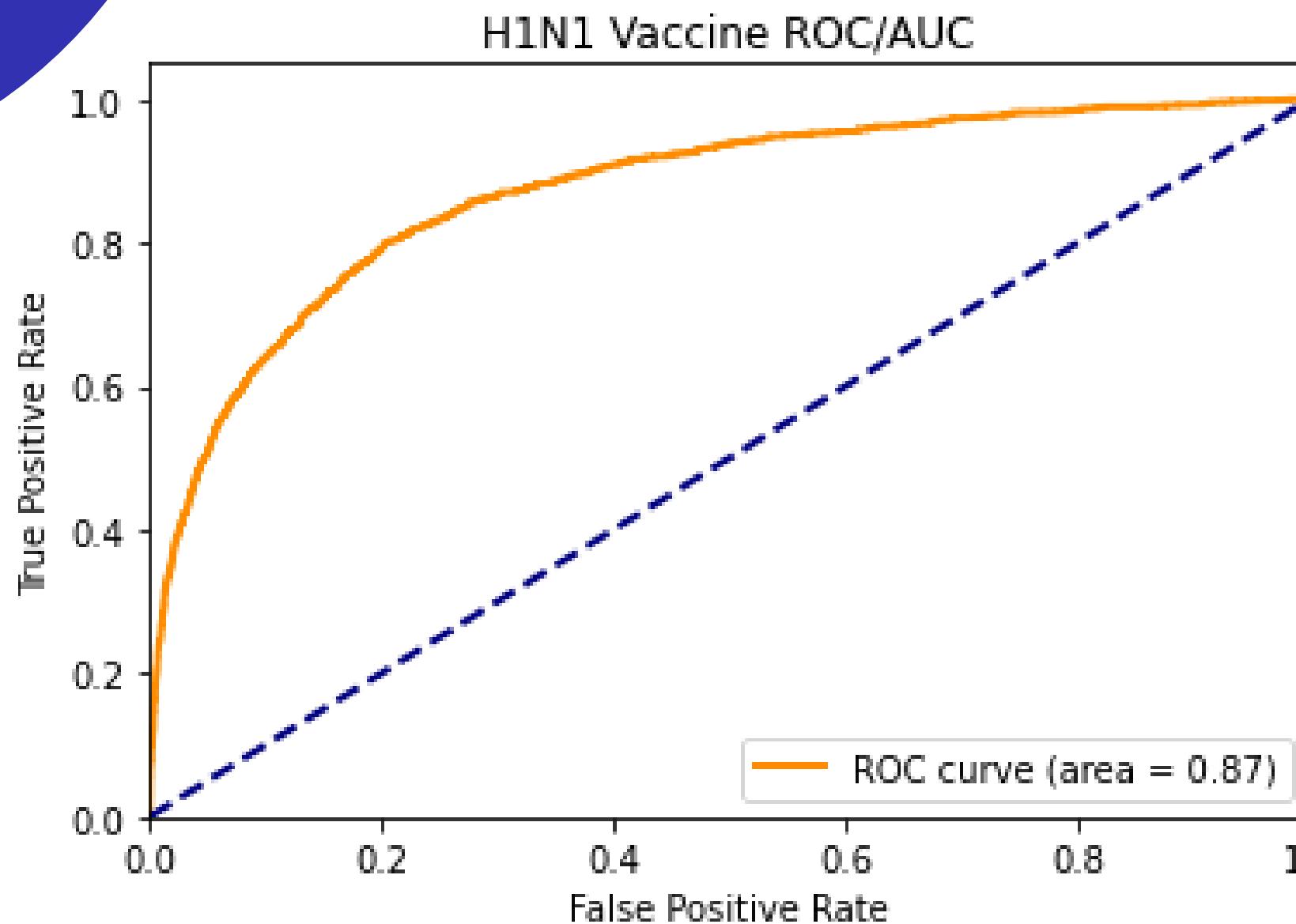
Model Summary



Model Summary



Best Model - H1N1

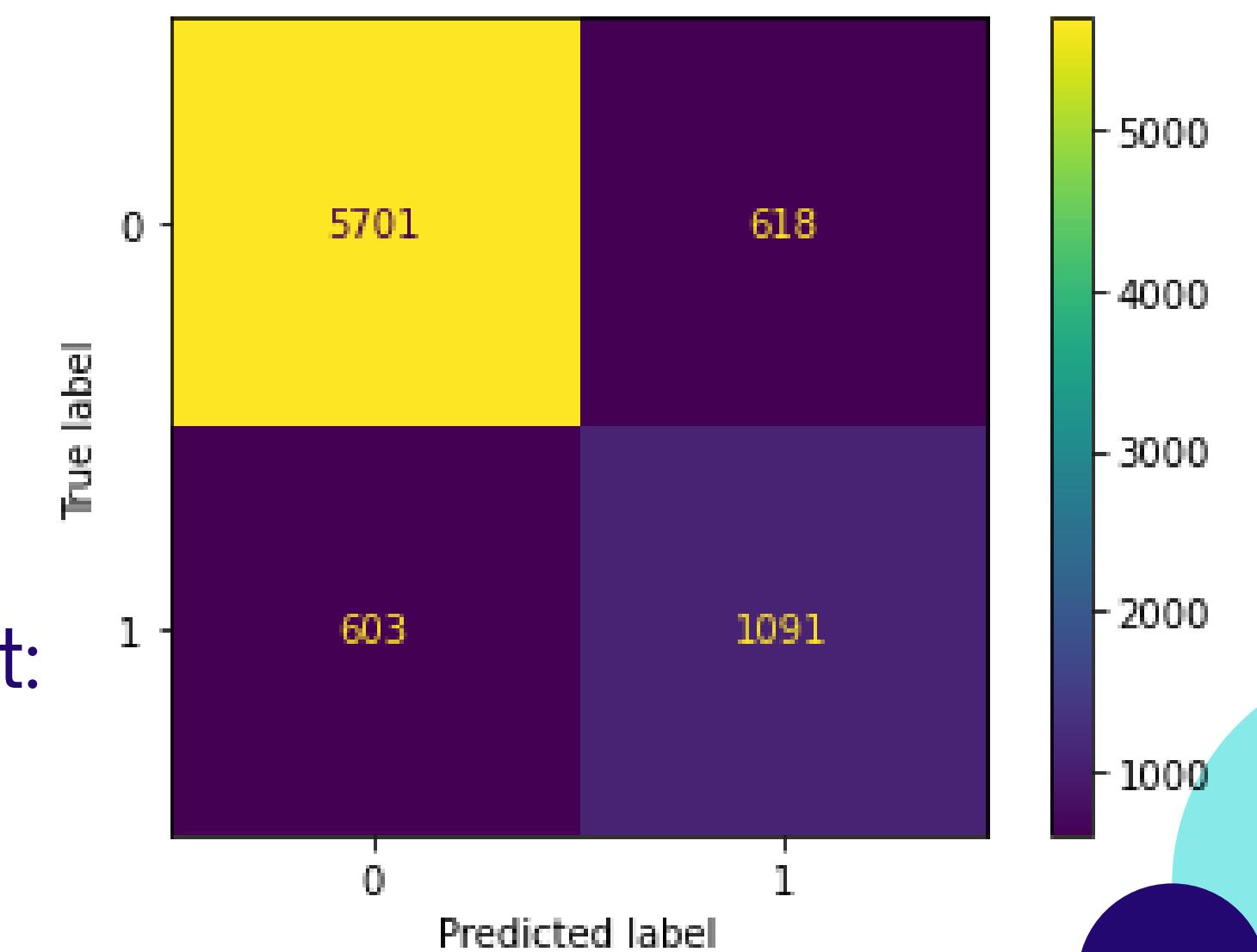


Classification Report:

