

Utilizing Artificial Intelligence for Fall Risk Prediction to Enhance Clinical Care Outcomes

Ya-Huei Chen, Mei-Yu Chang, Jyh-Jye Huang, Taichung Veterans General Hospital
Jia-Lang Xu, National Chung Hsing University

P562



INTRODUCTION

In the medical field, falls are a significant situation for both caregivers and patients. This can also lead to a greater psychological burden for clinical staff. As the development of artificial intelligence is getting more advanced and artificial intelligence can be used in various fields, it can be used to analyze the data collected in the past and develop a model to prevent the occurrence of adverse events by using algorithms, and nowadays more and more applications of artificial intelligence are in the medical field. In this study, we analyzed the analysis of care for patients over 40 years of age through machine learning to understand the important causes of patient falls during hospitalization and to provide a basis for reference in clinical care.

85% of patients who fall in our hospital are over 40 years old

AIM

- Machine Learning Algorithms for Model Training and Analysis of Patient Characteristics of Patients Over 40 Years of Age.
- Use the important features of the algorithm to understand the important causes of patient falls during hospitalization.
- Clinical application to provide reference basis for clinical care.

METHOD

In this study, 50 clinical data characteristics, such as gender, age, and related data usage, were collected from fallers aged 40 years or older (N=194) and one-month non-fallers (N=686) in the general ward of Taichung Veterans General Hospital from 2014 to 2019. Then Mann-Whitney U-test and chi-square independence test were performed to find the features with significant differences, which were then significantly brought into the l XG Boost. model of machine learning mode

HIS database → Statistical analysis → AI model training → High risk fall forecast warning system

RESULTS

The results of the study showed that 24 columns of data with high significance were first found by Mann-Whitney U-test and chi-square independent test, and then the values of these 24 columns of data were brought into the model for prediction. The first 5 were presence or absence of psychiatric medication, presence or absence of antiepileptic medication, presence or absence of sleeping medication, presence or absence of diuretics, presence or absence of blood pressure medication, then the values of 24 columns are brought into the model for prediction and it can be seen that better prediction can be obtained by using the algorithm of X-G Boost with an accuracy of 93.52% in the training set and 89.22% in the test set.

