

GROUP 4



Flu Shot Learning

Predicting H1N1 and Seasonal Flu **Vaccines**



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Overview

Background

The world has recently experienced the impact of major flu outbreaks like COVID-19, Swine Flu (H1N1), and Avian Flu(H5N1). The effect of any flu outbreak depends on the type of flu, its respective variants, and population demographics such as age, and health condition of the individual. In the US, seasonal flu places a substantial burden on the health of people each year. The CDC estimates the flu has resulted in 9 million – 41 million illnesses, 140,000 – 710,000 hospitalizations, and 12,000 – 52,000 deaths annually between 2010 and 2020. The CDC website results moreover show that vaccination rates have remained low with an overall average of 57.8% as of 2022.



Business Understanding

In this data science project, the objective is to understand how the following factors affect H1N1 & Seasonal flu vaccination rates.

01

Opinions and perception:

This could be one's personal opinion toward the vaccine or influence from the opinions of others

03

Behavioral:

This includes habits such as handwashing, wearing masks, and avoiding large crowds.

02

Demographics:

This includes factors such as age, education, employment status, and income levels.

04

Doctors recommendation:

This could be a prescription written to a patient from the doctor concerning the proper vaccine to take



Data Understanding

The outputs of this project will provide actionable insights for business and healthcare organizations to increase seasonal flu vaccination rates, these outputs include:

01

Key Factors:

By analyzing collected data, the project will identify influential factors such as people's opinions, perceptions and behavior related to flu vaccination

02

Target Population:

The project will also identify distinct segments within the target population based on their opinion, perceptions and behaviors

03

Prediction Models

By leveraging statistical modeling and machine learning techniques, the project will build predictive models that estimate vaccination rates based on various key factors.

Data Preparation

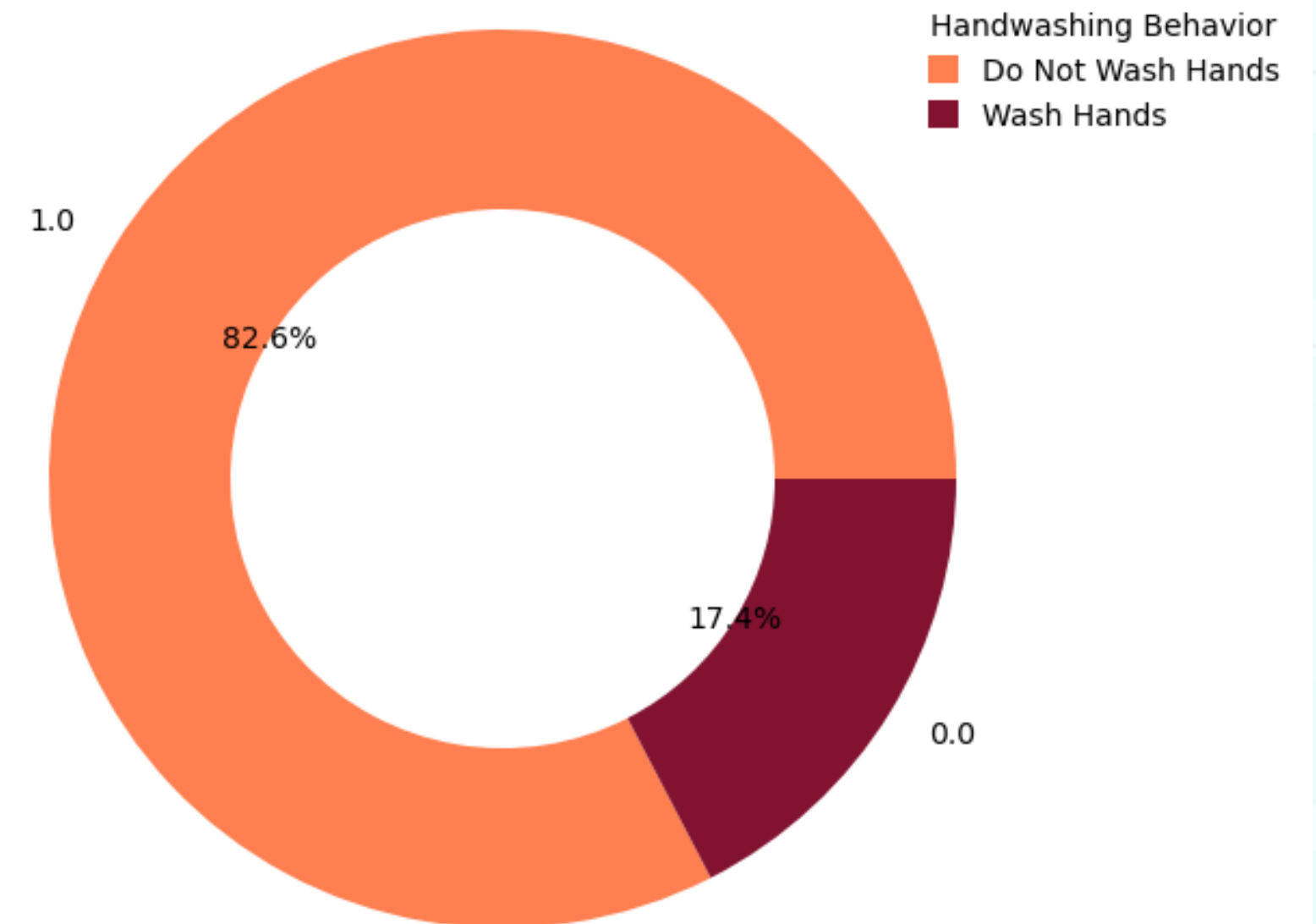
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UNIVARIATE ANALYSIS

From this visualization, we denote that 82 percent of the population does not wash their hands while 17 percent wash their hands.