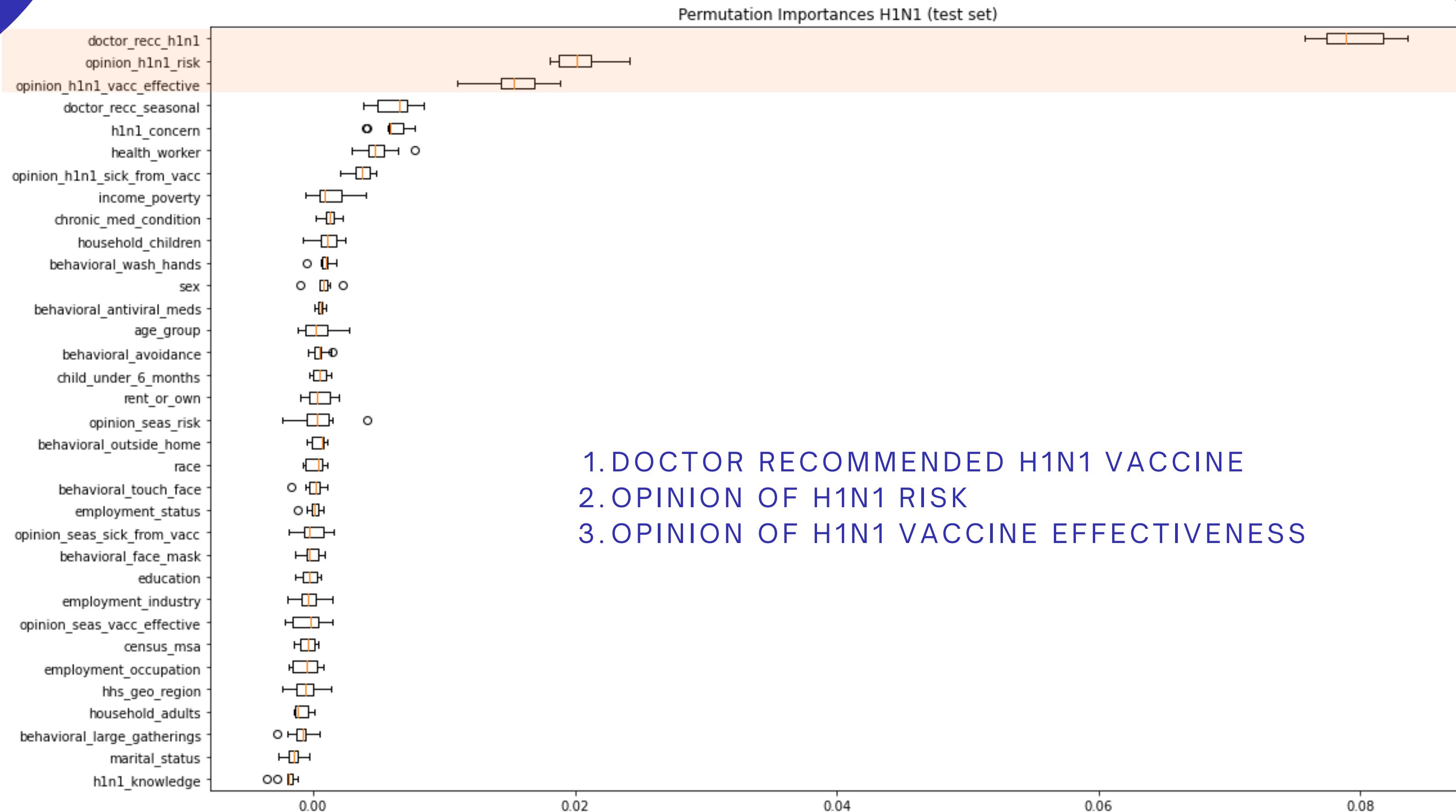
- Accuracy ~ 85%

Cat Boost Model

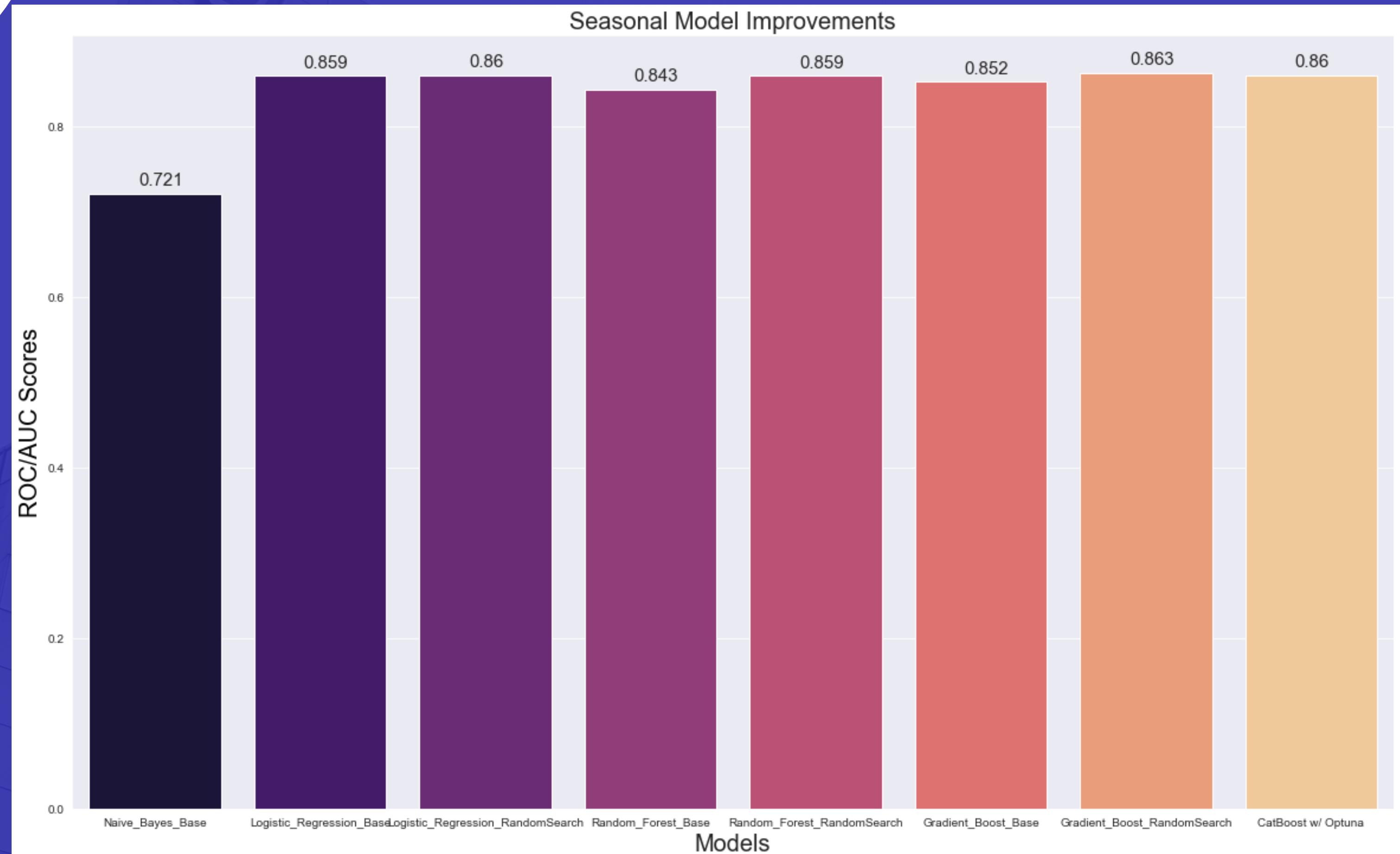
- ROC/AUC Score = .87



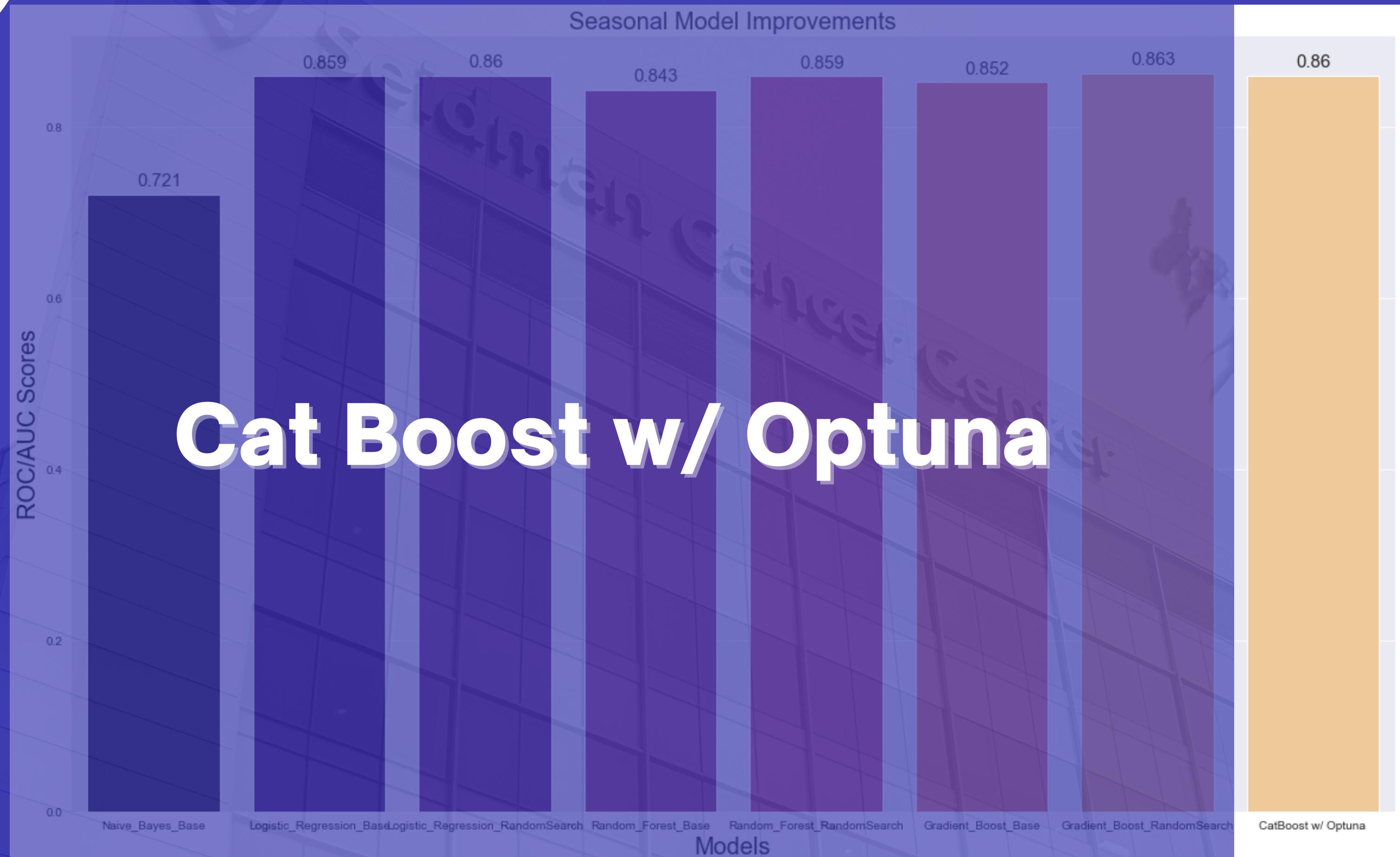
Top 3 Features - H1N1



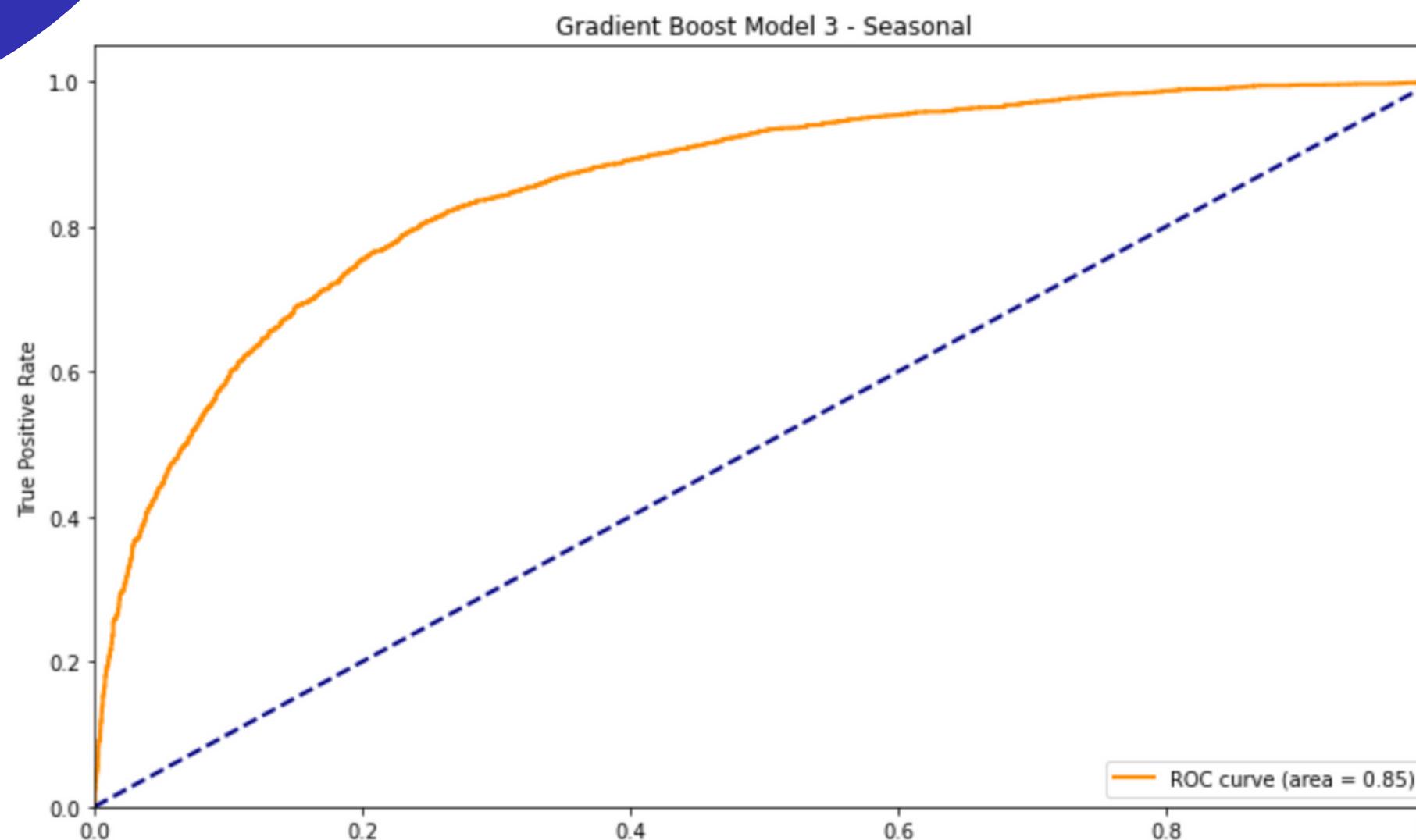
Model Summary



Model Summary



Best Model - Seasonal

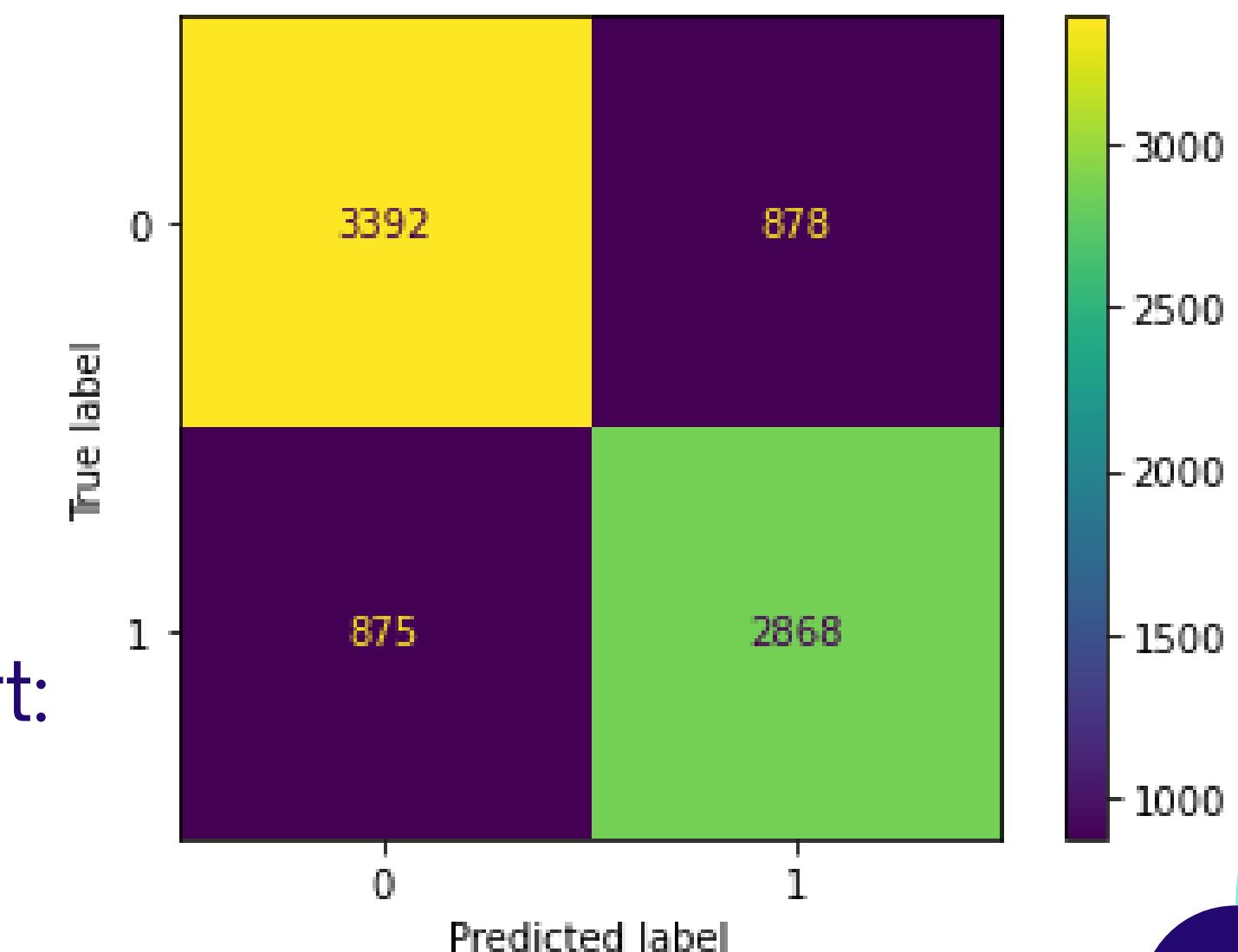


Classification Report:

