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An Effective Analysis of Detection of Erythemato Squamous using Machine Learning Algorithms

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Abstract: *In the realm of biotechnology, machine learning methods are crucial for illness diagnosis. Expert systems that aid in disease prediction can be created with the knowledge gained via the use of machine learning techniques. This paper discusses various data mining methods for predicting skin diseases. Skin conditions known as erythemato-squamous diseases (ESDs) are widespread. Psoriasis, seboreic dermatitis, lichen planus, pityriasis rosea, chronic dermatitis, and pityriasis rubra pilaris are among the six different classifications. With very few exceptions, they all exhibit erythema and scaling as clinical characteristics. The skin illness dataset is also subjected to a feature selection procedure in order to get an accuracy of 99.68% when the Gradient Boosting ensemble method is used on RNC. On the dataset for skin diseases, we found the highest accuracy in the literature. In this paper , we will be discussing about the various machine learning algorithms which shows different classification accuracy with our system.*

Keywords: Data mining algorithms, skin diseases, expert system , Accuracy, Classification Algorithms

I. INTRODUCTION

Skin disorders, or dermatological illnesses, are a widespread problem in today's society due to a variety of causes. Erythemato squamous disease (ESD), which is one of the categories of skin diseases, is regarded as a major issue in dermatology. This has an impact on the skin by causing the skin's outer layer to become red and results in skin loss and damage. Environmental and genetic factors play a role in the development of this type of dermatological condition. Here, we create various machine-learning methods for diagnosing Erythemato squamous illness. The categorization and acknowledgement frameworks have been modified in a higher aspect to aid medical professionals in the process of ailment diagnosis. We have created unique machine-learning approaches to diagnose the ESD here. Some diseases, such as lichen planus, seboreic dermatitis, pityriasis rubra pilaris, pityriasis rosea, persistent dermatitis, and psoriasis, are grouped under the ESD. Dermatologists and other specialists may be helped by the automatic diagnosis of ESD in reducing their own efforts and accepting quick judgments on therapy. Here, we develop various machine learning methods for erythemato-squamous illness diagnosis. The results of the machine learning approaches used to predict skin diseases have been superior than all others so far. Here, we apply five different machine learning algorithms before creating an ensemble strategy that combines all five of them into a single entity.

We classify the skin illness using several data mining approaches using useful dermatology data, and then we apply an ensemble machine learning method. With the help of various machine learning predictive techniques, including Logistic Regression (LR), Support Vector Machine (SVM), Random Forest (RF), Linear Regression (LR), Decision Tree (DT), and AdaBoost Classifier, this study has focused on the detection of erythemato-squamous on the dermatology dataset. In this study, six predicting techniques based on logistic regression, linear regression, SVM, RF, decision trees, and ada boost classifier approaches are evaluated for their ability to accurately predict the erythemato-squamous disease utilising 366 data samples. Data were first standardised, then utilised as inputs for deep learning models, followed by classification, and the effectiveness of the technique was assessed using precision, recall, and accuracy metrics. According to the findings of our experiment, combining data from laboratory and blood analysis to provide personalized risk scores may be helpful in helping to prioritize precious healthcare resources. Additionally, our discoveries about the value of

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laboratory assessments in predicting erythemato-squamous disease infection for patients deepen our comprehension of the consequences of erythemato-squamous disease.

Huge amounts of medical data are now available because to recent technological advancements. These statistics are rich with useful information. As a result, patterns can be derived using data mining techniques. This essay aims to present data mining, its many approaches, and a review of the literature on medical data mining that is currently available. Our main focus is the use of data mining for skin problems. Based on several data mining approaches, a categorization has been offered. The usefulness of the various data mining techniques is emphasised. Association mining is typically effective for obtaining rules. In medical mining, classification is a reliable technique. We have outlined the many applications of categorization in dermatology in this work. It is among the most crucial techniques for erythemato-squamous illness diagnosis. Neural networks, genetic algorithms, and fuzzy classification are some of the several techniques used in this area. In the mining of medical pictures, clustering is a useful technique. Using clustering techniques, it is possible to determine a structure for the provided data by comparing the similarities between the data among those that share similar characteristics. Dermatology can use clustering in specific situations. Along with offering various mining techniques, we have looked into certain difficulties associated with mining skin data.