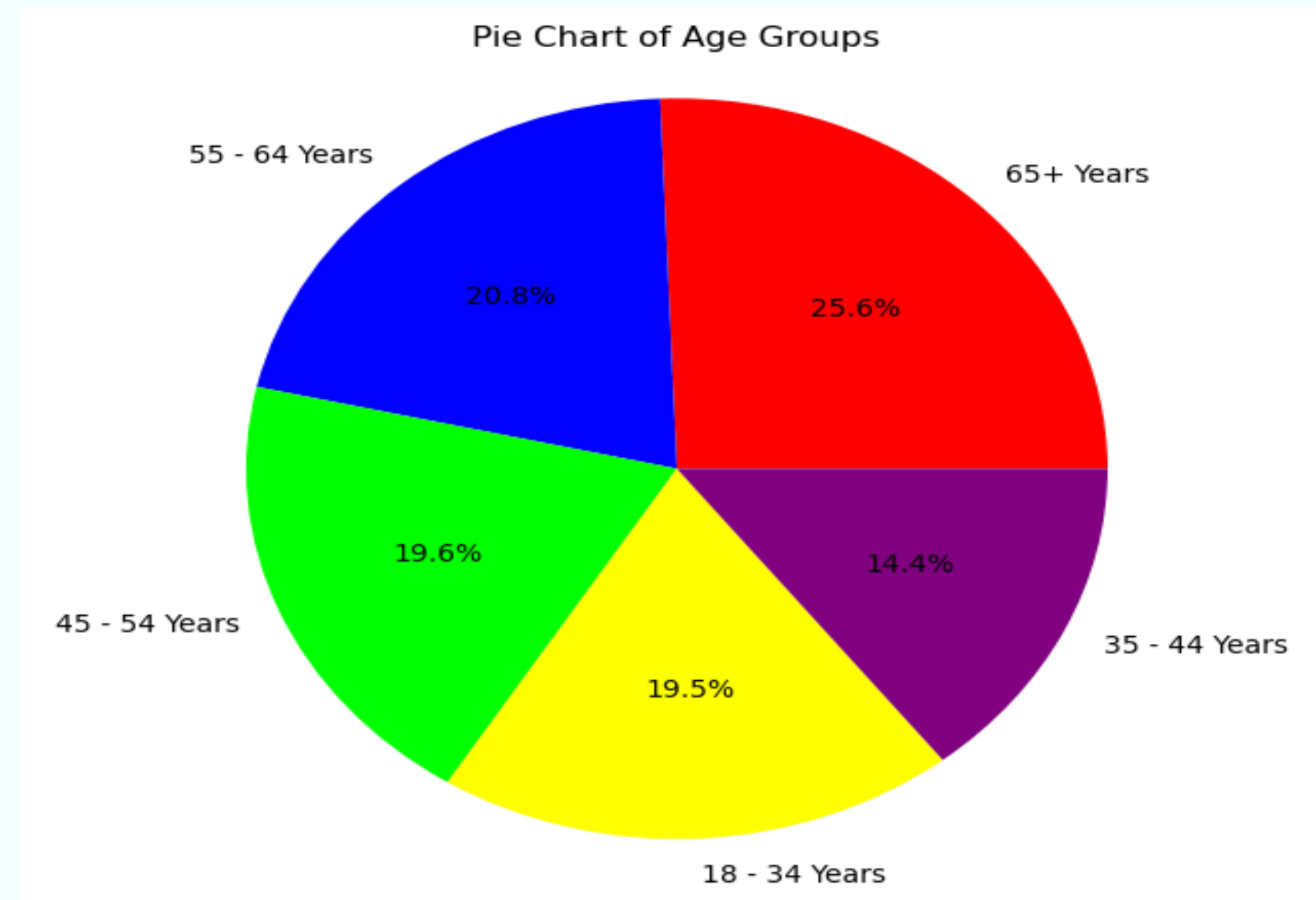
Donut Chart of Handwashing Behavior





UNIVARIATE ANALYSIS

From this visual, we note that majority of the people in the dataset are 65 years and older with the smallest population being around a 35- 44 years old.