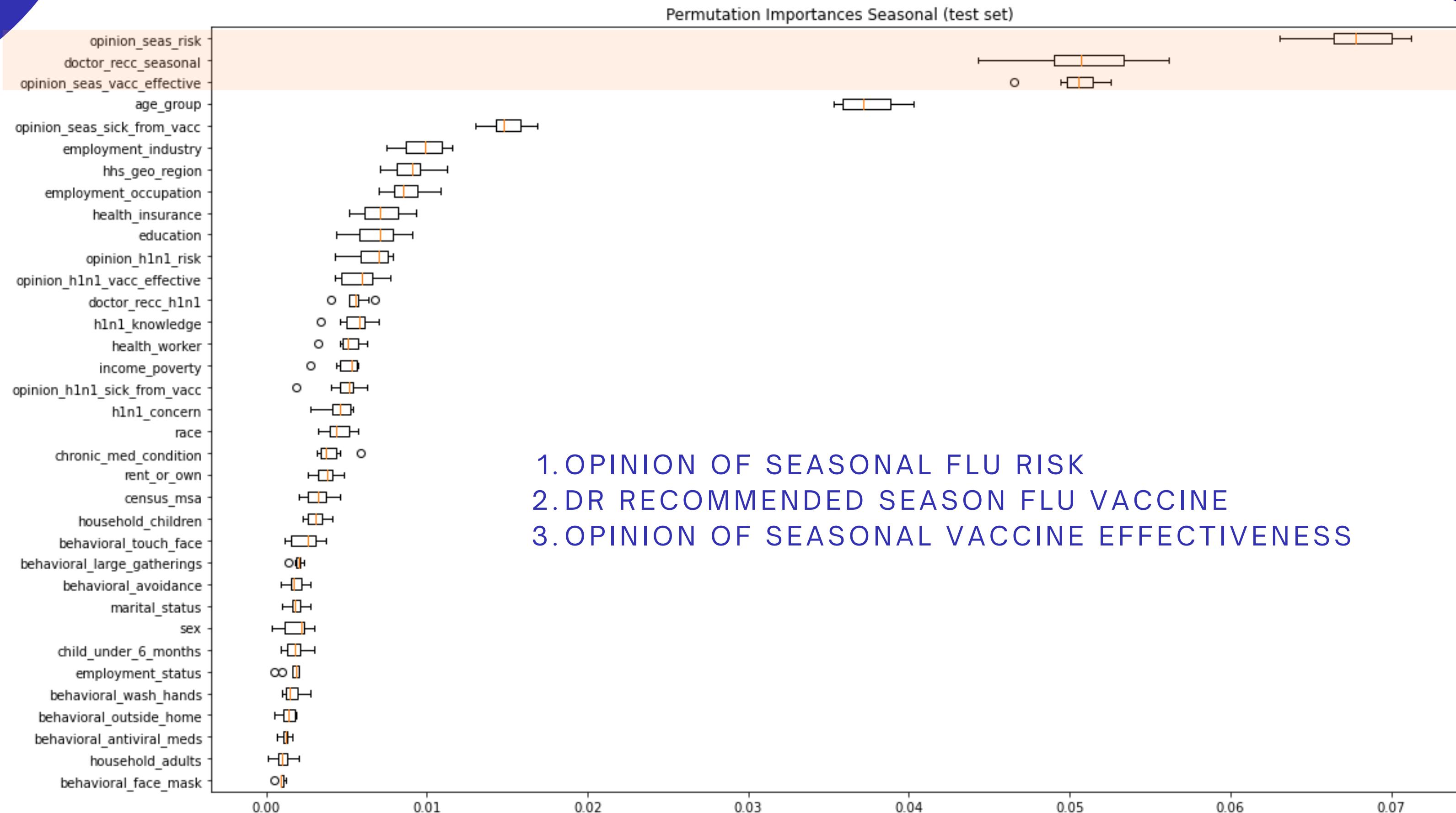
- Accuracy ~ 82%

Cat Boost Model

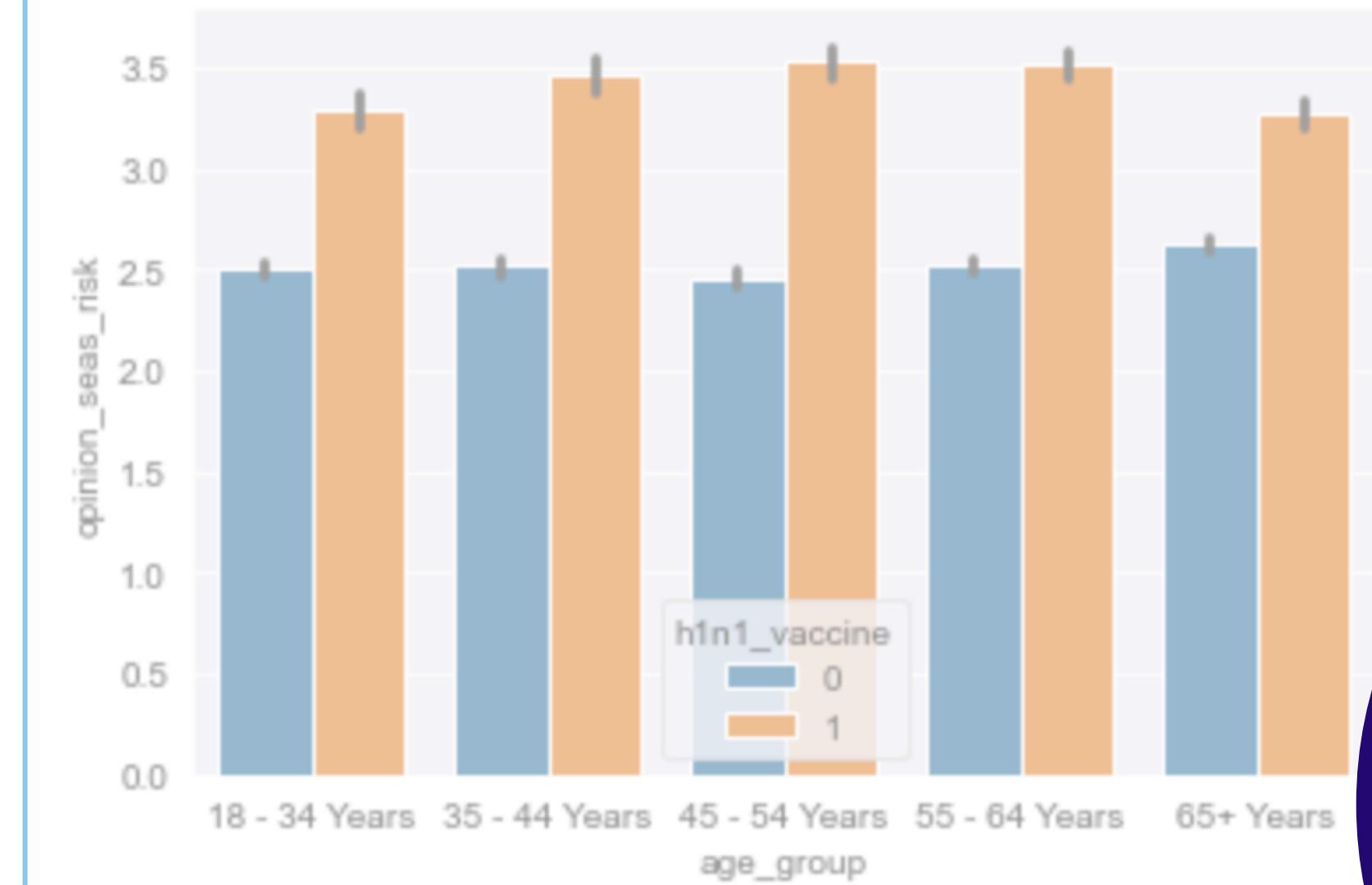
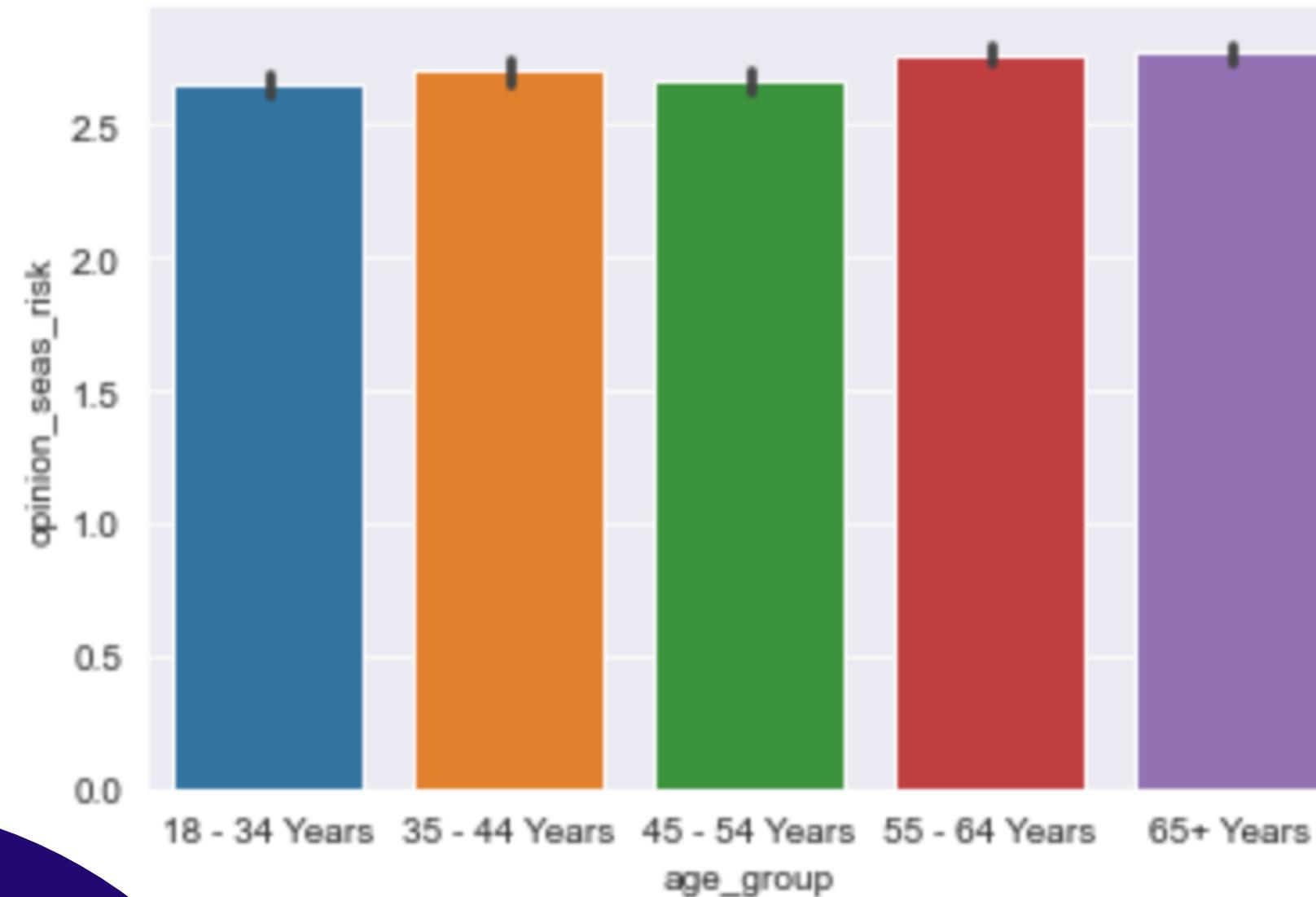