In Section 2, we give a concise examination of the literature The dataset used in this study is described in Section 3 of the report. This Sections 4 and Section 5 detail our suggested technique and the accordingly, the outcomes of experiments. The paper is concluded in Section 6.

II. RELATED WORK

There are numerous studies in the literature that employed traditional machine learning techniques to diagnose ESD. There are numerous examples of writings in the literature that offered various artificial intelligence (AI) techniques include decision trees, support vector machines, and neural networks and other technologies for automated erythemato-squamous type detection illness. Machine-based automated erythemato-squamous disease classification In the literature, learning and expert systems are reported. The first such study is that of Demiroz et al. [2], who created a novel classifier for the differential diagnosis of ESD termed "Voting feature intervals-5". Guvenir & Emeksiz [13] employed three classification techniques to determine the kind of ESD, including Voting feature intervals-5, Naive Bayes, and nearest neighbour classification. For the classification of ESD, Ubeyli [14] used multi-layer perceptron neural networks, and Xie & Wang [15] used support vector machines. Including tree-based techniques like CHAID decision For analysis and diagnosis, decision trees [1] and an ensemble of them [3] have been used.of ESD. On random subspace, Nanni [16] employed a group of support vector machines. Random forests were used by Menai [17] to diagnose ESD.

The literature has described a number of additional intriguing techniques for the diagnosis of ESD include neuro-fuzzy inference systems [19], fuzzy classification [18], and k-means clustering. boosting [20], genetic programming [12], and [11, 13]. We discover that none of the prior To the best of our knowledge, Deep learning has been applied in the works mentioned in the literature.

III. DERMATOLOGY DATA

In this study, we make use of the dermatology dataset that Ubeyli & Guler first employed. where the purpose was to identify the ESD kind. This data set is accessible to everyone. in the repository for machine learning at UCI [12]. There are 33 attributes and predictors in the dataset. factors, where 12 are clinical characteristics (including erythema, scaling, and Itching, the Koebner phenomenon, distinct borders, polygonal papules, and (g) Follicular papules, (h) involvement of the oral mucosa, I involvement of the knees and elbows (j) involvement of the scalp, (k) family history, and (l) age.

The final 21 traits are for histopathological characteristics, including (a) melanin. incontinence, eosinophilic infiltration, infiltrate of PNL, and papillary fibrosis ,exocytosis, acanthosis, hyperkeratosis, parakeratosis, the dermis, and (i) The suprapapillary layer has become thinner, the rete ridges have become clubbed, and the rete ridges have become longer. spongiform pustule, munro microabcess, focal hypergranulosis, epidermis, the granular layer disappearing, vacuolization, and damage to basal layer, (q) spongiosis, (r) follicular horn plug, (q) saw-tooth appearance of retes (s) parakeratosis of

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the perifollicle, inflammatory monoluclear inflitrate, and band-like infiltrate). after conducting one-hot encoding for the categorical data, the total number of features variables increase to 129.

The dataset contains 366 observations in total. But there are about We won't be taking into account the dataset's "Age" variable's 8 missing values. findings from our analysis. Consequently, after eliminating, the dataset comprises 358 instances. omitted values Six classes and the number of instances in each were the target variables. psoriasis (111 cases), seboreic dermatitis (60 cases), lichen planus (71 cases), and pityriasis (d) , pityriasis rubra pilaris (20), chronic dermatitis (48), and rosea (48), respectively.