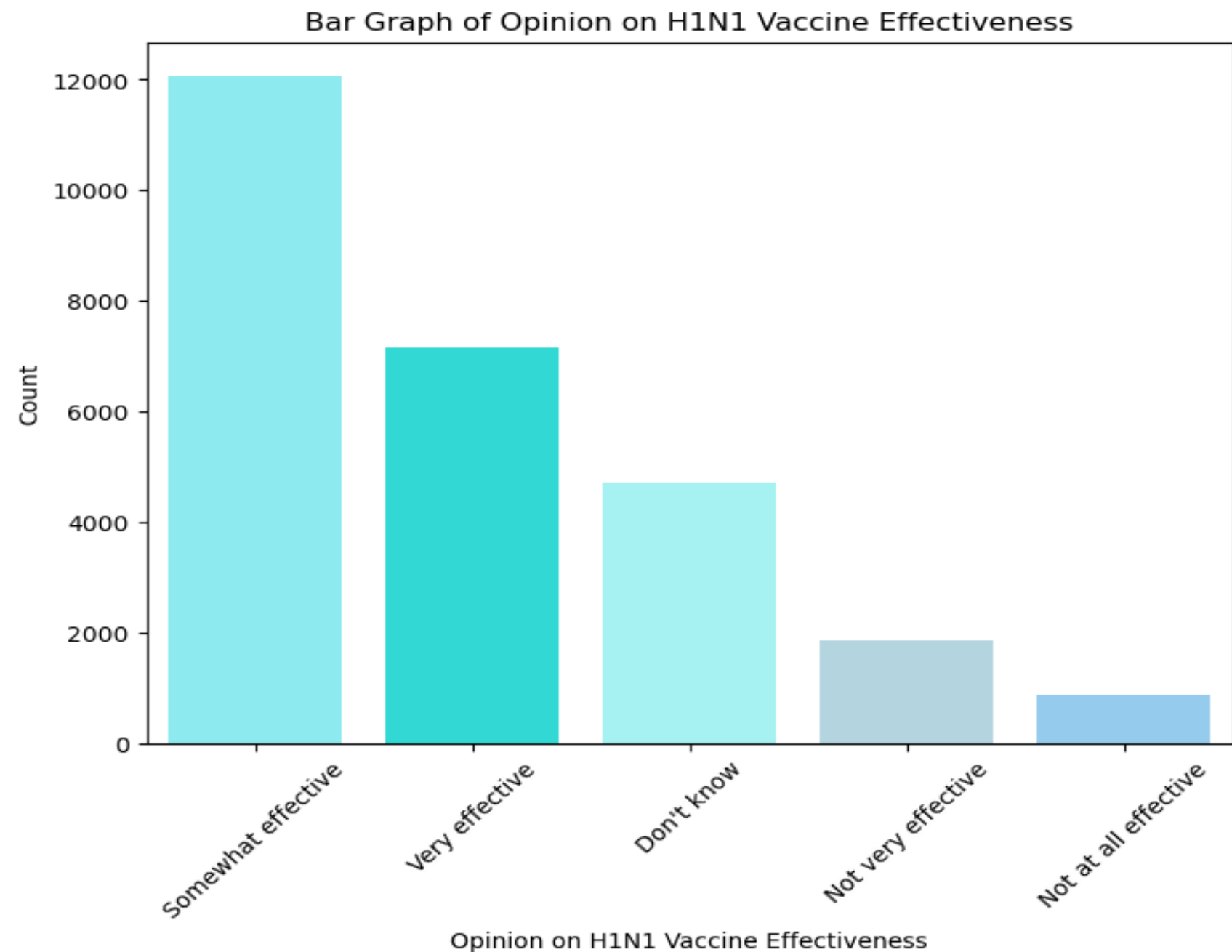
Data Preparation

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UNIVARIATE ANALYSIS

Here we investigated peoples opinion on the effectiveness of the H1N1 vaccine. Majority of the people voted that it was somewhat effective.