- ROC/AUC Score .85



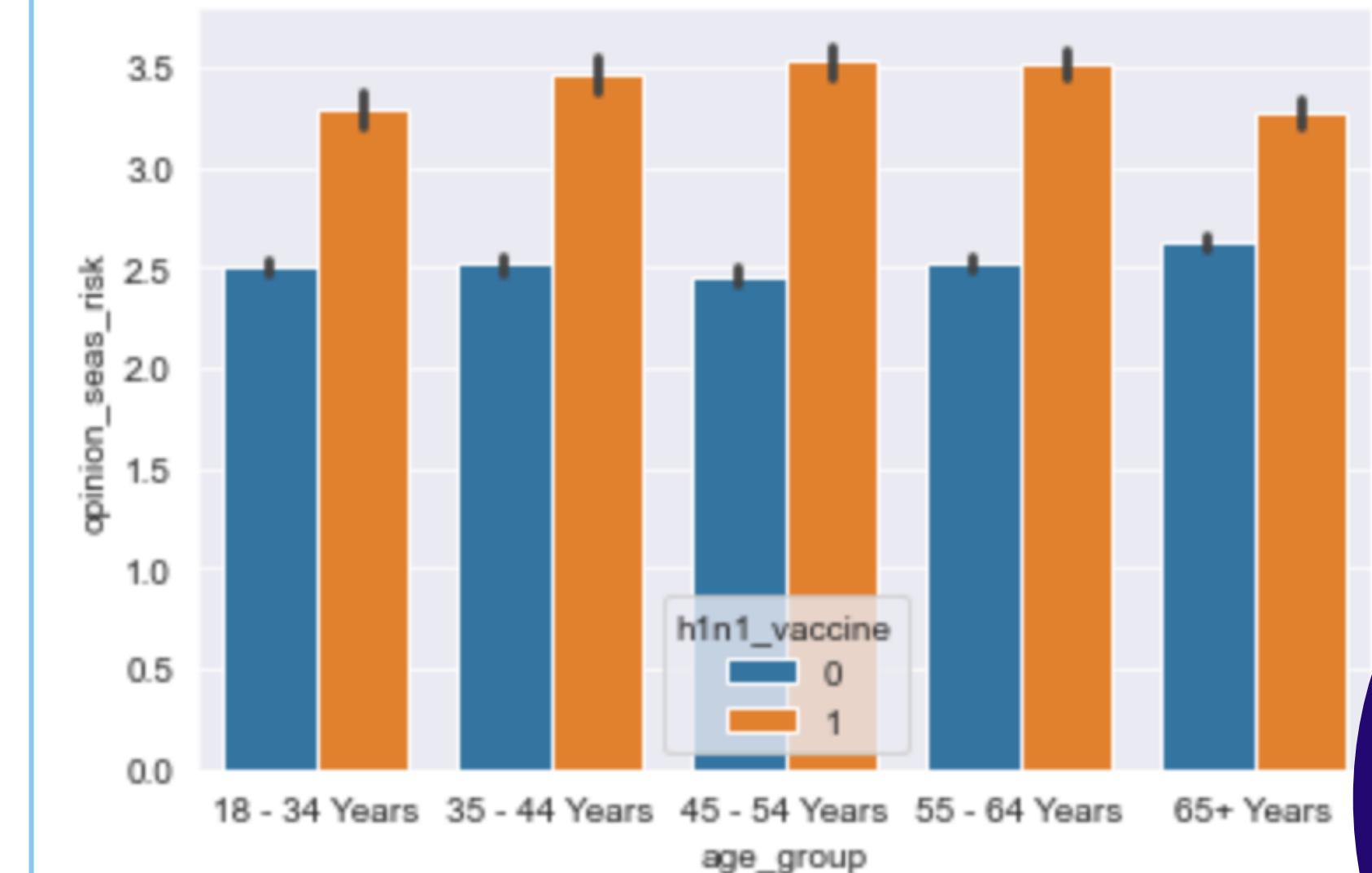
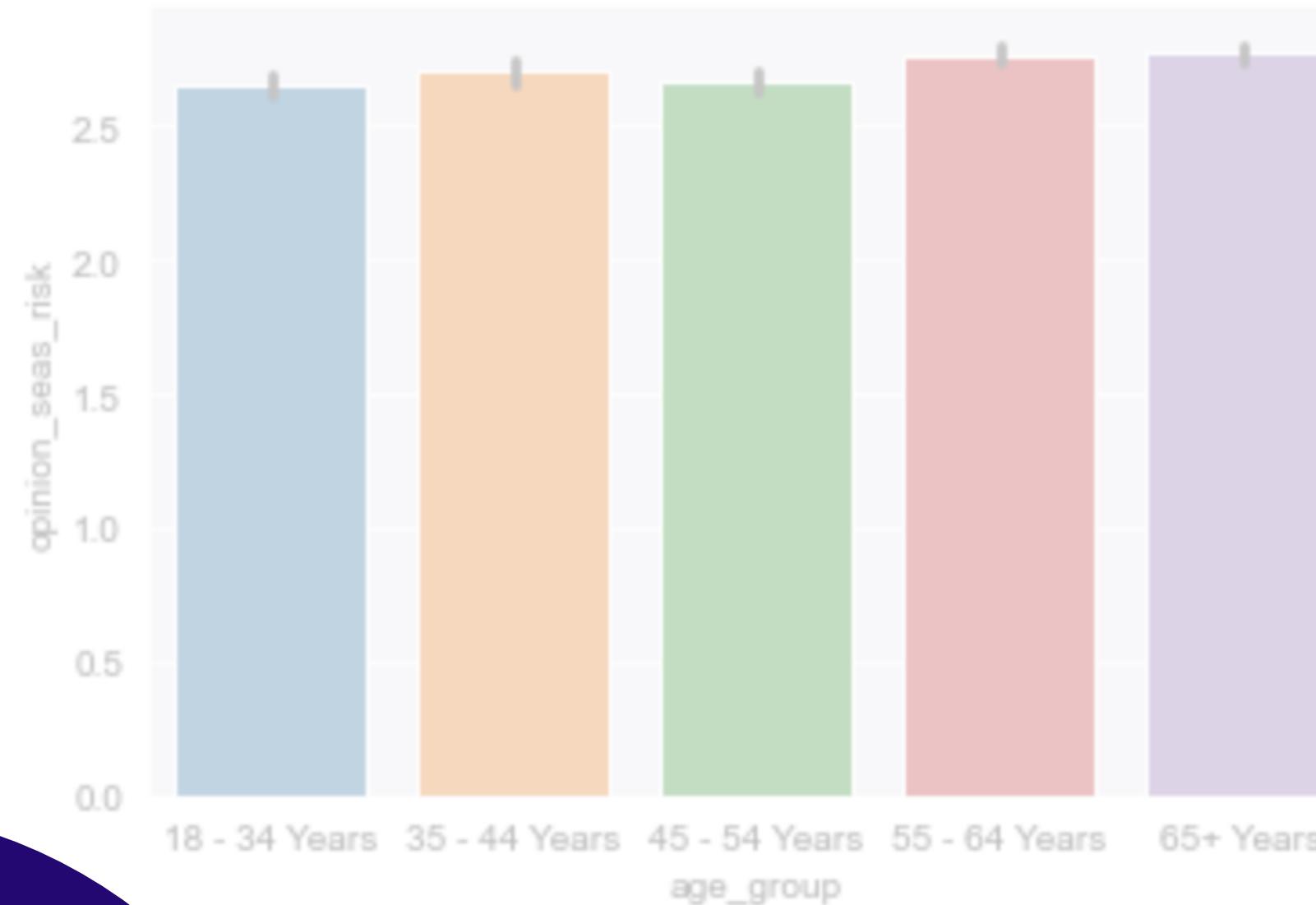
Top 3 Features - Seasonal



