INFLUENCE PREDICTION IN VACCINATION RATES

A METHOD BASED ON DATA

CONTENTS

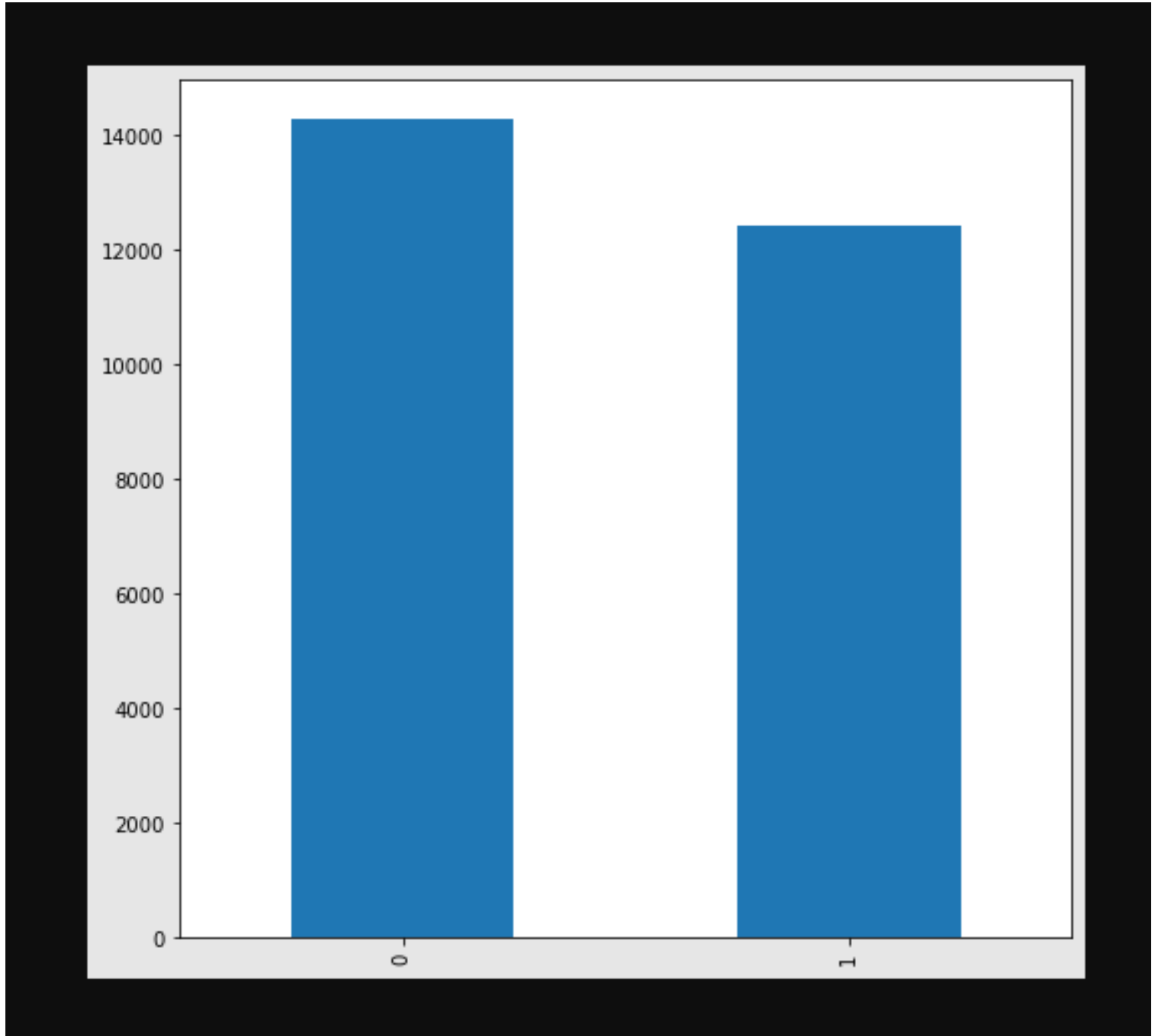
BUSINESS AND DATA UNDERSTANDING

- **BUSINESS PROBLEM:** THE PRIMARY OBJECTIVE OF THIS ANALYSIS IS TO PREDICT THE LIKELIHOOD OF INDIVIDUALS RECEIVING H1N1 AND SEASONAL FLU VACCINES.
- SEASONAL FLU VACCINES PROTECT AGAINST COMMON INFLUENZA VIRUSES, WHILE H1N1 VACCINES TARGET THE PANDEMIC (H1N1) 2009 VIRUS.