Data Preparation

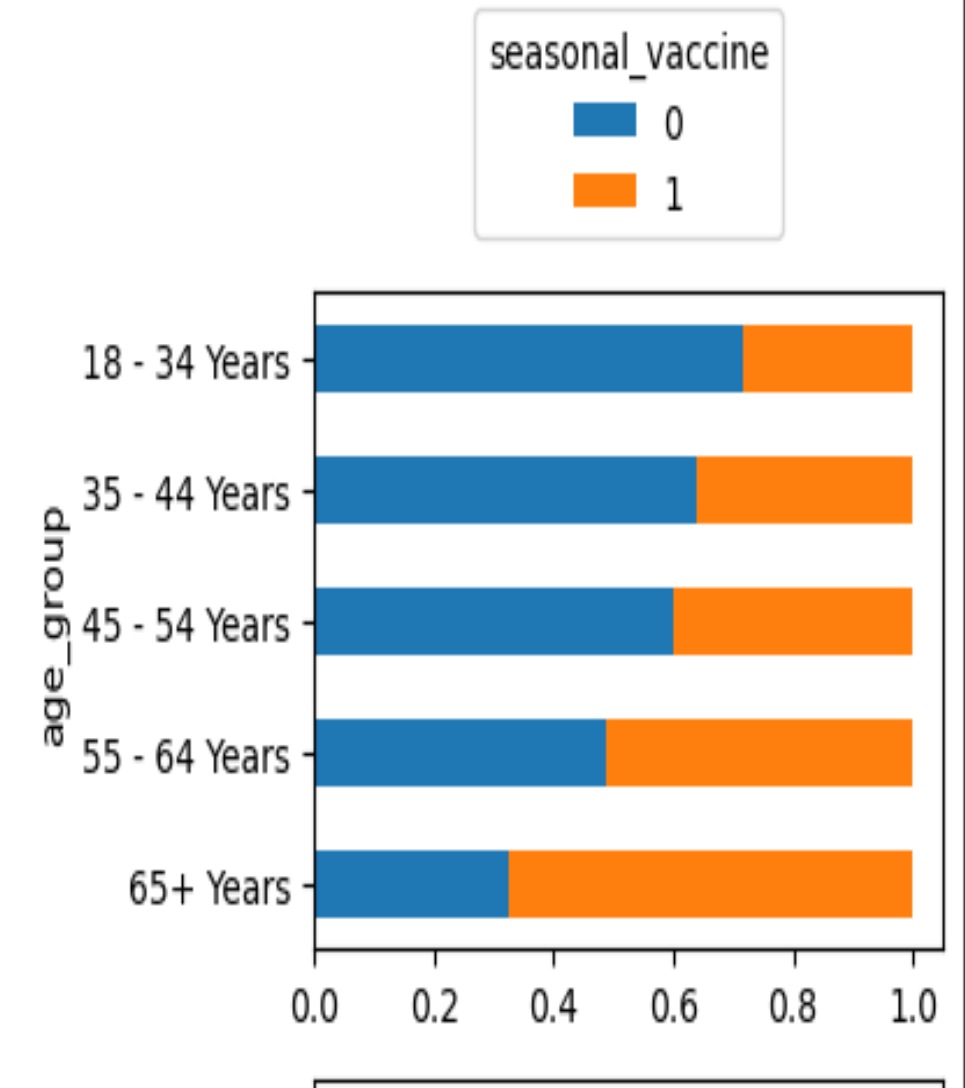
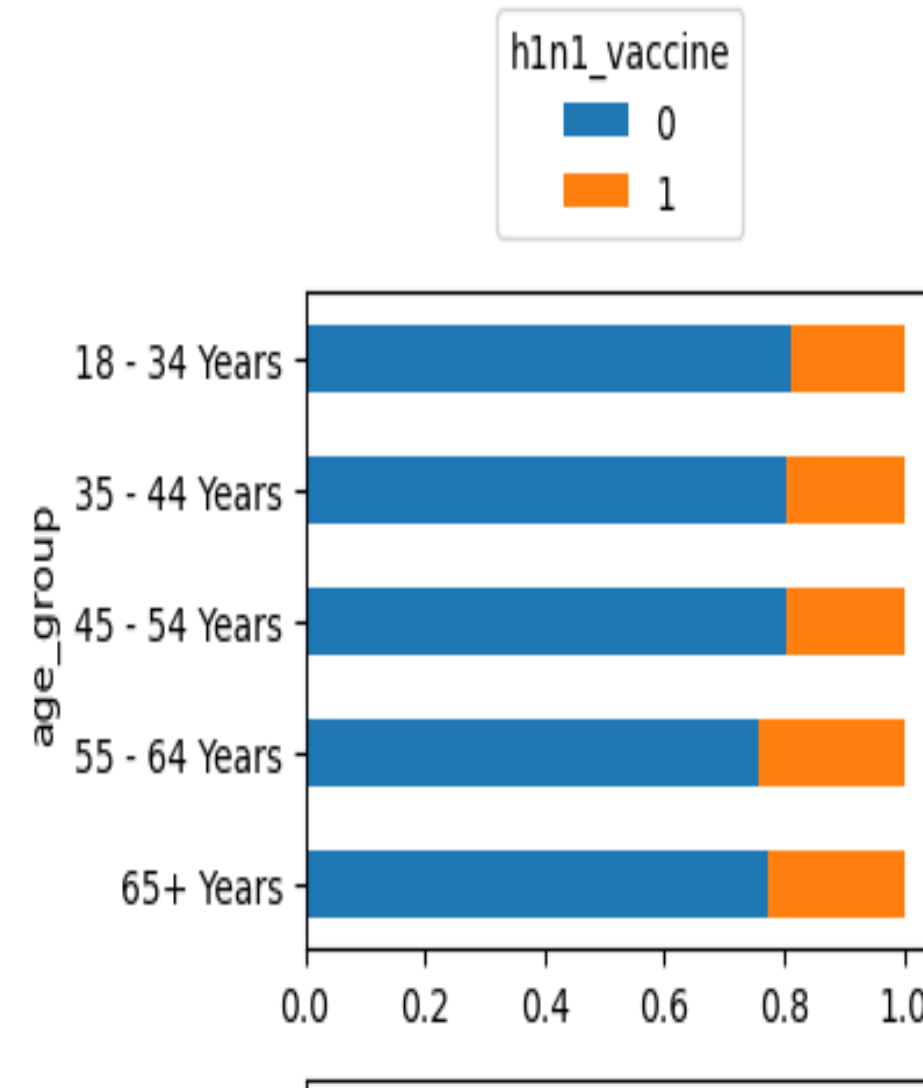
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BIVARIATE ANALYSIS

From the visualization, we observe that the majority of participants from 65 + years took the seasonal vaccine.

