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A Prediction Model to Detect Heart Diseases Using Machine Learning

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ABSTRACT

As a cutting-edge area of machine learning and facts withdrawal study, deep learning has emerged. Methodologies that are either confirmed or controlled and have several hierarchical handling levels are suitable for deep learning preparation. Each subsequent layer sources an ever added knowledgeable representation of the participation records and refines the representation from the previous layer, often by computing a nonlinear participation modification. Preparing the prototype on a dataset modifies the limitations of these changes. A deep learning prototype analyzes more accurate representations when it receives larger amounts of data. Reducing temporal complexity and improving the accuracy of expectations produced are the main goals of implementing deep learning techniques in recommender systems. By measuring Arbitration Period, Latency Interval, Jitter, Accomplishment Spell, System Bandwidth Intake, Power Intake, Training Precision, and Testing Precision, we assess the performance of the intended HRS.

Keywords: Health Recommendation System, Machine Learning, Deep Learning, Artificial Neural Network, Support Vector Machine

1. INTRODUCTION

A subfield of computer science called machine learning (ML) is concerned with developing efficient methods to

manage computationally difficult jobs. Although machine learning uses statistical methods, it furthermore uses approaches which are not only established on the prior effort of statisticians, which has resulted in different and fine acknowledged developments in the ground. Particularly in the last several years, people are becoming more conscious of deep learning [1]. Deep learning models, which can learn data representations at different levels of abstraction, are composed of multiple processing layers. Machine learning is a helpful and rapidly evolving technology in the fitness carefulness industry. Machine learning provides improved support for sickness analysis, investigation, and avoidance. Numerous machine learning established categories have been researched in order to offer adapted daily life commendation mediation [2].

2. PROPOSED WORK

This work presents a medical recommendation system that provides effective assistance to heart disease prediction and diagnosis process. It makes use of fast Fourier transformation with ensemble learning techniques to support heart disease prediction and medications across electronic-health environment [3].

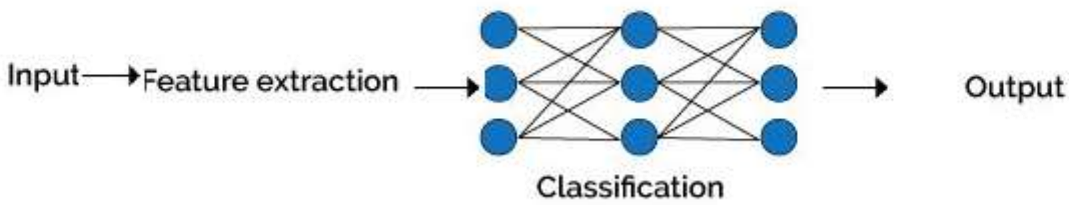

Figure 2.1: Machine Learning

When manually mining topographies from a dataset, a detailed accepting of the topic and the area is compulsory. It takes a much extended time to complete. As seen in figure 2.2, we can systematize the feature production procedure with deep learning [4].

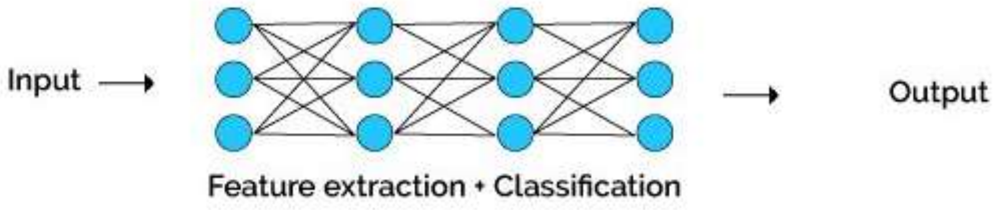

Figure 2.2: Deep Learning

We designed deep neural system architectures for recommender arrangement. In feature mining, we mine all the compulsory topographies and in feature collection, we first-rate the significant topographies that recover the presentation of deep learning prototypical [5].

3. RESULTS AND DISCUSSION

3.1 Naive Bayes [6] and Laplace smoothing [7] techniques

MATLAB R is used to run the simulations (2018a). The system specs include a 2.5 GHz Intel Core i-5-7200U processor, 16 GB of internal RAM, and 1000 GB of disk space. The simulation procedure runs on the Windows 11 operating system.

