

JOURNEY OF miRNA TARGET PREDICTION THROUGH MACHINE LEARNING APPROACH: A REVIEW

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ABSTRACT

Machine learning which is completely based on artificial neural network. The neural network is going to mimic the human brain therefore actually, machine learning is a kind of mimic in the human brain and it is find the lots of applications in various areas not just related to computer science. One of the area is that bioinformatics. The combination of machine learning and Bioinformatics is a remarkable one. This review paper discuss about a new miRNA target prediction through machine learning. miRNAs reduce protein translation by binding to the 3' UTR regions of target genes with imperfect complementary pairing. The identification of microRNA targets has become one of the major challenges of miRNA research. Here discuss various machine learning techniques in mirna target prediction.

Keywords:miRNA,miRNA prediction, machine learning

1.INTRODUCTION

MicroRNA is a small noncoding RNA molecule. Which are the 21nt noncoding RNA. It is mainly found in plants, animals and some viruses that functions in RNA silencing and post transcriptional regulation of gene expression. It consist 21nt noncoding RNAs. The dysregulation leads diseases and various conditions in a wide range of biological processes. Cancer, heart diseases, kidney diseases is some of the diseases are raises because of the miRNA deregulation. So miRNA target prediction plays a key role in biological field. miRNA targets represents a fundamental step in order to under- stand the microRNA operation and involvement toward cell functions. The journey of miRNA target prediction in under way stage. Now miRNA target prediction is reached in the conduit of machine learning.In addition to experimental research and Methods, various machine learning approaches have been developed in the miRNA target prediction. Svm, decision tree , naïve bayes are some of the methods. New approaches are used for getting maximum faultlessness in this field. The machine learning also embarked miRNA target prediction algorithms. The experiments are started earlier now target predictions are moved through the growing phase. Here some techniques and methods are discussed through this getting the knowledge of the miRNA, target prediction and systems developed for this. Accurately

distinguishing real miRNA target from noisy background from thousands of candidate miRNA target duplexes remains a challenging task.

II.DESCRPTION

A micro RNA mainly founded in plants, animals and some viruses which is the small noncoding RNA molecule. Non coding RNA means that is not translated in to protein. This type of RNA having the functions in RNA silencing and post transcriptional regulation of gene expression. Gene expression is the process by which data from a gene is used in the synthesis of a functional gene product. Regulation of gene expression means wide range of mechanisms that are used by cells to increase or decrease the production of specific gene protein or RNA and is informally termed like this. Computational prediction of miRNA targets is a important step in identifying miRNA. In any given miRNA large number of potential target sites are existed so validating potential miRNA target in laboratory is time consuming and costly. That's why methods are developed for the miRNA target prediction. Numbers of diseases are founded because of miRNA deregulation. The first human disease known to be associated with miRNA deregulation was chronic lympholytic leukemia. With cancer many other miRNAs also linked. Number of diseases is occurred due to this that is heart diseases, kidney diseases and also miRNA are appearing to regulate the development and function of the nervous system. Because of these all the reasons miRNA target prediction is important one. Now a day's many mechanisms are developed for this purpose these are introduced next section.

III.MACHINE LEARNING APPROACHES

Some of the machine learning approaches is introduced for improving miRNA target prediction. For example miREE[1] uses two categories Abintio method and machine learning approaches. Abintio uses genetic-algorithms for prediction part. It have two modules mainly 1) miRNA module 2) mRNA module. miRNA module consist duplex specific characteristics and mRNA module consist environmental characteristics for binding sites. Machine learning part is mainly used for the classification. Machine learning approaches consists the SVM algorithm. The below figure [1] explain the block diagram of miREE.

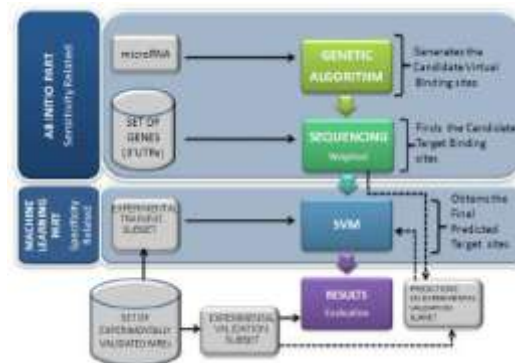


Fig:1 Block diagram for miREE

Next method is the MiRTif[6]. This miRNA target filtering system is support vector machine classifier. Here miRNA:target interaction pair is divided in to two region, seed and nonseed. For the data representation kgram frequency method is used. F-Score method is used for feature selection. After feature selection method it removes the non-informative features. Then SVM is used for the classification. Third one is the NBmiRTar[7]. it uses naïve base classifier for predicting the miRNA target site. Here NB classifier reprocesses the miRanda output. The filters are used for restrict and reduce the predictions. The dataset contains experimentally validated and artificially generated target sites. The figure 2 explains the working of NBmiR tool.

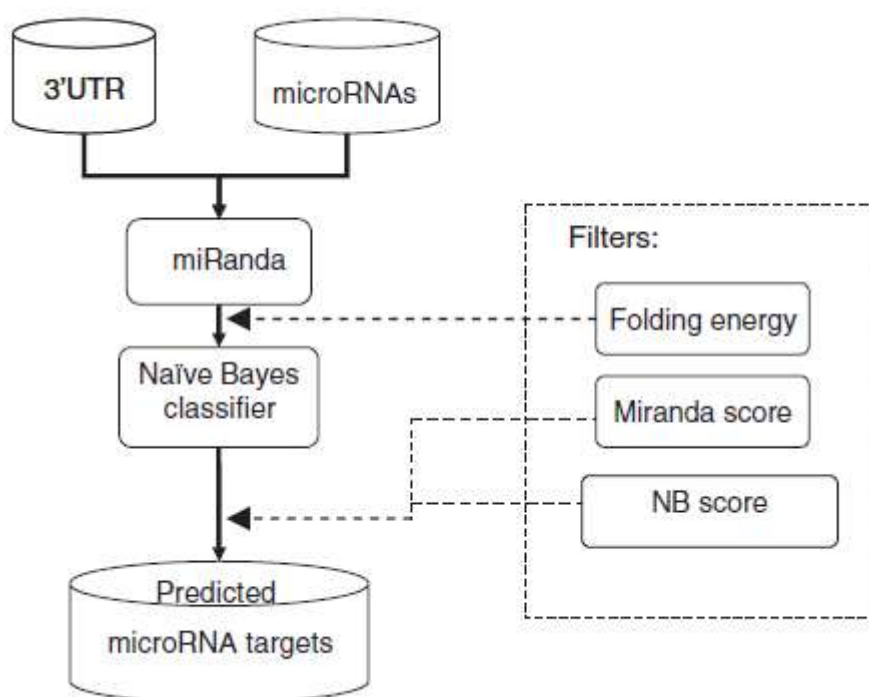


Fig: 2 computational procedure for implementing NBmiRTar tool.

IV.DISCUSSION

Machine learning methods are widely used in miRNA target predictions. Here review the three machine learning methods for miRNA target predictions. In any given miRNA large number of potential target sites are existed so validating potential miRNA target in laboratory is time consuming and costly. That's why mechanisms are developed for the miRNA target prediction. From these mechanisms machine learning played a key role in miRNA target predictions. In future I will do the project related to Mirna target prediction. This review paper is the first step of that.



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