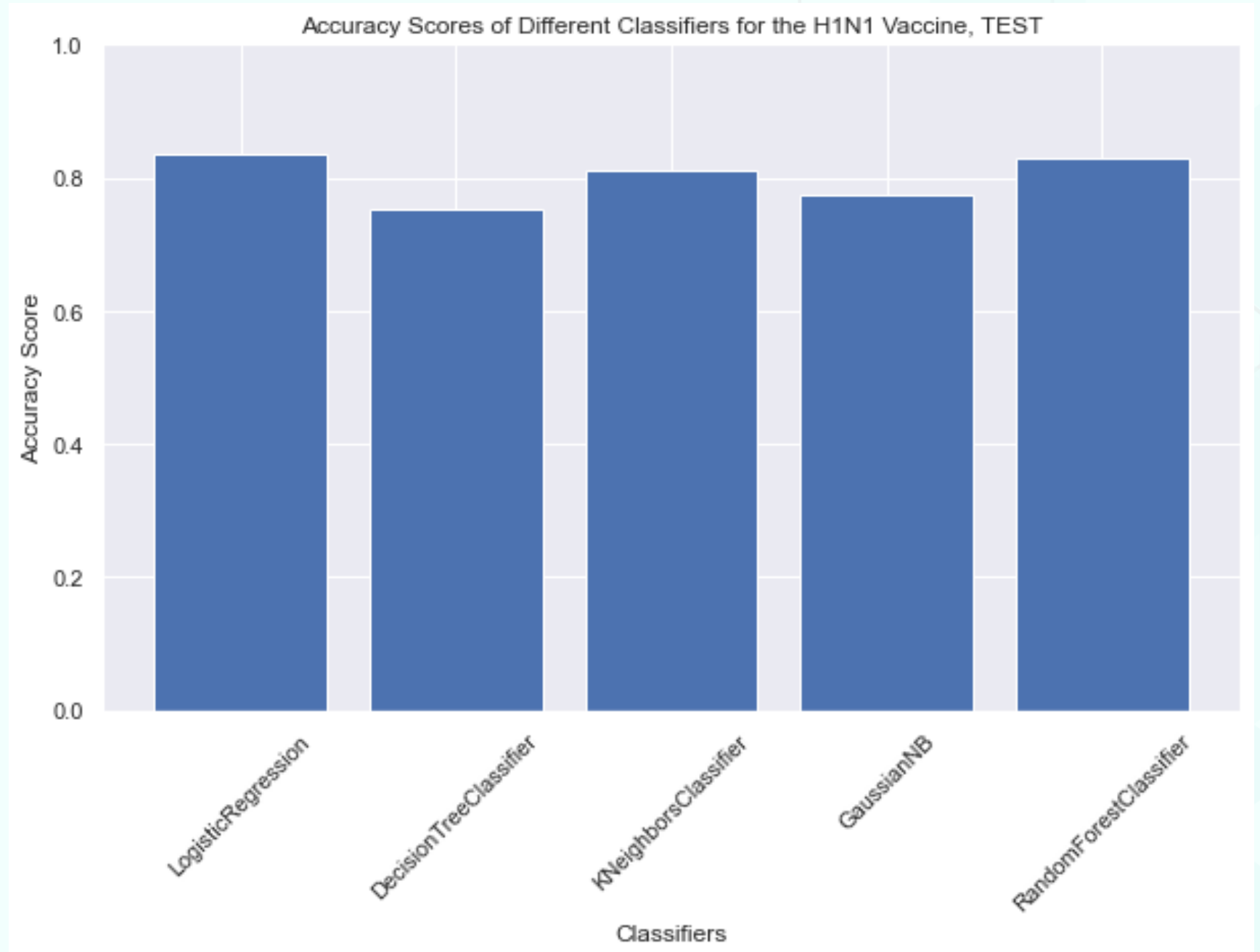
For the H1N1 vaccine, individuals aged between 55-64 took most of the vaccine





