FORECAST INDIVIDUALS' H1N1 SEASONAL FLU VACCINE INTAKE

BY : MONICA WAMBUI MWANGI

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OVERVIEW

Seasonal flu and H1N1 flu are respiratory infections caused by influenza viruses.

The H1N1 flu was a pandemic in 2009, causing numerous deaths. It is now part of the seasonal flu. Influenza vaccines protect against common flu viruses.

CDC recommends vaccination for everyone aged 6 months and older.

The suitability of a vaccine depends on factors like age, health, and allergies.

Three flu vaccines are recommended for those aged 65 and older.

PROBLEM STATEMENT

Given the rapid spread and associated health risks of viral diseases like H1N1and seasonal flu, it is crucial to create a model to identify individuals likely to get vaccinated.

The 2009 H1N1pandemic resulted in over 284,000 global deaths and was declared a pandemic by the World Health Organization.

While H1N1now resembles seasonal flu, identifying vaccine candidates is vital to increase vaccination rates and curb flu transmission.

This model will enable targeted interventions, efficient resource allocation, and tailored information campaigns, ensuring high-risk individuals and those in contact with vulnerable populations receive vaccinations.

The urgency lies in leveraging data-driven insights to improve public health and reduce mortality rates from these viral infections.

PROPOSED SOLUTION

Develop data-driven predictive models for identifying likely H1N1and seasonal flu vaccine recipients using demographics and vaccination history.

Integrate data from multiple sources, personalize information campaigns, allocate resources strategically, monitor real-time trends, collaborate with healthcare providers and community organizations, and maintain an evaluation feedback loop for improving prediction accuracy and vaccination rates.

WHICH MODEL BEST PREDICTS LIKELIHOOD OF H1N1 VACCINE BEING TAKEN?

The Logistic Regression model performs well as compared to the other models, (DecisionTreeClassifier and KNN Classifier),
in predicting vaccine uptake with high accuracy.

However, it can be further enhanced by improving precision and recall.

Access to additional features like location and employment which were encoded for data privacy reasons could boost its performance, making it a strong candidate for deployment.

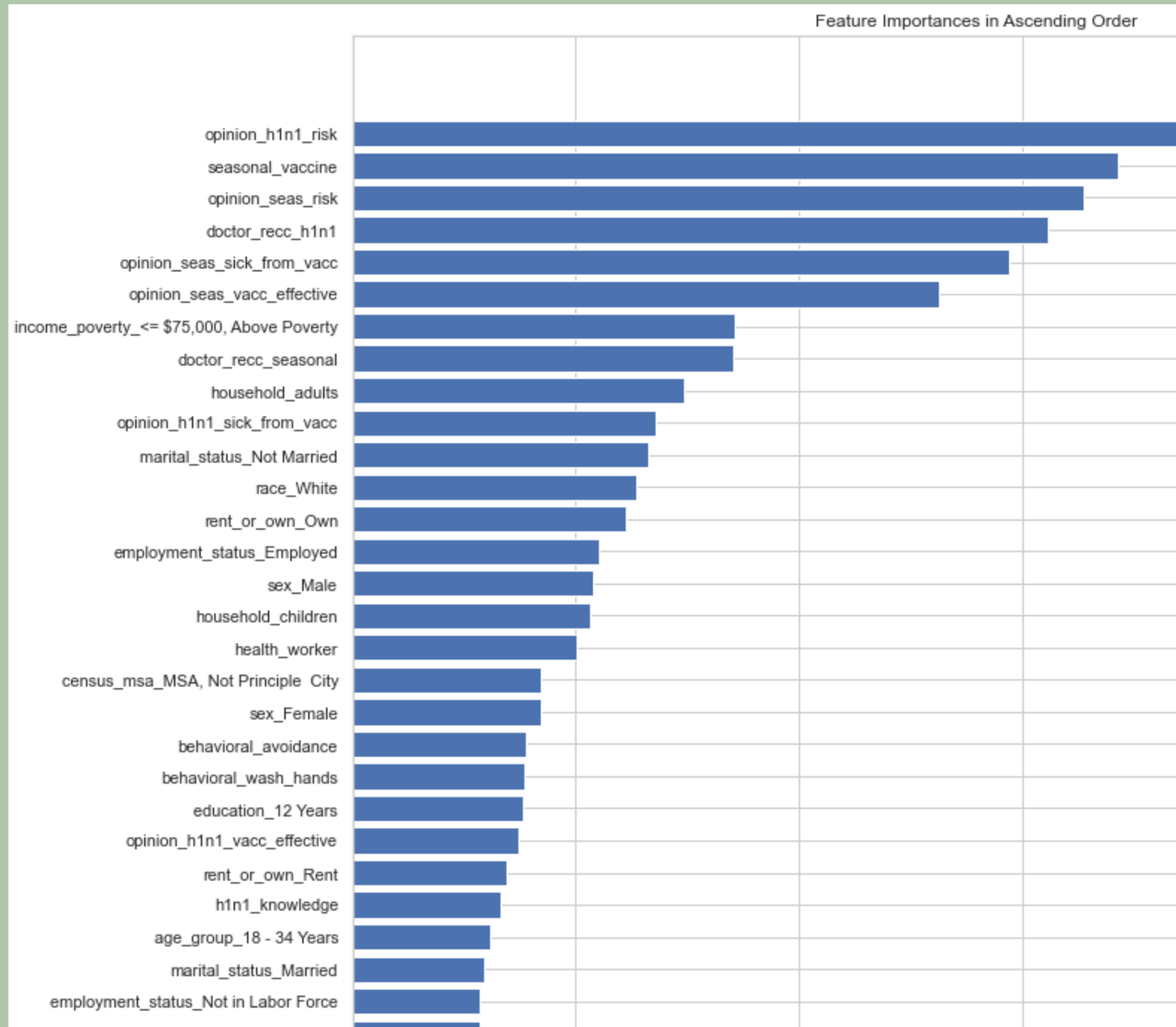
WHICH KEY FACTORS SHOULD BE EMPHASIZED ON WHEN PROMOTING VACCINATION?