- **DATA UNDERSTANDING:** THE DATA IS DERIVED FROM THE NATIONAL 2009 H1N1 FLU SURVEY.
- PARTICIPANTS WERE ASKED ABOUT THEIR VACCINATION STATUS FOR H1N1 AND SEASONAL FLU, ALONG WITH QUESTIONS ABOUT THEIR SOCIO-ECONOMIC BACKGROUND, DISEASE RISK PERCEPTIONS, AND VIEWS ON THE EFFECTIVENESS OF VACCINATIONS.

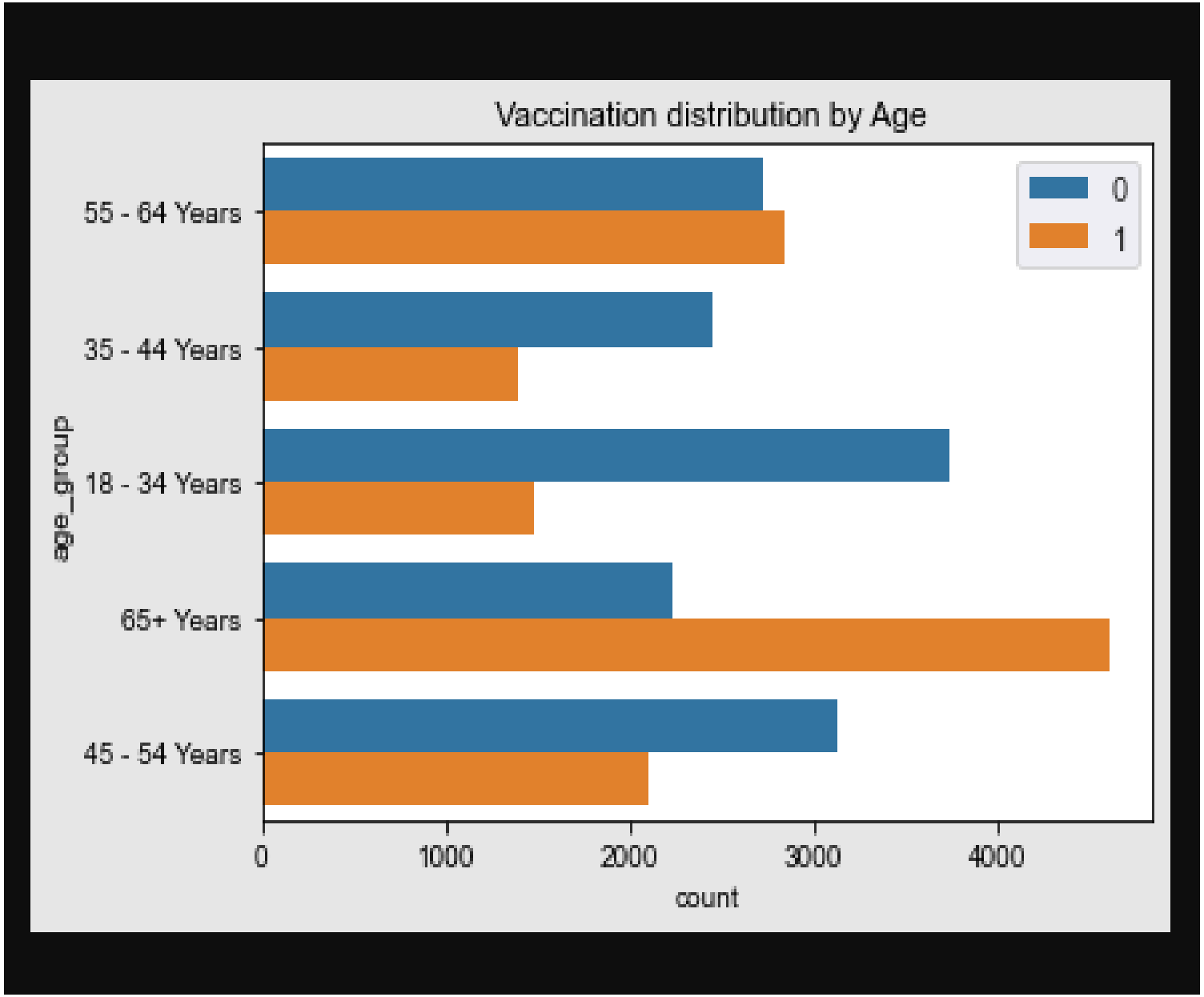
TO ACHIEVE THIS WE TOOK SEVERAL KEY STEPS:

- ✓Data Analysis
- ✓Modelling
- ✓Evaluation



DATA ANALYSIS

The graph showcases a comparison between those who got the vaccine and those who didn't.