Modelling

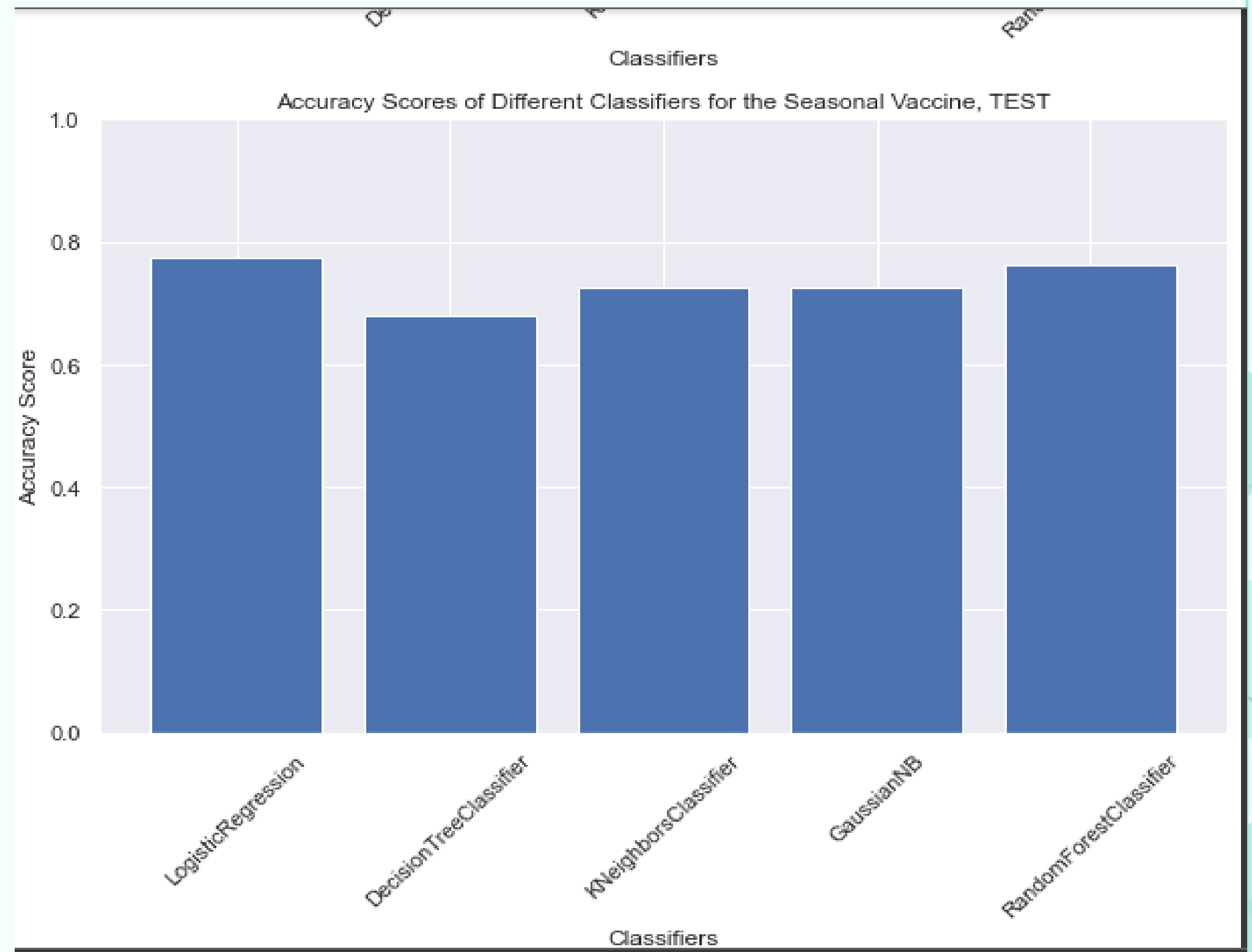
When doing classification on H1N1 vaccine, we observe here that logistic regression model and random forest classifier have the highest accuracy scores





Modelling

On this analysis of seasonal vaccine, we observe that logistic regression model and random forest classifiers model have the highest accuracy scores