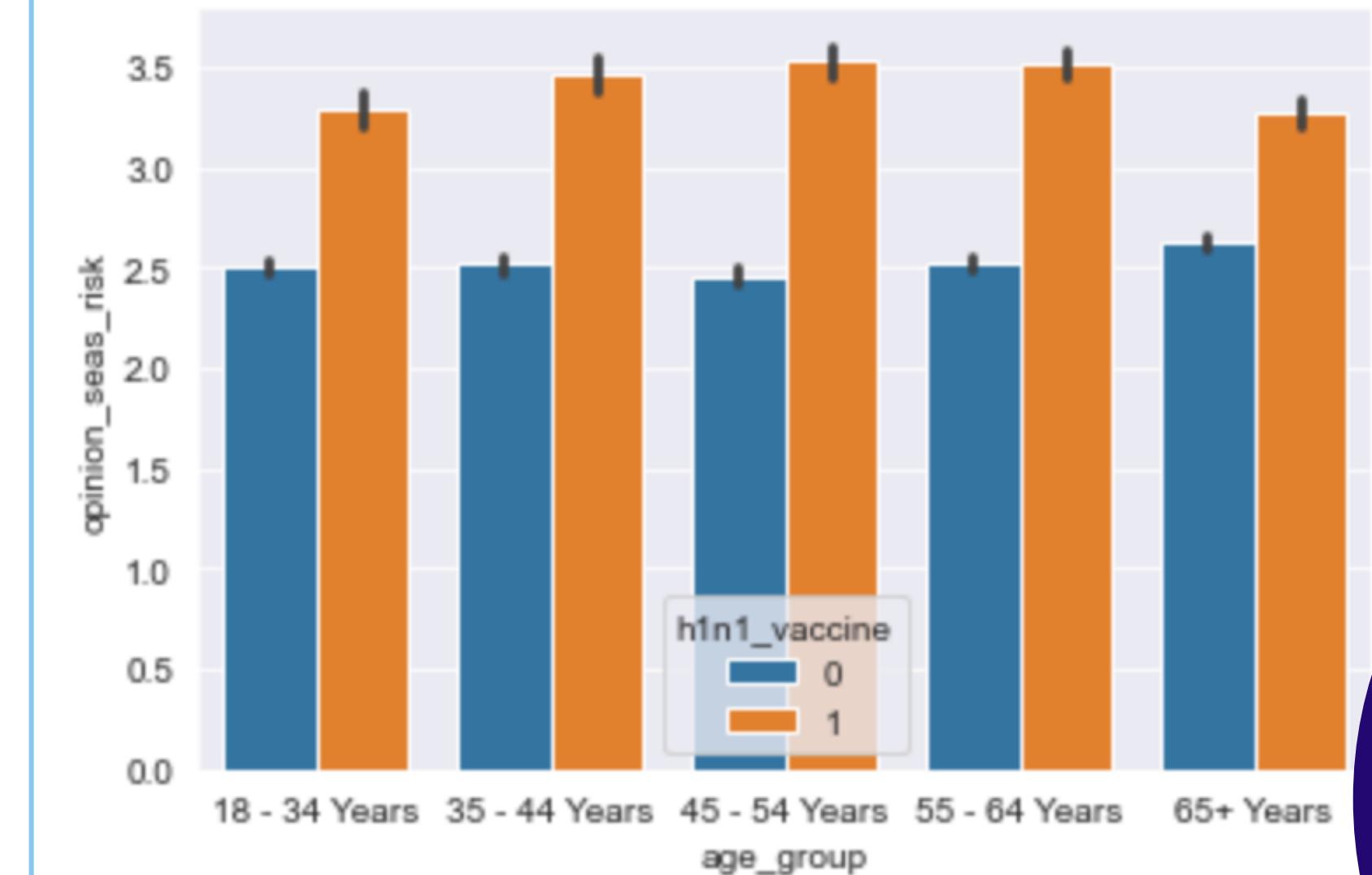
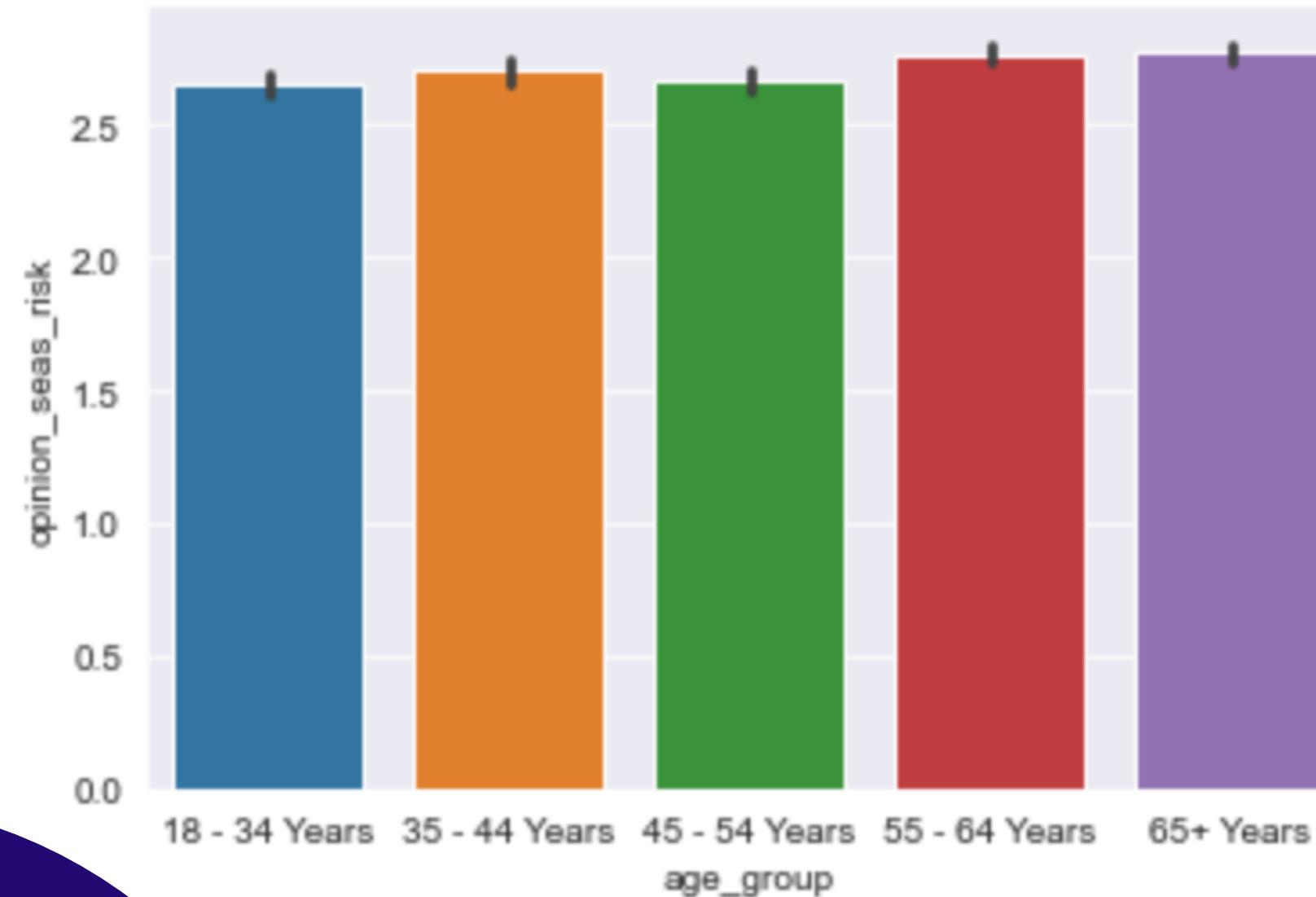
Opinions On Risk