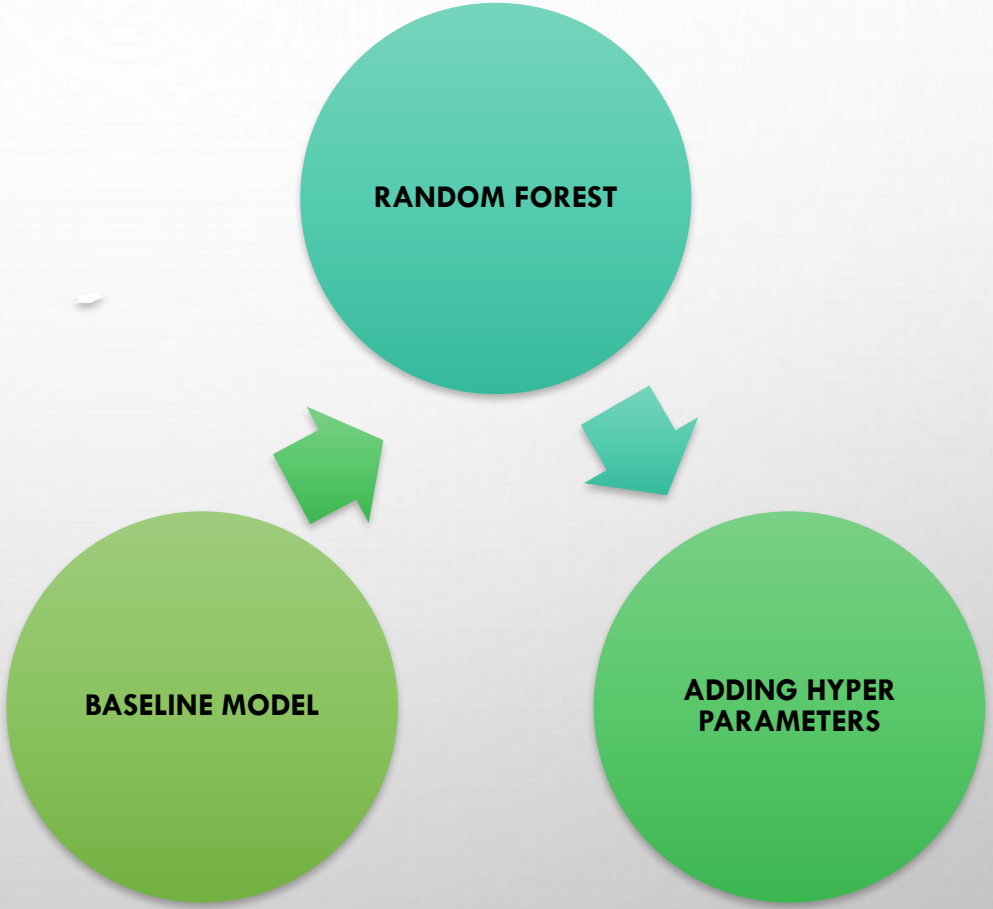


-Here is a relationship between the target variable and Age.

-65+ years old age got the vaccine compared to the other younger age group.

MODELLING

STEPS USED DURING MODELLING



MODELLING

BASELINE MODEL

Accuracy: 0.7104080868588544

	precision	recall	f1-score	support
0	0.73	0.74	0.73	2891
1	0.69	0.68	0.68	2451
accuracy			0.71	5342
macro avg	0.71	0.71	0.71	5342
weighted avg	0.71	0.71	0.71	5342

RANDOM FOREST

Accuracy (Complex Model): 0.7879071508798203

	precision	recall	f1-score	support
0	0.80	0.82	0.81	2891
1	0.78	0.75	0.76	2451
accuracy			0.79	5342
macro avg	0.79	0.79	0.79	5342
weighted avg	0.79	0.79	0.79	5342

ADDING HYPERPARAMETERS

Best Hyperparameters: {'n_estimators': 300, 'min_samples_split': 5, 'min_samples_leaf': 4, 'max_features': 'auto', 'max_depth': 30}

Accuracy (Hyperparameter-Tuned Model): 0.7950205915387495

	precision	recall	f1-score	support
0	0.81	0.82	0.81	2891
1	0.78	0.77	0.77	2451
accuracy			0.80	5342
macro avg	0.79	0.79	0.79	5342
weighted avg	0.79	0.80	0.79	5342

EVALUATON

-After fine-tuning, our model with optimized hyper parameters has delivered strong performance, achieving an accuracy increase from 71% to 79%.

- In practical terms, this means it correctly predicts 79 out of 100 test samples, making it our final and best model among the three tested.

BUSINESS RECOMMENDATIONS

- Public Awareness Campaigns: Launch comprehensive campaigns to inform the public about the importance of the H1N1 vaccine, emphasizing its effectiveness in preventing virus spread and the severity of H1N1 influenza.

- Healthcare Provider Involvement: Encourage healthcare professionals to actively recommend the vaccine to patients, recognizing their influential role in vaccination decisions.

- Transparency and Communication: Maintain open and transparent communication about vaccine development, safety, and address concerns promptly to foster public trust.