The most crucial feature, 'opinion_h1n1_risk,' highlights the significance of people's perception of H1N1virus risk in vaccination decisions. 'Seasonal_vaccine' follows, indicating a link between prior seasonal flu vaccination and H1N1vaccine uptake.

'Opinion_seas_risk' also plays a vital role.

'Doctor_recc_h1n1' and opinions on seasonal flu vaccine effectiveness and side effects matter.

Socioeconomic factors and demographics are influential, while being a health worker is less critical.



CONCLUSIONS FROM THE PROJECT

1. **Model performance: Different machine learning models exhibit varying degrees of performance in predicting vaccine uptake.**

2. **Imbalance Data: The dataset used for this project appears to suffer from class imbalance, with significantly more instances of non-uptake of the vaccine compared to uptake.**

3. **Feature importance: Socioeconomic and demographic factors, along with individuals' perceptions of the risk and effectiveness of vaccine emerged as influential features**

4. **Model selection and Tuning: The choice of models and the fine-tuning of hyperparameters significantly impact predictive performance.**

5. **Evaluation Metrics: Accuracy alone may not adequately capture model performance , especially in imbalanced datasets.**

6. **Recommendations for Improvement: Addressing class imbalance, exploring more sophisticated models or ensemble methods, conduct further feature engineering, and fine-tuning hyperparameters are key recommendation to improve model performance.**

7. **Practical Implications: Despite challenges, predictive modeling for vaccine uptake predictions holds significant potential for information public health interventions.**

RECOMMENDATIONS

1. **Feature Engineering:** Consider exploring additional features or transforming existing ones to better capture the underlying patterns in the data.

2. **Hyperparameter Tuning:** Further fine- Tuning of hyperparameters, especially for models like Decision Trees and Logistic Regression, could potentially improve their performance.

3. **Addressing Class Imbalance:** Model like Random Forest, SVM, and Gradient Boosting seem to struggle with class imbalance, leading to poor performance in predicting the minority class.

4. **Model Selection**: Given the task of predicting vaccine uptake. It's important to prioritize models with better performance in identifying cases of vaccine uptake (class 1). Logistic regression and decision tree models have shown promising results in this regard.

5. **Validation and Robustness**: Ensure rigorous validation of models using techniques like cross-validation to assess their robustness and generalizability.

CONCLUSION

Logistic regression model displays promise in predicting vaccine uptake with considerations for improving precision and recall while socioeconomic and demographic factors play significant roles.

THANK YOU