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A Design of Approximation Algorithm for Efficient DNA Mapping using Hadoop Technology

PRASHANT CHATURVEDI

Computer Science & Engineering (High Performance Computing Solution)
Vel-Tech University, Chennai, Tamil Nadu, India
C-DAC, Pune, Maharashtra, India
prashantchaturvedi1987@gmail.com

Abstract- DNA Sequencing is a process where we determine and identify every single DNA base and element that is in the genome of an individual. There are six billion of those in every normal cell in every person. When we apply DNA sequencing in the Cancer project. We first figure out what those six billion DNA bases are in the normal cells in that person and then we take some of the tumor in that person and figure out what the DNA bases are in the tumor. In this paper, Here we discuss implements and future works in bioinformatics with Hadoop. We study the MapReduce algorithm from algorithm lay by point and demonstrate the appropriates of our approach by tracing and analyzing efficient MapReduce algorithms for sorting and simulation problem of parallel algorithms specified in the help of pigeonhole principle. The big data is a great computational challenge to statistical analysis of DNA big data. We can get general statistical analysis through R language. After studying the survey paper various approaches of using GPU and MapReduce. We adopted the best solution to using R with MapReduce. An R package is created to shift a set of critical R functions on GPU card. It allows users to run R code with GPU spread that enable much faster large data set of computation.

Keywords- Big Data, Approximation Algorithm, Pigeonhole Principle, NVIDIA card.

I. INTRODUCTION

Bioinformatics department is help of solve the biologists computational problems on purpose confront large amount of data.

DNA is the hereditary building in all organisms. DNA resides in every cell in the body of organism. DNA is a double helix. It is a long twisted pair helix.

The DNA side wall backbone made by sugar and many phosphate molecules and four nucleotide joint each other middle by the hydrogen bonds. Nucleotides are four types-

- ✓ Adenine (A)
- ✓ Thymine (T)
- ✓ Guanine (G)
- ✓ Cytosine (C)

The base pair form naturally between A and T and between G and C at normal data pattern therefore that basic sequence is a single strand of DNA.

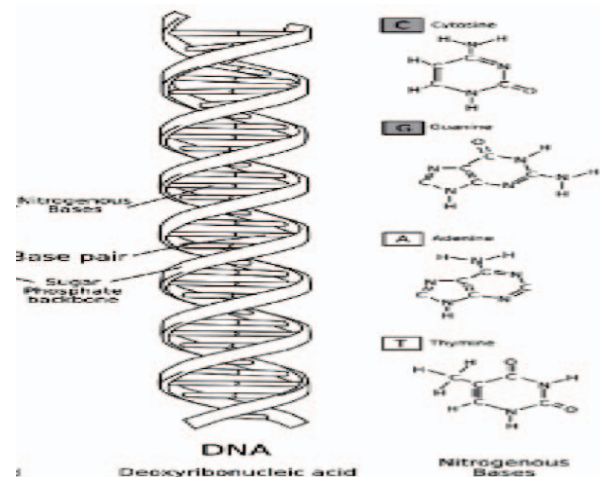


Fig. 1 DNA Structure with Molecular Structure (source: google Image)

DNA is the chemical liquid which carrying instructions to cell. When those instructions have mistaken that cells function normal or not. These cancer causing changed to DNA sequence. It is called mutations. Cancer are changes DNA Sequence. It can cause cells to produce the wrong amount of a certain protein. In cancer many tissues are damaged. If mutation is changed in our DNA building. A gene mutation is a change in or damage to a gene. These changes in your DNA can result in genetic disorders.

Mutations can lead to missing or deformed proteins and that can lead to disease.

- Deletion
- Substitution
- Inversion
- Insertion

In this disease this caused changes the human DNA structure and mutated in an individual's DNA sequence. These mutations can be create some subsequence an error in DNA replication due to environmental factors such as cigarette smoke, alcohol and divestment to radiation which cause changes in the DNA sequence. Our DNA provides the code for making proteins.