Probable Attributes

The following criteria are verified for the prognosis of cardiac diseases:

1. Value 0: less than 50% diameter narrowing. Then, heart disease is not a possibility.

2. Value 1: more than 50% diameter narrowing. Then heart disorders might be an option.

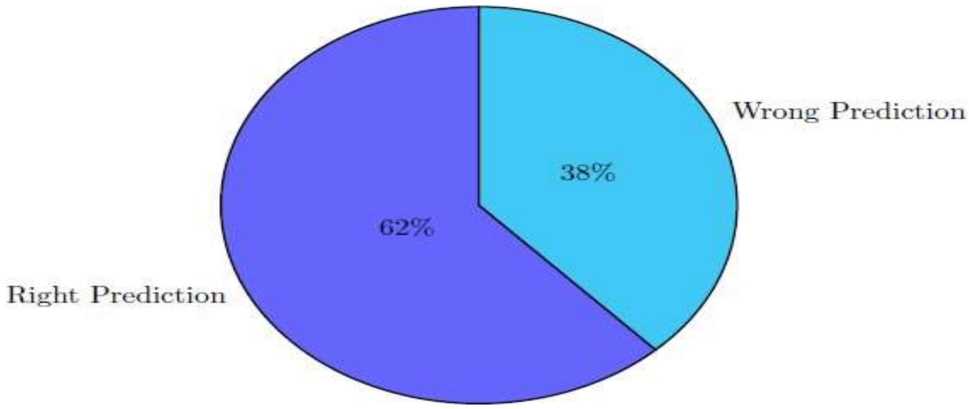

Figure 3.1: Estimate of Heart illnesses minimal attributes (6)

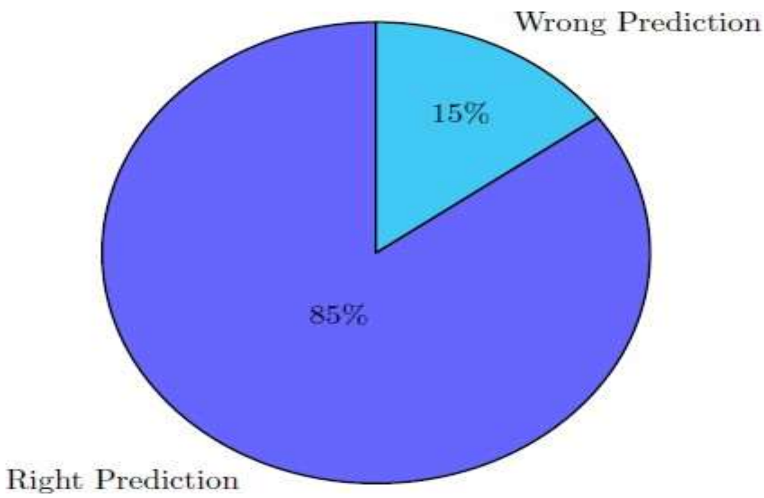

Figure 3.2: Estimate of Heart illnesses maximal attributes (13)

As shown in figure 3.1 with minimal attributes (6) right prediction is 68 % and as shown in figure 3.2 with maximal attributes (13) right prediction is 85 %.

Table 3.1: Performance Evaluation

Total of Attributes	Techniques	Sensitivity	Specificity	Precision	Accuracy
	SVM	37.2	85.3	68.3	61.2
	ANN	38.3	85.7	68.9	62.5
Minimal (6)	Proposed	39.5	87.5	70.2	63
	SVM	75.6	94.3	93.2	84.1
	ANN	76.4	95.5	94.1	85.2
Maximal (13)	Proposed	77	96.5	95.8	87