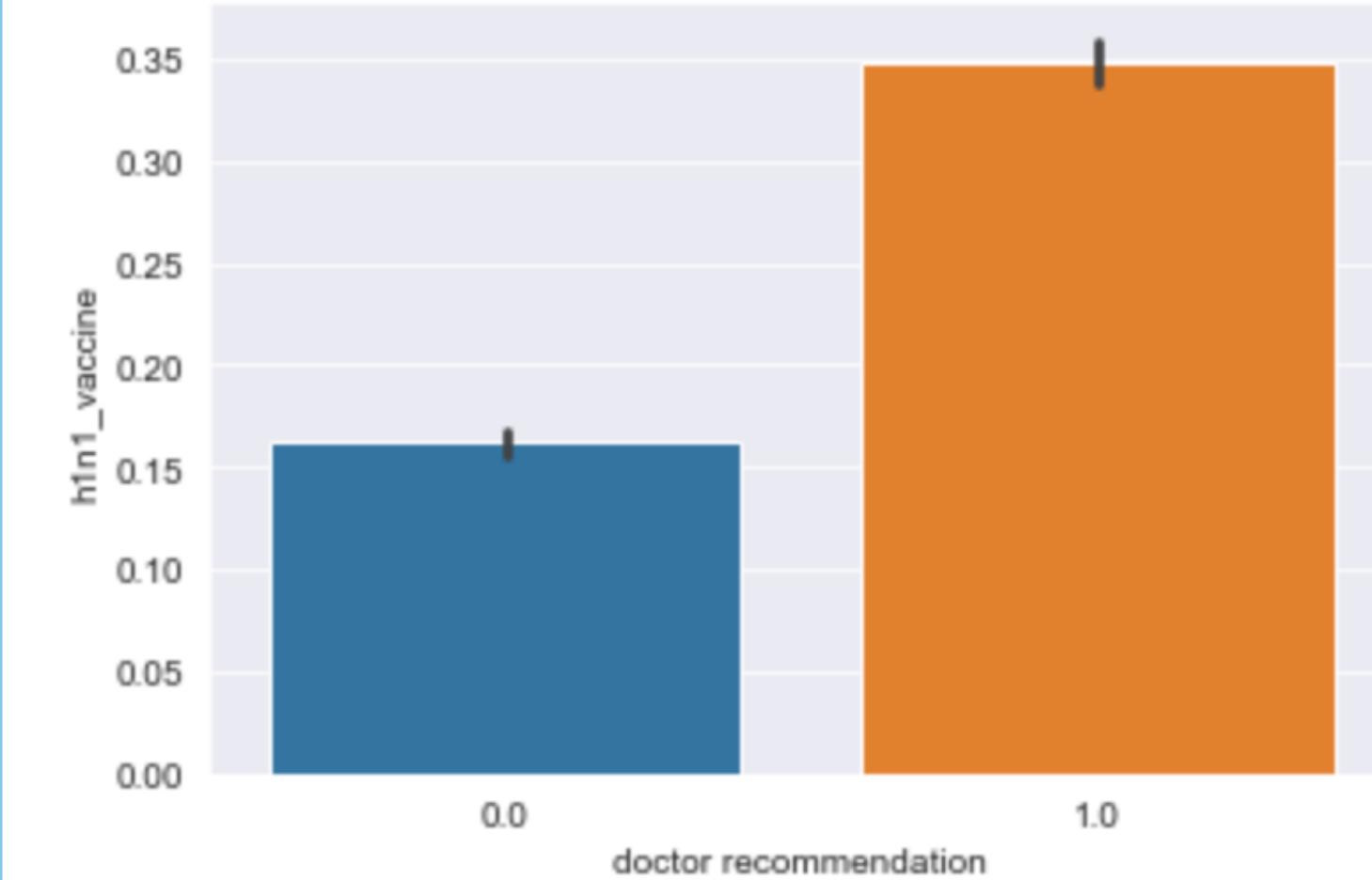
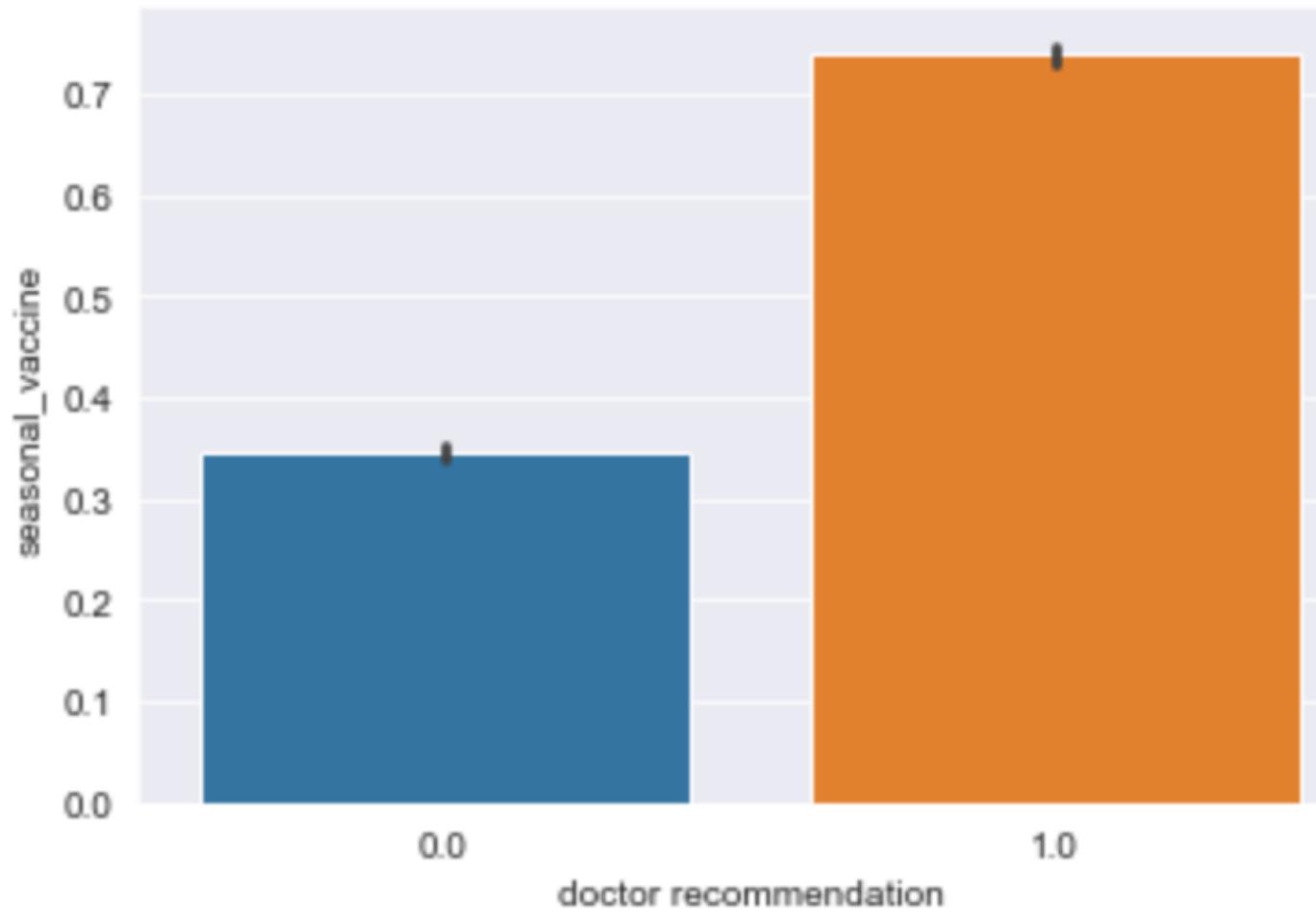
Opinions On Risk



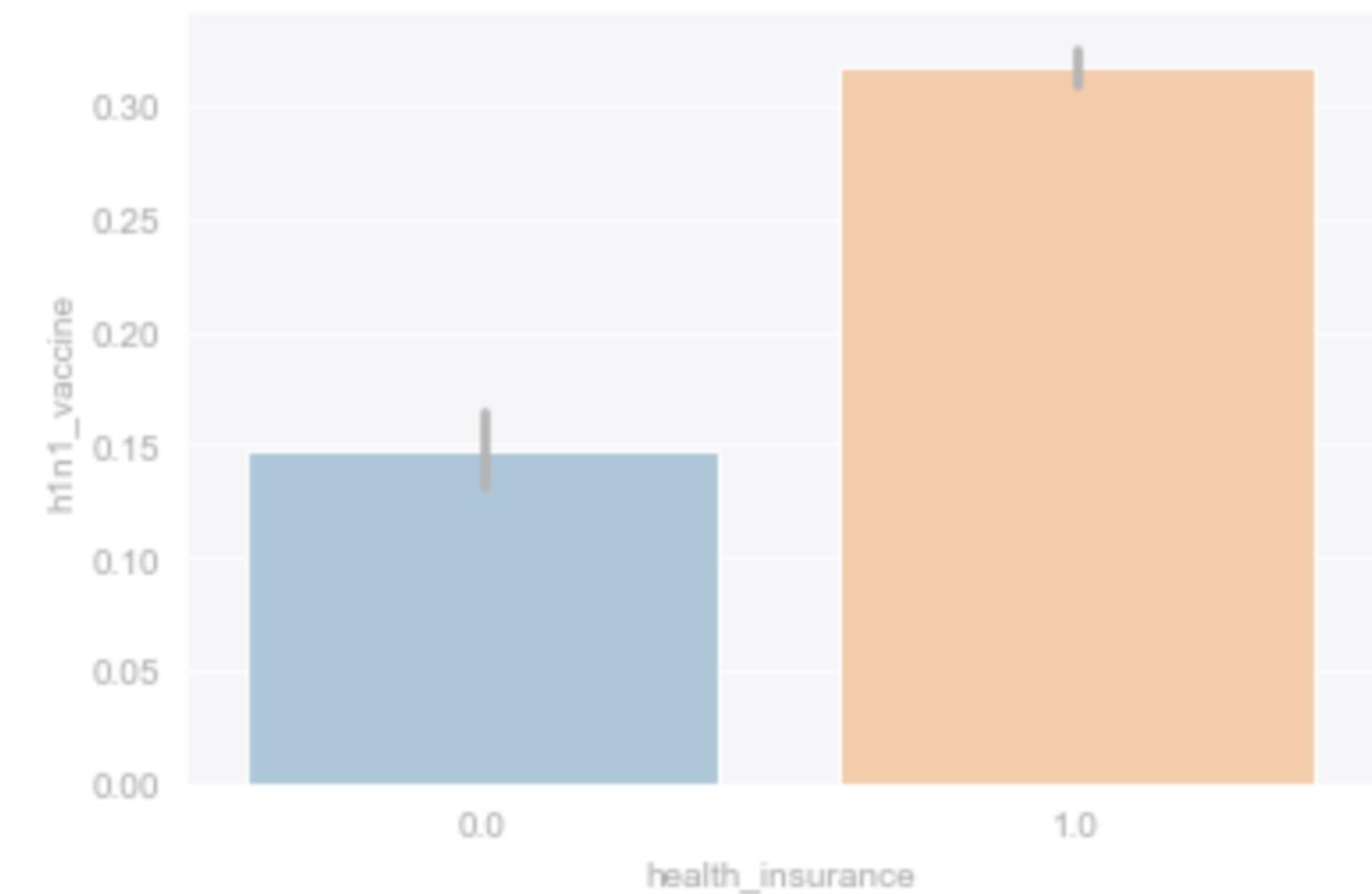
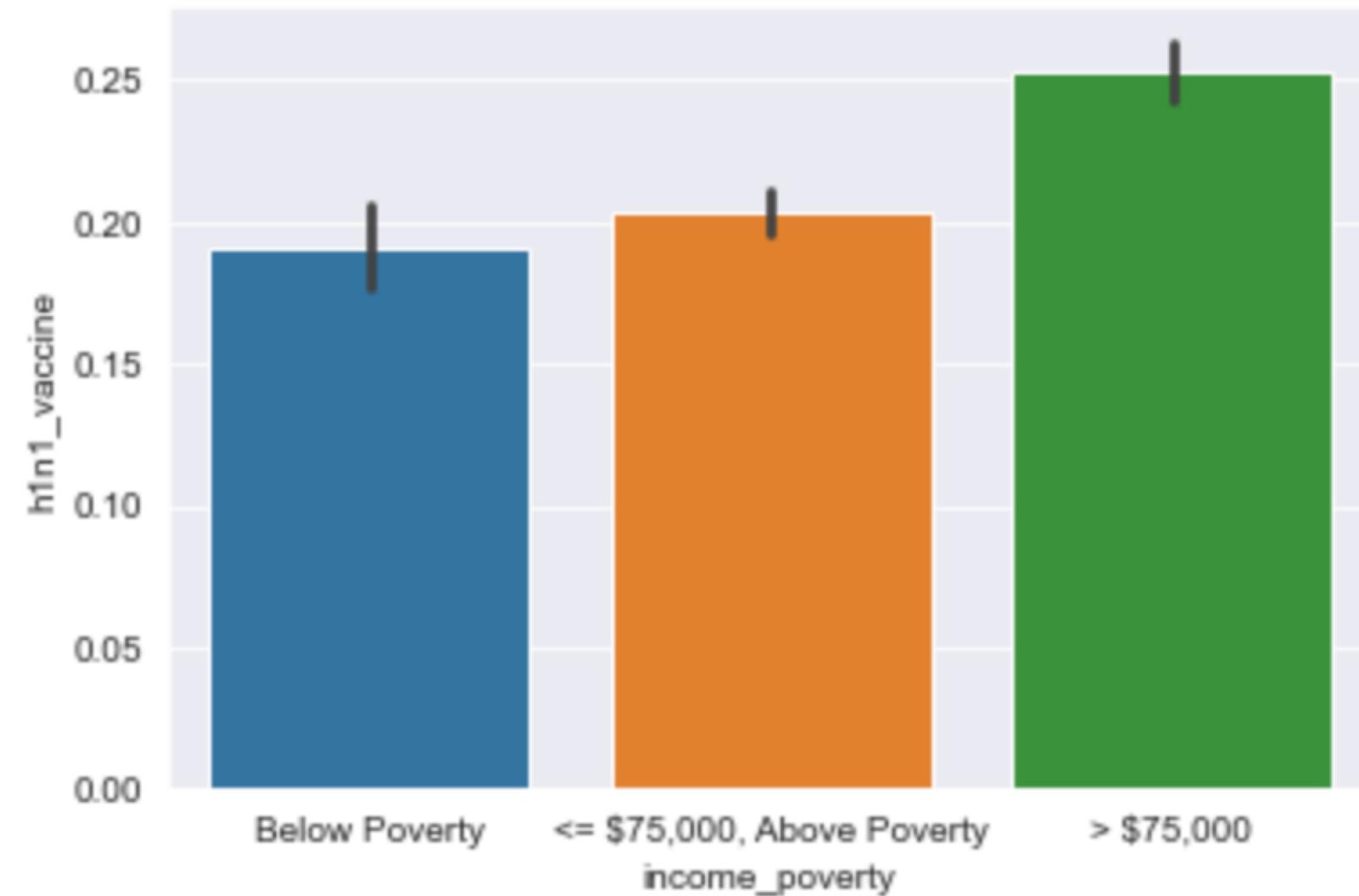
Opinions On Risk