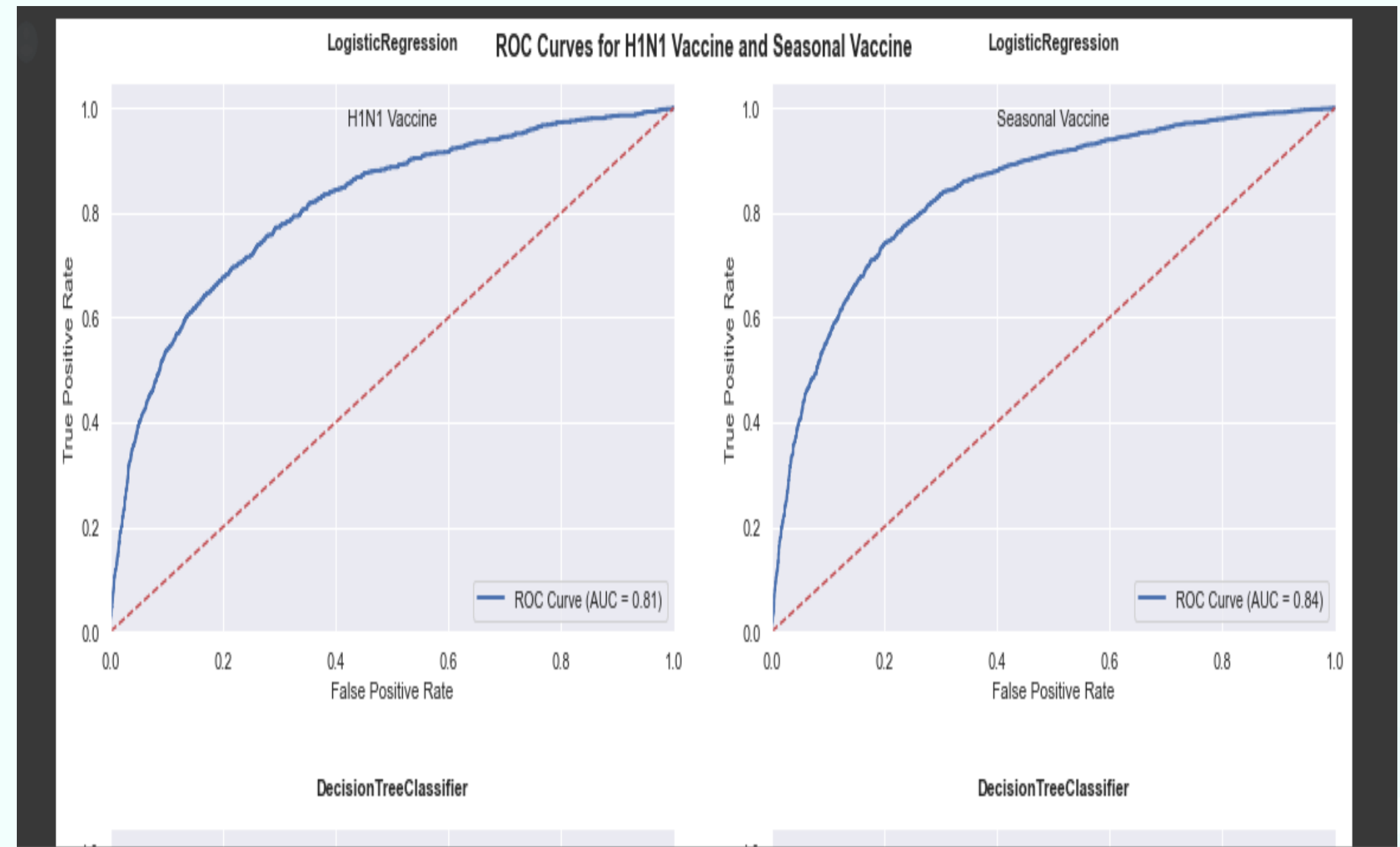




Modelling

Curves of the logistic regression and random forest model recorded the highest ROC and accuracy scores

The logistic regression had a score of 81% and 84% for H1N1 and seasonal vaccines respectively

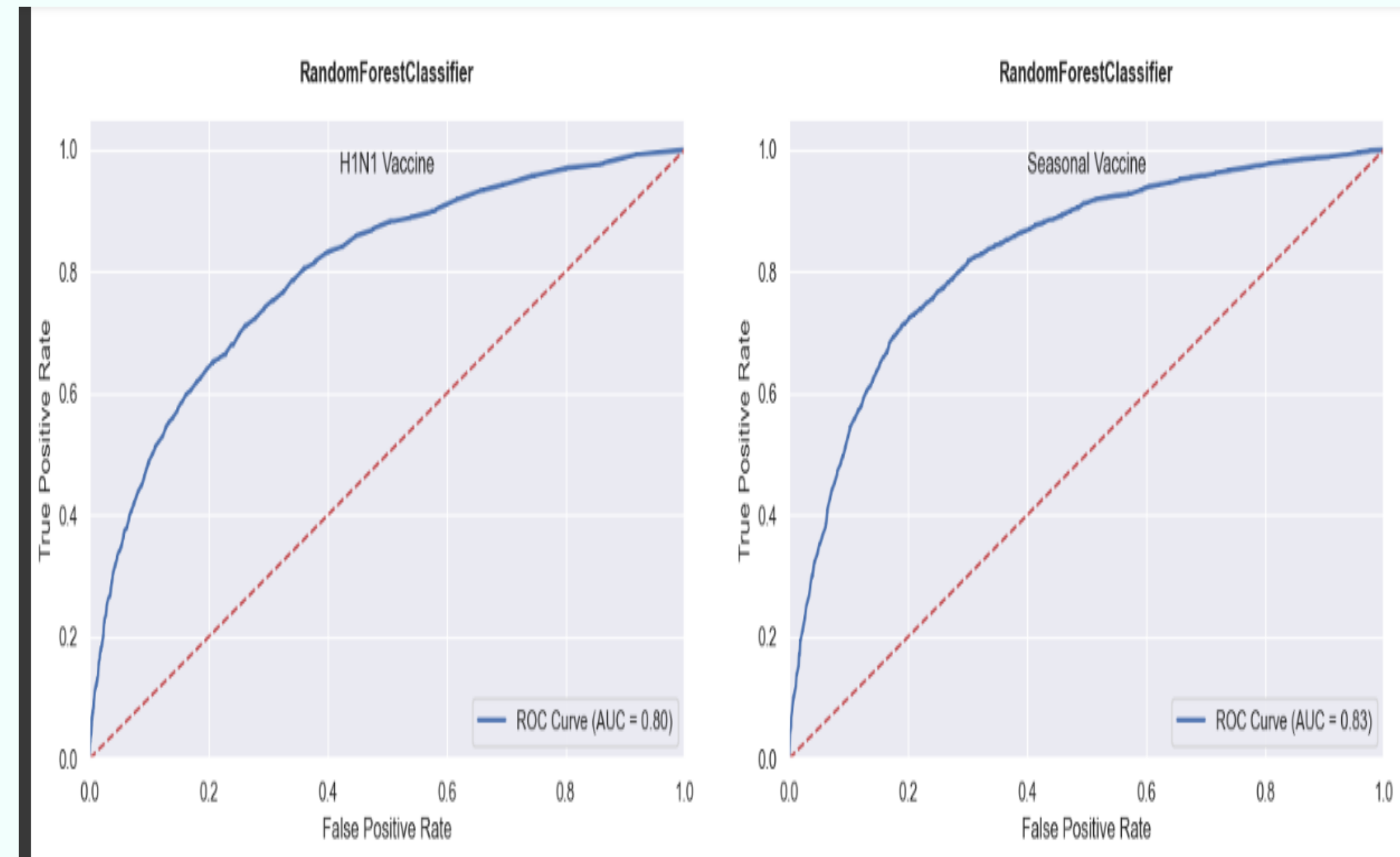




Modelling

Curves of the logistic regression and random forest model recorded the highest ROC and accuracy scores

The random forest classifier had scores of 80% and 83% for H1N1 and seasonal vaccines respectively.