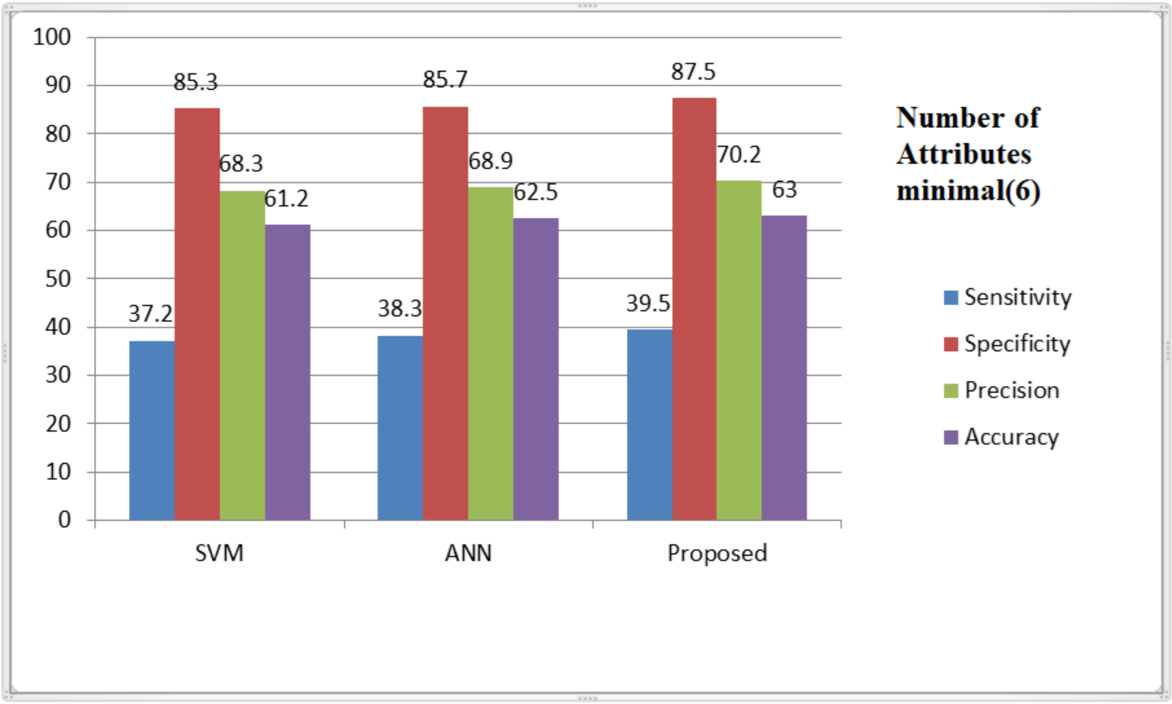

Figure 3.3: Existing vs. Proposed minimal attributes (6)

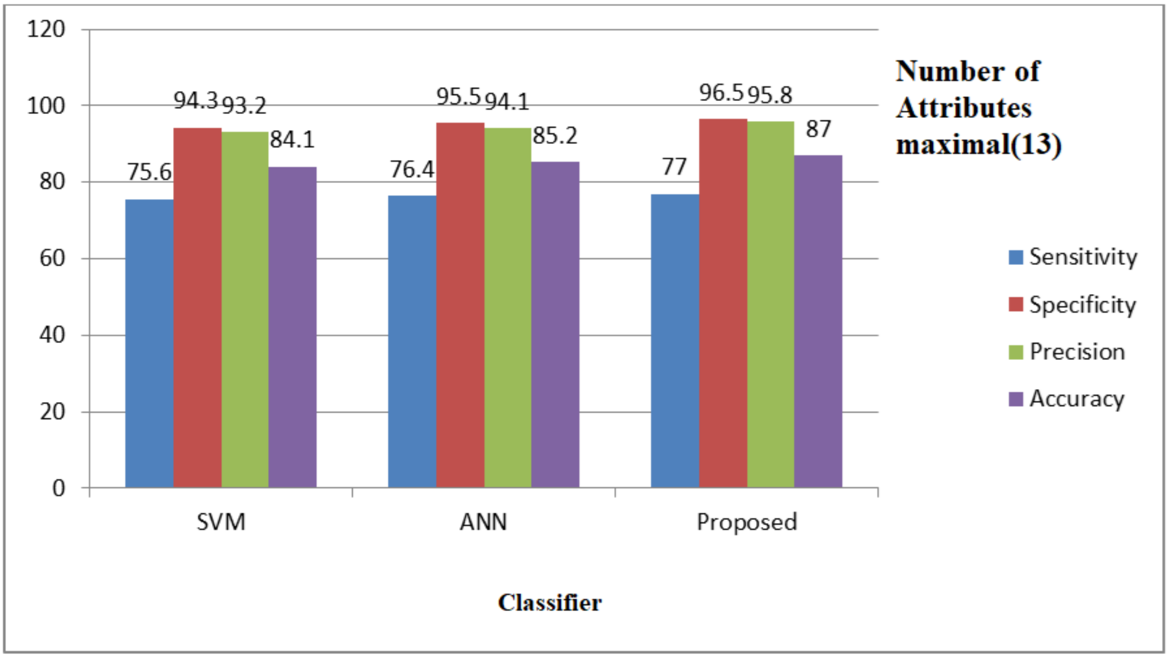

Figure 3.4: Existing vs. Proposed maximal attributes (13)