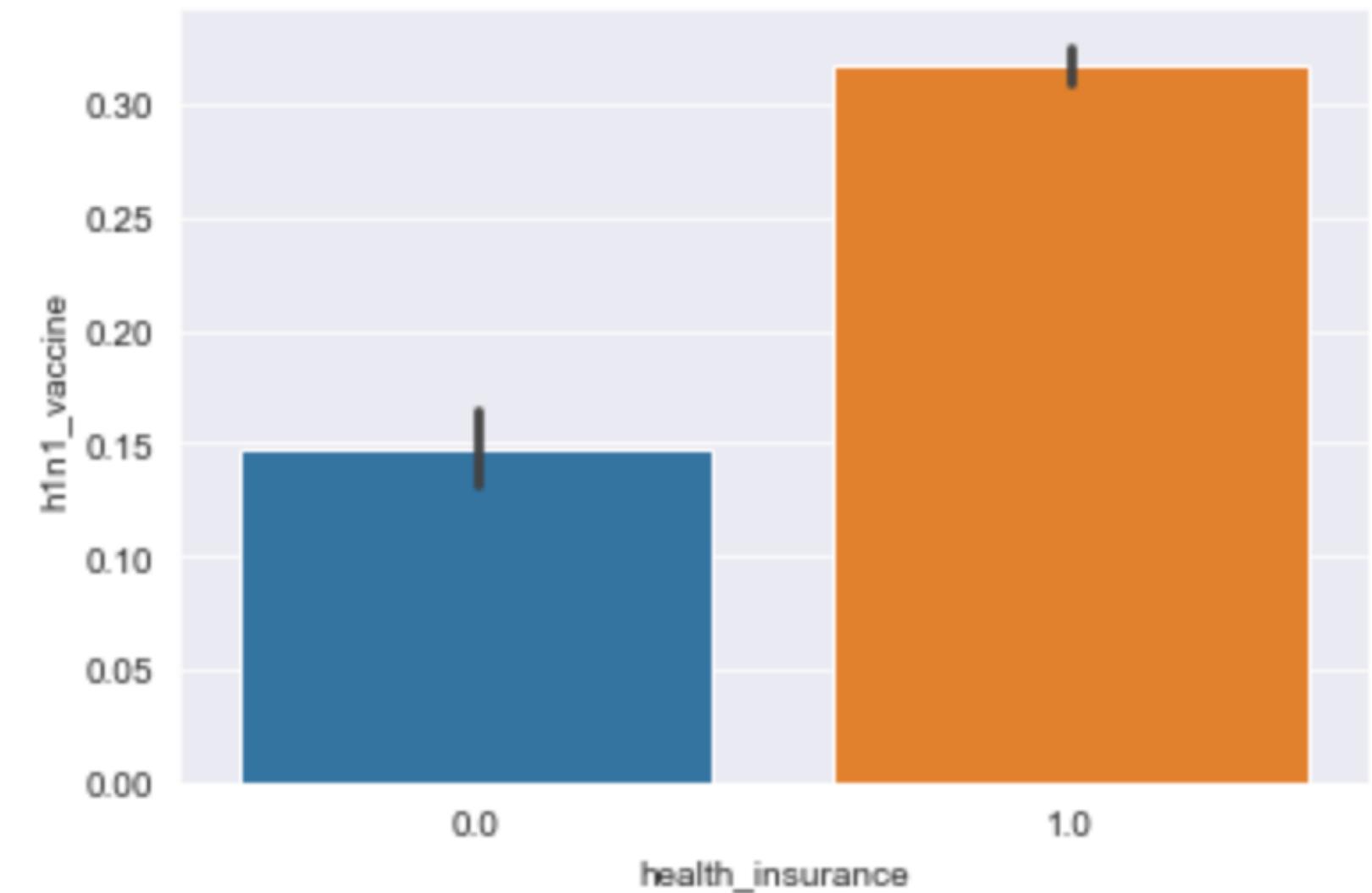
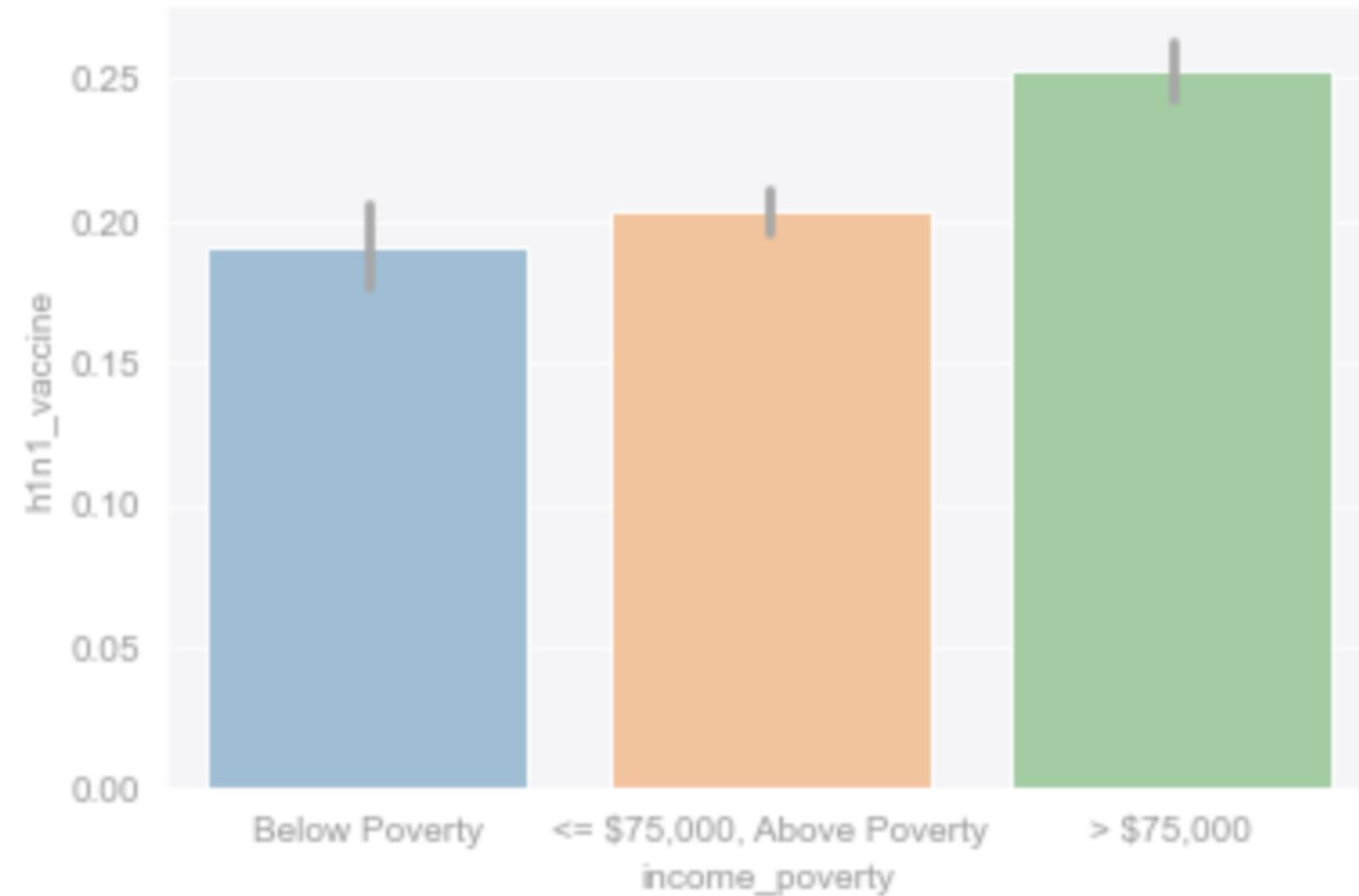
Doctor Recommendation