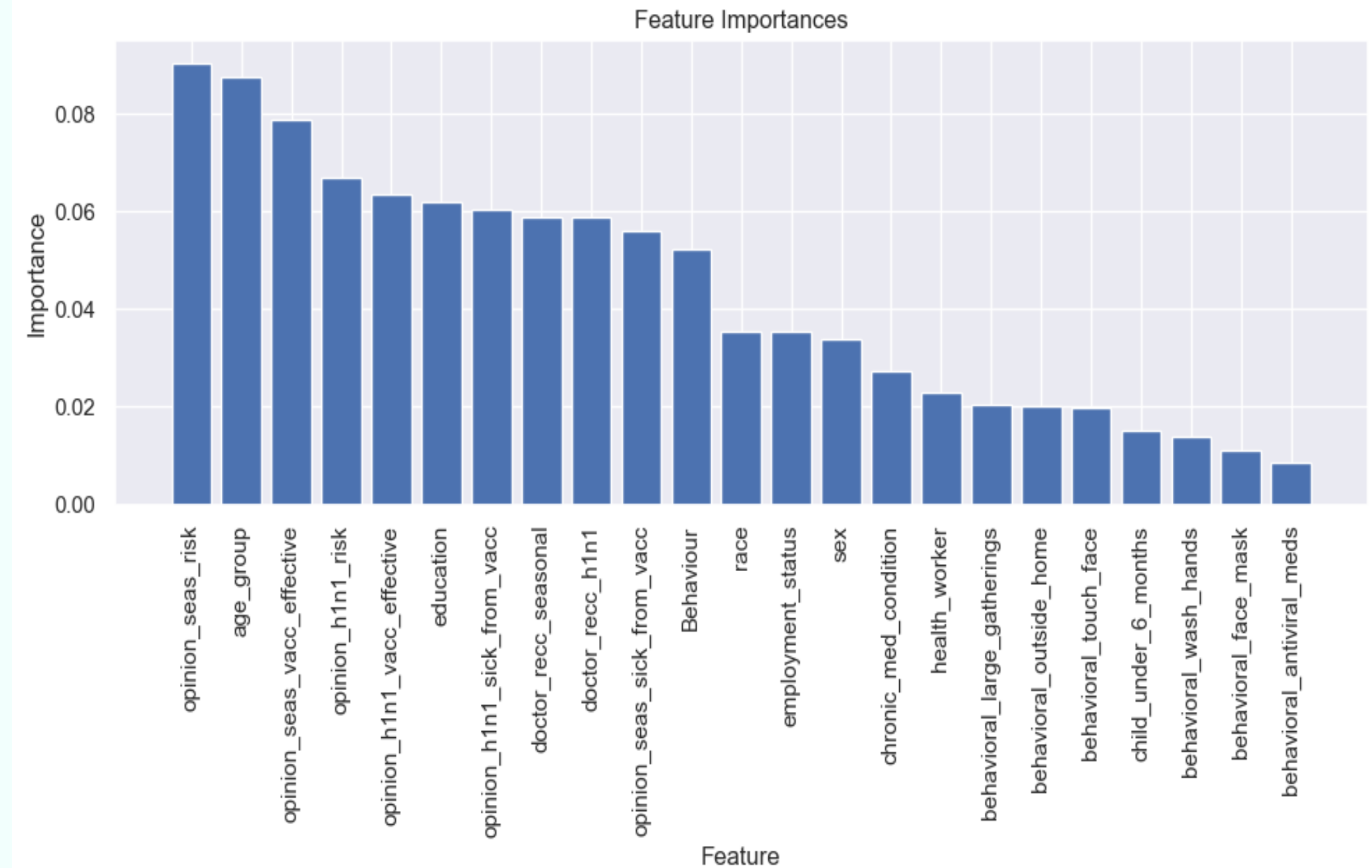


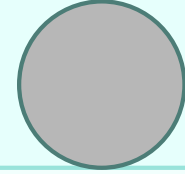


Modelling

From the visualization, the most influential features are :

- Age group
- Respondent's opinion about seasonal flu vaccine effectiveness
- Respondent's opinion about the risk of getting sick with H1N1
- Respondent's opinion about the risk of getting sick with seasonal flu without vaccine





Conclusions

From the previous chart, the following top 4 features had the most effect on vaccine uptake:

1. Age group
2. Respondent's opinion about the risk of getting sick with seasonal flu without a vaccine
3. Respondent's opinion about the risk of getting sick with H1N1
4. Respondent's opinion about seasonal flu vaccine effectiveness



Recommendations

➤ Mass and grassroots sensitization

Stakeholders to invest in mass and grassroots sensitization about H1N1 and the seasonal Flu vaccine led by healthcare professionals. They should be educated on the vaccine efficacy and the dangers of not getting it.

➤ Healthcare Provider Recommendations

Encouraging healthcare providers to actively recommend and offer H1N1 and seasonal vaccination to their patients can significantly impact vaccine uptake. The stakeholders can provide training and resources to healthcare professionals to increase their knowledge and confidence in recommending the vaccine.

➤ Collaboration and Partnerships

Collaborating with community organizations, schools, workplaces, and other stakeholders can amplify efforts to promote H1N1 vaccination. Engaging influencers, community leaders, and trusted voices within different communities can help build trust and increase acceptance of the vaccine.



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MEMBERS

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Thank You