More precisely, the Laplace smoothing methods [8] handle noise and missing data. As a result, the categorization measure's accuracy increases. Matlab is used for the studies, and the UCI repository's heart disease dataset [9] [10] is used. As seen in figures 3.3 and 3.4, the smallest set of records yields less accuracy than the maximal collection.

CONCLUSION

The reduction of noise and redundant attributes provides clear crisp datasets which improve the classification accuracy and reduces the system computation time. Finally, the suggested recommendation system delivers improved accuracy measures and effort reductions with reduced risk levels, as evidenced by the observations. As a result, the suggested recommendation system is highly effective for heart disease patients, as it requires them to undergo fewer tests and expose them to less health risks. Overall, we believe that this study has provided a new approach for using machine learning techniques to quantify personal health records. We propose two probable research directions for the future.

In the future, other learning strategies may be employed as research to enhance performance. Hybrid methods can also be applied to provide further assessment. In the future, this system will be used to handle electronic health records utilizing unsupervised learning methodologies. The next step is to focus the suggested work solely on structured data, with the possibility of expanding it to include formless and semi-structured statistics in the future.

REFERENCES

[1] Satya Prakash Sahu, Anand Nautiyal, Mahendra Prasad, "Machine Learning Algorithms for Recommender System - a comparative analysis", International Journal of Computer Applications Technology and Research Volume 6–Issue 2, 97-100, 2017, ISSN:-2319–8656

[2] Basiliyos Tilahun Betru, Charles Awono Onana, Bernabe Batchakui, "Deep Learning Methods on Recommender System: A Survey of State-of-the-art", International Journal of Computer Applications (0975 – 8887) Volume 162 – No 10, March 2017

[3] Oleg Rybakov, Vijai Mohan, Avishkar Misra, Scott LeGrand, Rejith Joseph, Kiuk Chung, Siddharth Singh, Qian You, Eric Nalisnick, Leo Dirac, Runfei Luo, "The Effectiveness of A Two-Layer Neural Network For Recommendations", Workshop track - ICLR 2018

[4] Zeynep Batmaz, Ali Yurekli, Alper Bilge, Cihan Kaleli, "A review on deep learning for recommender systems: challenges and remedies", Artificial Intelligence Review https://doi.org/10.1007/s10462-018-9654-y, Springer 2018

[5] Abhaya Kumar Sahoo, Chittaranjan Pradhan, Rabindra Kumar Barik and Harish Chandra Dubey, "DeepReco: Deep Learning Based Health Recommender System Using Collaborative Filtering", Computation 2019, 7, 25; doi: 10.3390/computation7020025

[6] Prakash Ramani, Nitesh Pradhan, “Classification Algorithms to Predict Heart Diseases—A Survey “, Computer Vision and Machine Intelligence in Medical Image Analysis, pp 65-71, 2020

[7] Jun Yi LIU, "A Survey of Deep Learning Approaches for Recommendation Systems", IOP Conf. Series: Journal of Physics: Conf. Series 1087 (2018) 062022 doi: 10.1088/1742-6596/1087/6/062022

[8] K. Butchi Raju, Suresh Dara, "Smart Heart Disease Prediction System with IoT and Fog Computing Sectors Enabled by Cascaded Deep Learning Model", Hindawi Computational Intelligence and Neuroscience Volume 2022, Article ID 1070697, 22 pages https://doi.org/10.1155/2022/1070697

[9] A Angel Nancy, Dakshanamoorthy Ravindran, "IoT-Cloud-Based Smart Healthcare Monitoring System for Heart Disease Prediction via Deep Learning", Electronics 2022, 11, 2292.

[10] Govardhan Logabiraman1, D.Ganesh, "Heart disease prediction using machine learning algorithms", MATEC Web of Conferences 392, 01122 (2024) https://doi.org/10.1051/matecconf/202439201122 ICMED, 2024