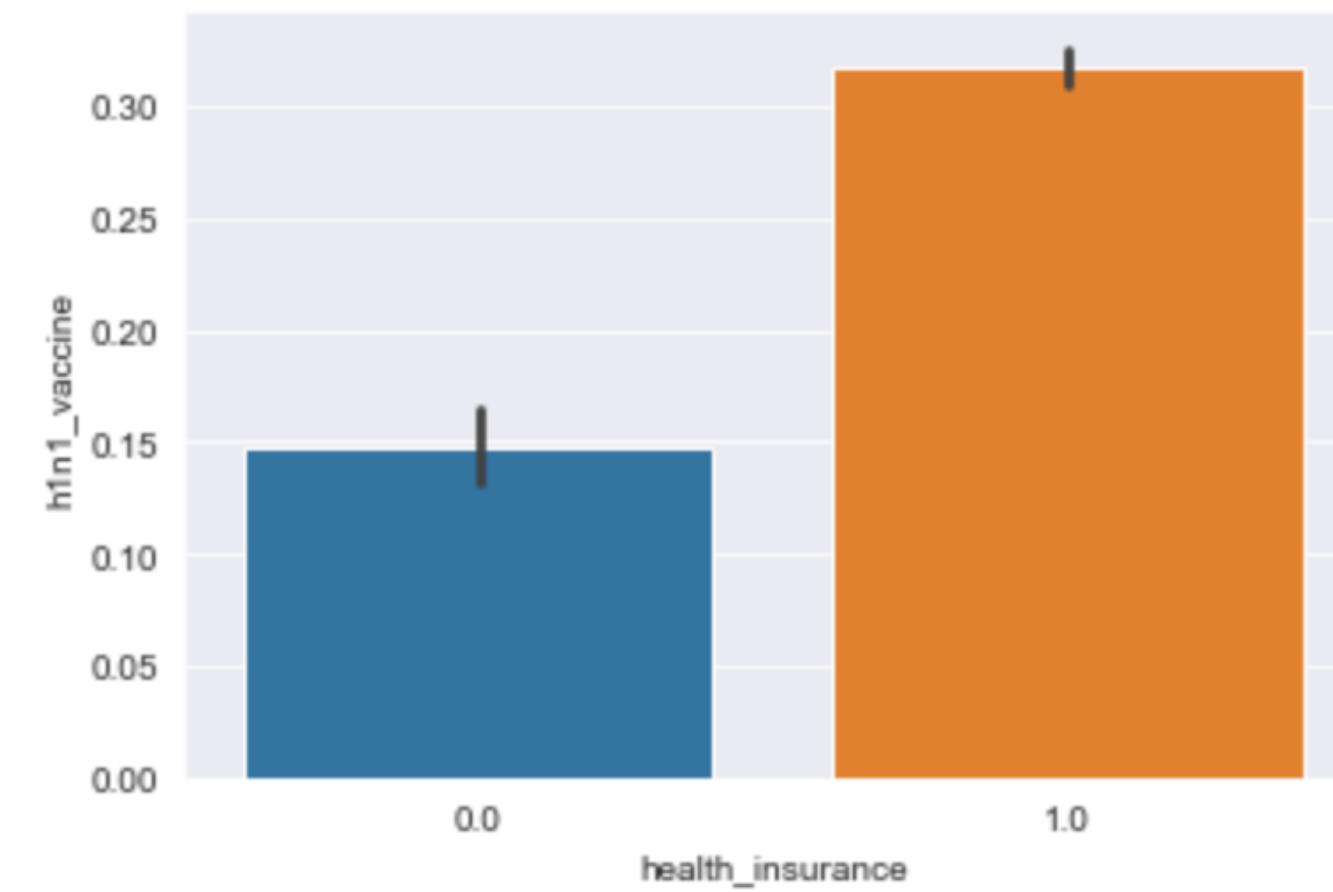
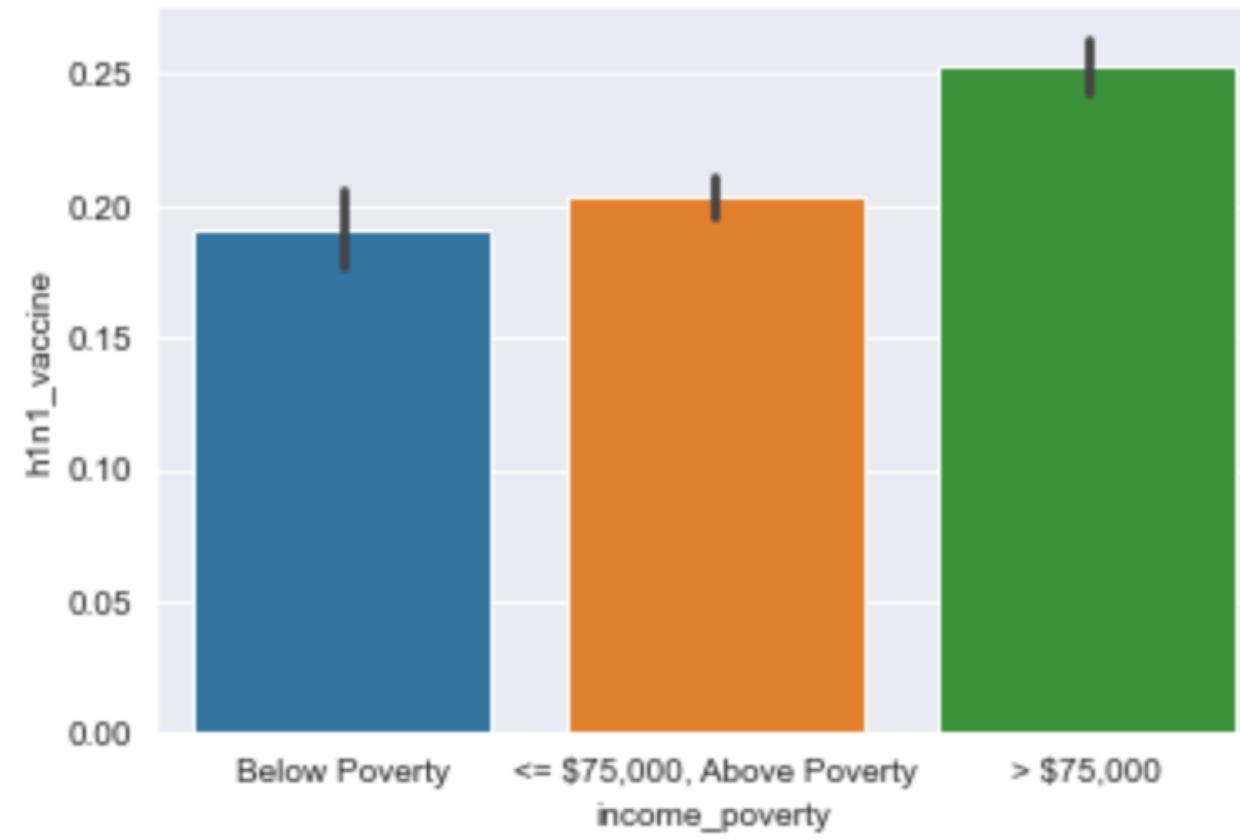
Health, Cost, and Income



Health, Cost and Income



Health, Cost and Income



Vaccine Classification Model

Action

Options

Test our model

Vaccine Type

H1N1

Model Type

Random Forest

How do you feel about the effectiveness of the vaccine?

Not at all effective

Were you recommended by a doctor?

Yes

No

How concerned are you about the flu?

Not at all concerned

Are you a health worker?

Yes

No

Are you worried about being sick from the vaccine?

Not at all worried

How much of a risk is getting the flu without being vaccinated to you?

1

5

Make Prediction

Action

Options

Simple Modelling

Choose Target

Target

Seasonal Vaccines

Choose Classifier

Classifier

Logistic Regression

Make model

X

☰

Vaccine Classification Model

Model Hyperparameters

C value	Penalty
0.001	l1

Confusion Matrix ROC Curve Precision Recall Curve

Logistic Regression results

AUC: 0.638 Accuracy: 0.572 Recall: 0.117 Precision: 0.774

Confusion Matrix

- 3000

Vaccine Classification Model

Action

Select the features to exclude

Options

Comprehensive Modelling

Choose Target

Target

Seasonal Vaccines

Choose Classifier

Classifier

Random Forest

Make model

Model Hyperparameters

Criterion

entropy

Max Features

sqrt

Max Depth

min_samples_leaf

1 15 1 200

n_estimators

max_iter

1 1000 1 200

Confusion Matrix

ROC Curve

Precision Recall Curve

Conclusion



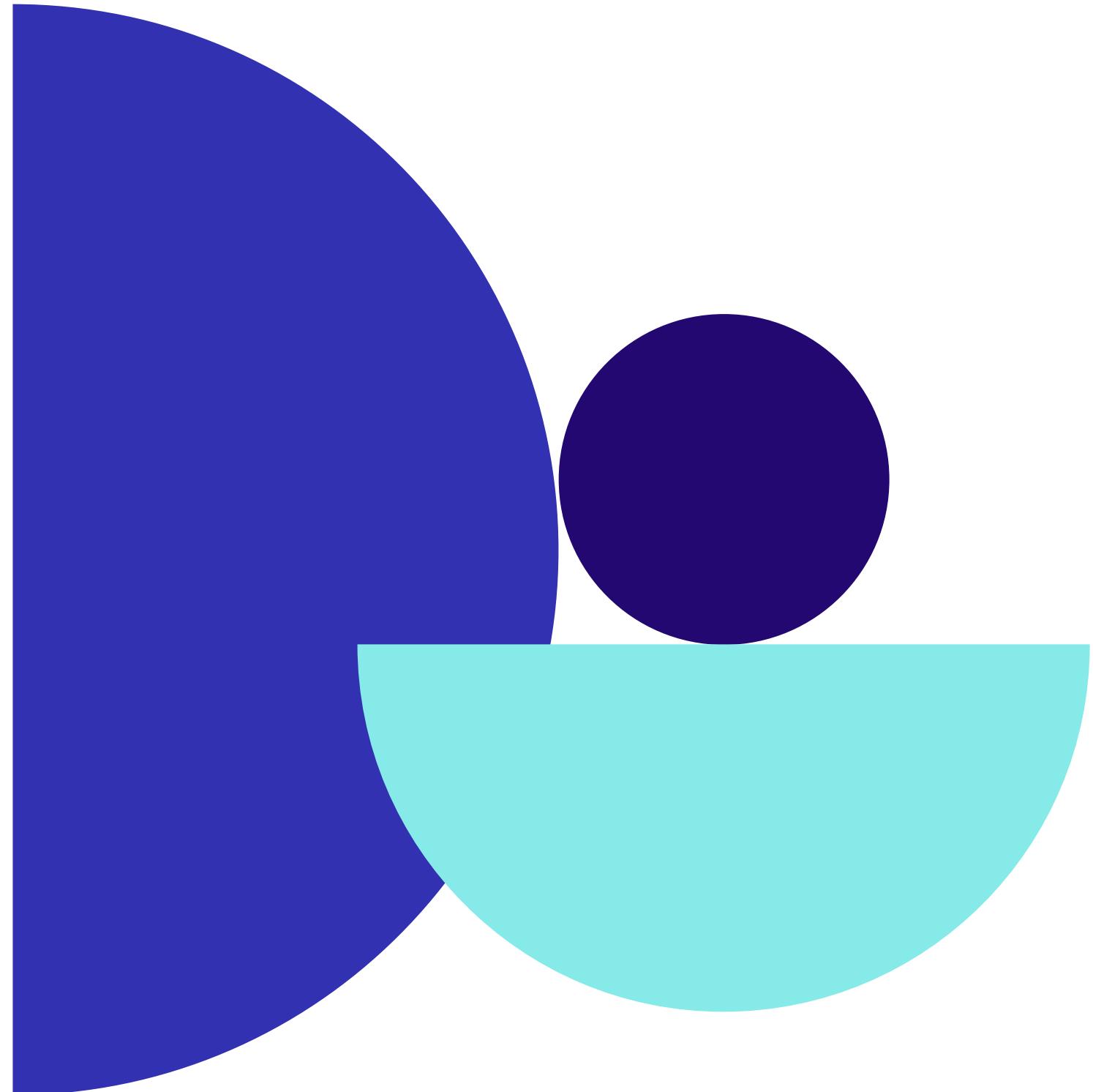
H1N1

- Doctor recommended h1n1 vaccine
- Health insurance
- Opinion of h1n1 risk

SEASONAL FLU

- Opinion of seasonal flu risk
- Dr recommended season flu vaccine
- Opinion of seasonal vaccine effectiveness

Recommendations



- ◆ Doctors should regularly recommend that their patients get vaccinated
- ◆ Targeted efforts should be made to inform and provide access to vaccinations for people without health insurance and below the poverty line.
- ◆ Inform people of the potential risks of H1N1/seasonal flu and provide more education on vaccine effectiveness

THANK YOU!

Our Team



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APPENDIX



Submissions

BEST	CURRENT RANK	# COMPETITORS	SUBS. MADE
0.8617	204	3540	3 of 3

Heatmap