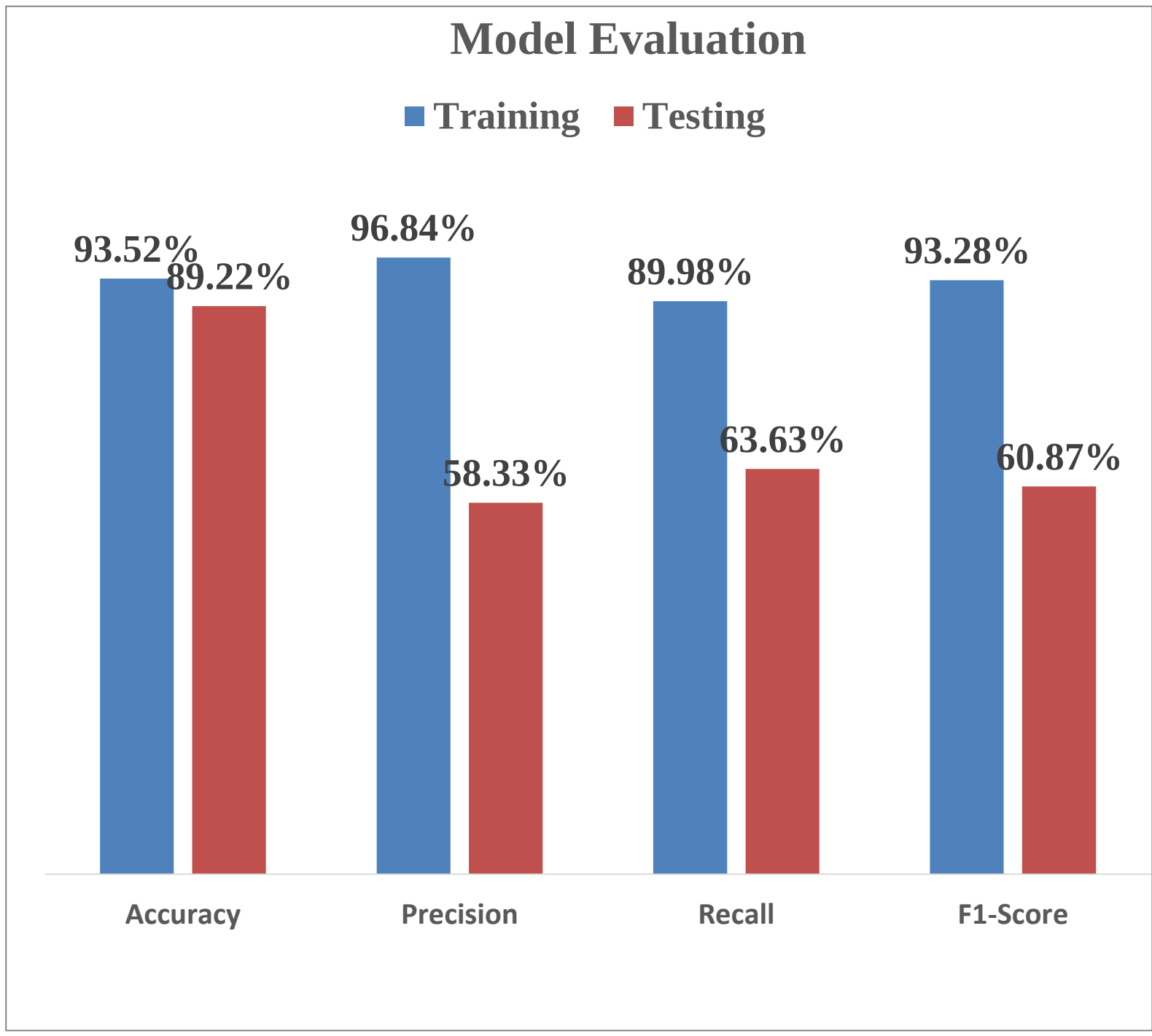


Figure 1. The results of training and testing datasets

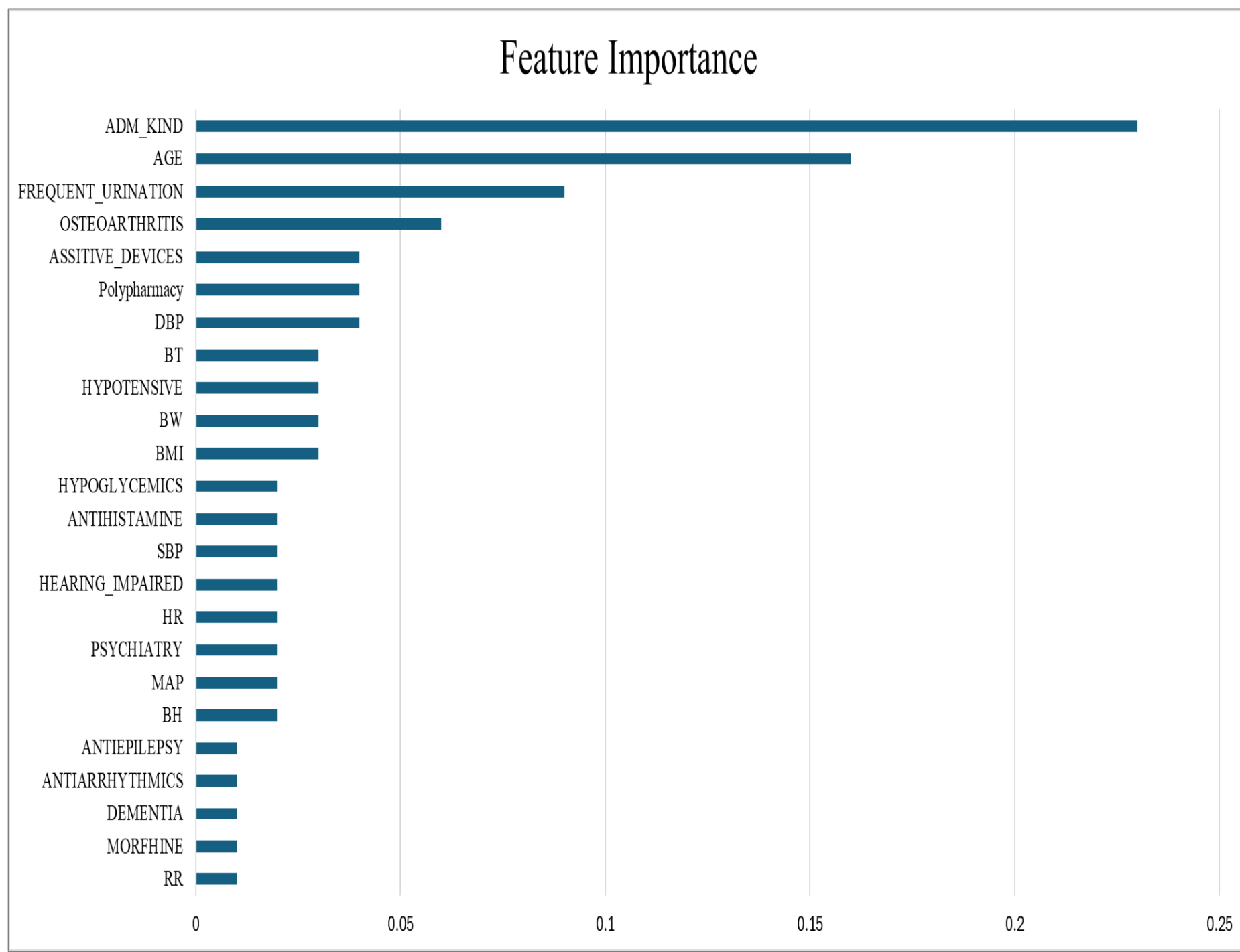


Figure 2. The results of feature important

CONCLUSIONS

In this study, in addition to using the model for prediction on the clinical application, and including an Explainable AI in the model to tell the clinical stakeholder what the important behavior of each field is in predicting whether or not the patient will fall, so it can effectively tell the clinical staff how to proceed with the management and care of the patient. The fall prediction dashboard shows the high-risk fall patient. Enables a 25% reduction in caregiver burden.



The third shift nurse uses the fall prediction results to hand over the shift



Apply the High Risk Fall Forecast Warning System

- Red light: high risk of falling
- Green light: non-high risk fall
- Black light: empty bed

Falls Dashboard: Displays 25 predictions per bed

REFERENCES

- The treatment of high grade superficial bladder cancer and carcinoma in situ with BCG – a questionnaire survey of Consultant practice in England and Wales. *Urol Oncol* 2002; 2; 77-80
- Applying artificial intelligence to predict falls for inpatient(Frontiers in medicine Front Med 10:1285192, Frontier in Medicine 2023;10(1):01-07. doi: 103389/fmed20231285192)
- A dynamic risk model for inpatient falls, *American Journal of Health-System Pharmacy*, Volume 75, Issue 17, <https://doi.org/10.2146/ajhp180013>

CONTACT INFORMATION

- Name: Ya-Hui Chen
- Contact Number: +886-937148908
- Email: r924260180@gmail.com
- Adress : 1650 Taiwan Boulevard Sect. 4, Taichung, Taiwan 407219, ROC