IV. COMPARATIVE ANALYSIS

S. No	Research work	Algorithms Used	Accuracy Achieved
1	A Hybrid Deep Learning Approach for Diagnosis of the Erythemato-Squamous Disease	Derm2Vec DNN Extreme Gradient Boosting	96 .92% 96.65% 95.80%
2	Differential Diagnosis of Erythmato-Squamous Diseases Using Classification and Regression Tree	Standard Process for Data Mining (CRISP-DM) methodology	94.84%
3	Hybrid Model Based on ReliefF Algorithm and K-Nearest Neighbor for Erythemato-Squamous Diseases Forecasting	ReliefF Algorithm	94.59%
4.	An efficient approach to an automatic detection of erythemato-squamous diseases	fuzzy extreme learning machine (FELM)	93 %.
5.	Automatic detection of erythemato-squamous diseases using PSO–SVM based on association rules	AR_PSO–SVM model	98.91%
6.	Estimation of automatic detection of erythemato-squamous diseases through AdaBoost and its hybrid classifiers	hybrid AdaBoost algorithms	99.3%.
7.	Predictive Tool for Dermatology Disease Diagnosis using Machine Learning Techniques	Naive Bayes Random forest SVM Linear regression and K Nearest Neighbors	99.31% 97.80% 94.35% 82.14% and 94.44%
8.	Comparison of skin disease prediction by feature selection using ensemble data mining techniques	Feature Selection Method	99.68%
9	The Erythemato-Squamous Dermatology Diseases Severity Determination using using Self-Organizing Map	SOM algorithm's	psoriasis 85,94%, seboreic dermatitis 40,48%, lichen planus 56,25%, and pityriasis rosea 82,61%,
10	Automatic Detection of Erythemato-Squamous Diseases Using k-Means Clustering	K-Means Clustering Algorithm's	94.22%.
11	Analysis and Diagnosis of Erythemato-Squamous Diseases using CHAID Decision Trees	Chaid Decision Trees (Dts)	93.5

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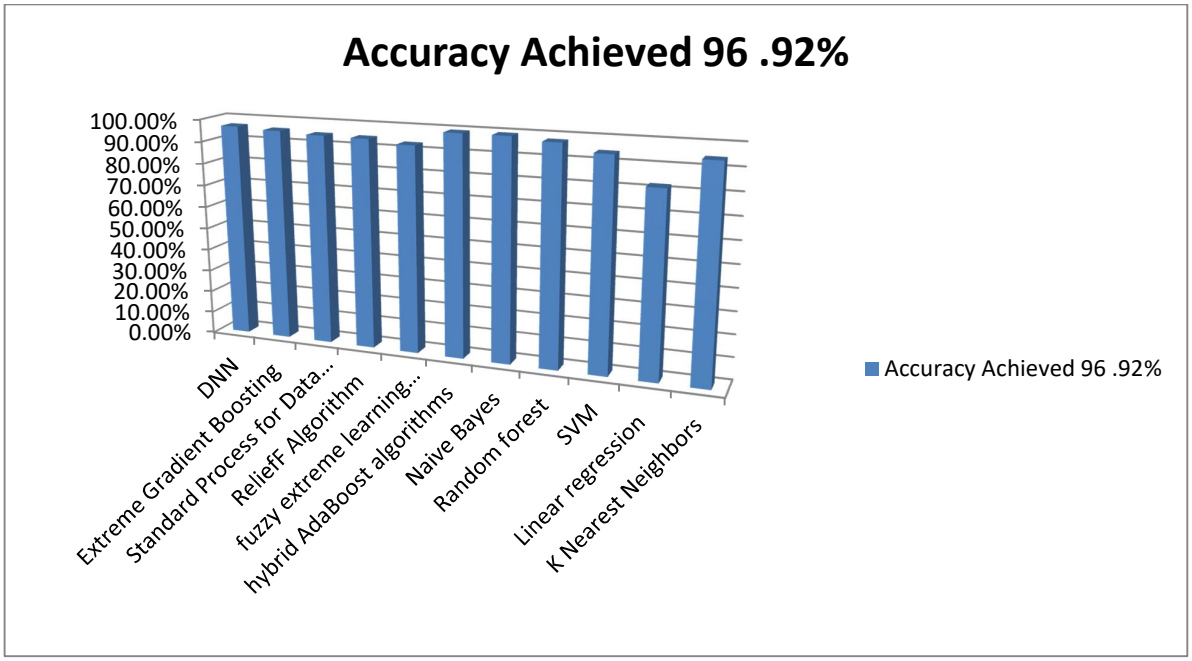
12	Hybrid Model Based on ReliefF Algorithm and K-Nearest Neighbor for Erythemato-Squamous Diseases Forecasting	Relieff algorithm K-nearest neighbor (knn)	96.5



V. CONCLUSION AND FUTURE WORK

In this study, We suggested a classification scheme for erythemato-squamous disorders that does not require user input. The effectiveness of the system that could serve as a decision support tool for doctors to categories erythemato-squamous disorders has been demonstrated through experimental results.

The system was able to categorise six different skin conditions (psoriasis, seboreic dermatitis, lichen planus, pityriasis rosea, chronic dermatitis, and pityriasis rubra pilaris); nevertheless, in the future, we plan to create a machine that is more reliable and effective.

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