

Final Assignment Report

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Rubyat Jesmin Shammi
Department of Computer Science and Engineering
State University of Bangladesh (SUB)
Dhaka, Bangladesh
rubyatshammiss@gmail.com

Abstract—This paper introduced for KNN problem and Decision Tree problem.

Index Terms—

I. INTRODUCTION FOR KNN

KNN is a lazy learning, non-parametric algorithm. It uses data with several classes to predict the classification of the new sample point. KNN is non-parametric since it doesn't make any assumptions on the data being studied, the model is distributed from the data.

II. ADVANTAGES FOR KNN

- 1.Simple to implement and intuitive to understand
- 2.Can learn non-linear decision boundaries when used for classification and regression. Can come up with a highly flexible decision boundary adjusting the value of K.

III. DISADVANTAGES FOR KNN

- 1.Performance Issue with large data-set: The time required to calculate the distance between the new point and each existing points is huge. Which then degrades the performance of the algorithm.
- 2.Value of K: It is really crucial to determine what value to assign to k. with different value of K you get different results

IV. LITERATURE REVIEW FOR KNN

Author's introduction: Zhongheng Zhang, MMed. Department of Critical Care Medicine, Jinhua Municipal Central Hospital, Jinhua Hospital of Zhejiang University. Dr. Zhongheng Zhang is a fellow physician of the Jinhua Municipal Central Hospital. He graduated from School of Medicine, Zhejiang University in 2009, receiving Master Degree. He has published more than 35 academic papers (science citation indexed) that have been cited for over 200 times. He has been appointed as reviewer for 10 journals, including Journal of Cardiovascular Medicine, Hemodialysis International, Journal of Translational Medicine, Critical Care, International Journal of Clinical Practice, Journal of Critical Care.

V. CONCLUSION FOR KNN

The article introduces some basic ideas underlying the kNN algorithm. The dataset should be prepared before running the knn() function in R. After prediction of outcome with kNN algorithm, the diagnostic performance of the model should be checked. Average accuracy is the most widely used statistic to reflect the performance kNN algorithm. Factors such as k value, distance calculation and choice of appropriate predictors all have significant impact on the model performance.

VI. INTRODUCTION FOR DECISION TREE

In a decision tree, the algorithm starts with a root node of a tree then compares the value of different attributes and follows the next branch until it reaches the end leaf node. Deficiency of adenosine deaminase type 2 (DADA2) is an autosomal recessive systemic autoinflammatory disorder (SAID) described for the first time in 2014 [1, 2]. Both homozygous or compound heterozygous genotypes have been detected [3]. Although one mutation c.139G_TA;p.(Gly47Arg) is frequent, notably in the Georgian population, due to a founder effect, the disease seems to occur ubiquitously; indeed, patients with DADA2 have been identified in several countries [4].

VII. ADVANTAGES FOR DECISION TREE

- 1.When using Decision tree algorithm it is not necessary to normalize the data.
- 2.Decision tree algorithm implementation can be done without scaling the data as well.
- 3.When using Decision tree algorithm it is not necessary to impute the missing values.
- 4.The data pre-processing step for decision trees requires less code and analysis.
- 5.The data pre-processing step for decision trees requires less time.

VIII. DISADVANTAGES FOR DECISION TREE

- 1.The mathematical calculation of decision tree mostly require more memory.
- 2.The mathematical calculation of decision tree mostly require more time.
- 3.The space and time complexity of decision tree model is relatively higher.
- 4.Decision tree model training time is relatively more as complexity is high.

IX. LITERATURE REVIEW FOR DECISION TREE

Angel Insua, Alberto Monje, Hom-Lay Wang, Marita Inglehart, Patient-Centered Perspectives and Understanding of Peri-Implantitis, Journal of Periodontology, 10.1902/jop.2017.160796, 88, 11, (1153-1162), (2017).

Wiley Online Library Nima D. Sarmast,Howard H. Wang,Nikolaos K. Soldatos,Nikola Angelov,Samuel Dorn,Raymond Yukna,Vincent J. Iacono, First published: 01 December 2016

X. CONCLUSION FOR DECISION TREE

We report a large series of patients referred to us for genetic diagnosis of DADA2. We used information provided by the ordering clinicians to (1) describe the population with suspected DADA2, (2) compare our patients to those previously reported and (3) try to delineate prerequisites for a positive genetic diagnosis. We identified 13 patients carrying recessively inherited mutations in ADA2 that were predicted to be deleterious. Eight patients were compound heterozygous for mutations. Seven mutations were novel (4 missense variants, 2 predicted to affect mRNA splicing and 1 frameshift). Phenotypic manifestations included fever, vasculitis and neurological disorders. Prerequisites for quick and low-cost Sanger analysis included one typical cutaneous or neurological sign, one marker of inflammation (fever or elevated CRP level), and recurrent or chronic attacks in adults.

ACKNOWLEDGMENT

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XI. CODE

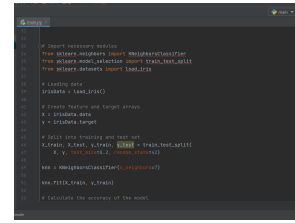


Fig. 1.

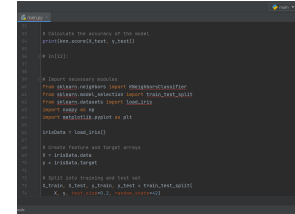


Fig. 2.

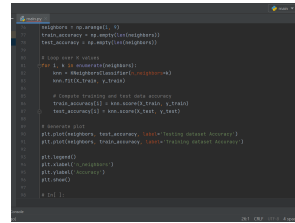


Fig. 3.

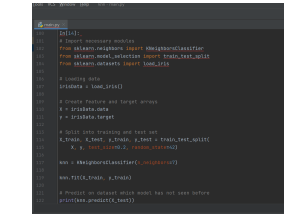


Fig. 4.

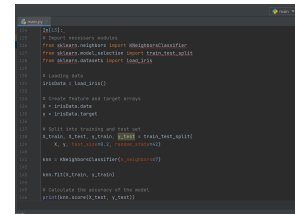


Fig. 5.

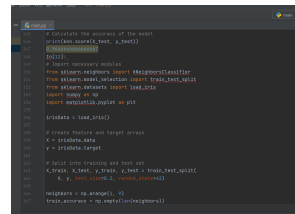


Fig. 6.

```
100 # loop over 4 values
101 for i, N in enumerate(outputs):
102     wts = sigmoidal(outputs[i].detach().cpu())
103     wts.detach().retain_grad_()
104
105     # compute gradients and test data accuracy
106     train_accuracy[i] = topk_accuracy(train_loader, 1, train)
107     test_accuracy[i] = topk_accuracy(test_loader, 1, test)
108
109 # summary plot
110 plt.plot(outputs, test_accuracy, label='training accuracy accuracy')
111 plt.plot(outputs, train_accuracy, label='training accuracy accuracy')
112
113 plt.legend()
114 plt.xlabel('accuracy')
115 plt.ylabel('accuracy')
116 plt.show()
117
118 1000/1000
```

Fig. 7.