

The Use of Alignment-Free Analysis in Predicting the Evolution of Crucivirus

Yuxuan Liu

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What is Virus?

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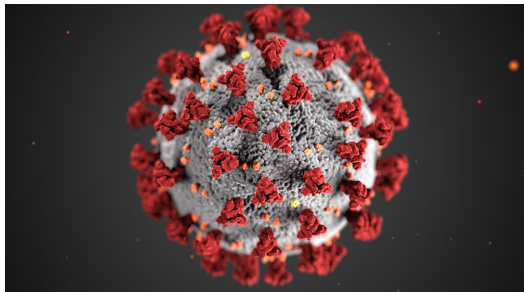


Image by CDC

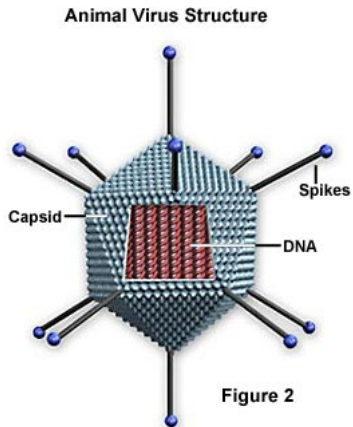
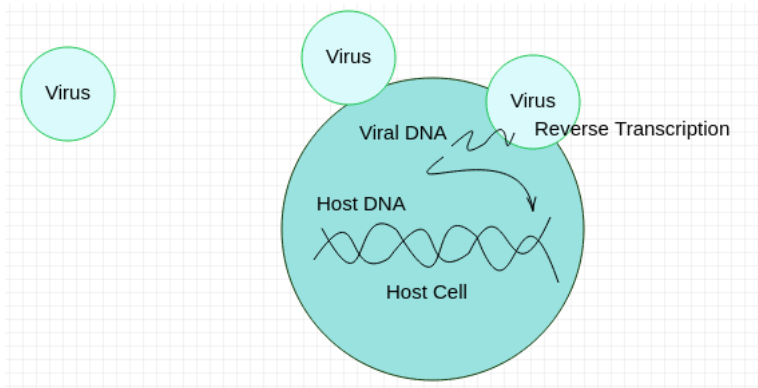


Figure 2

Image by Molecular Expressions

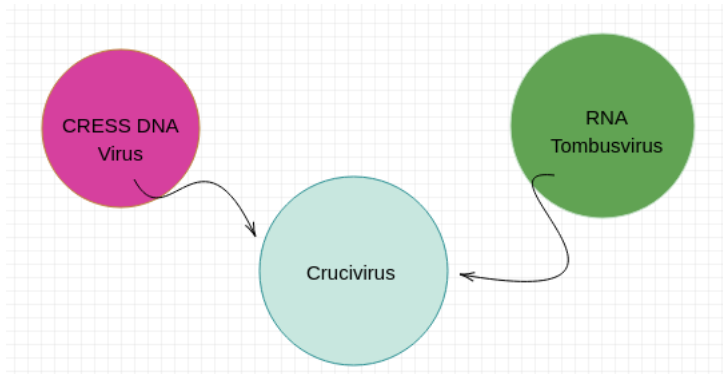
Effects of Virus

1 Introduction



DNA? RNA?

1 Introduction



Previous Research

1 Introduction

Analyses researchers had used:

- Phylogenetic analysis
- Network analysis

Analyses used in this project:

- Alignment-Free Analyses

Alignment-Free Analyses

1 Introduction

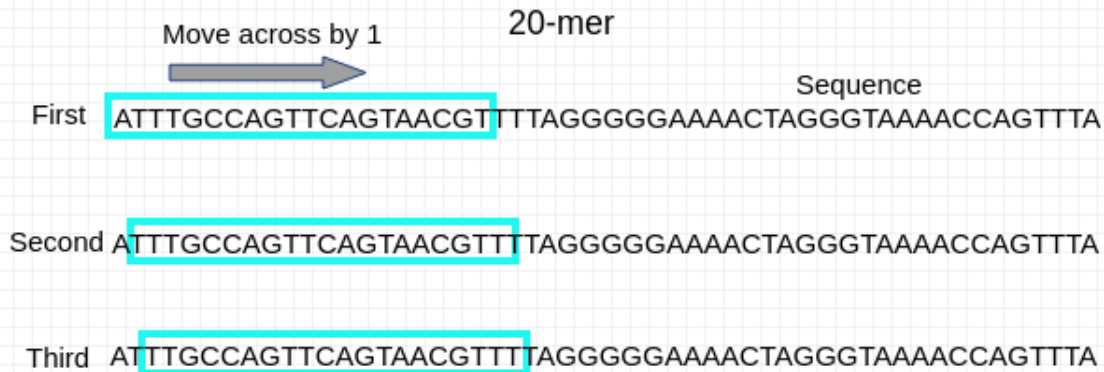




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Materials

2 Methods and Materials



Image by Coursera



Image by Numpy

Methods

2 Methods and Materials

```
def genomeskmerMatch(fileName1, fileName2, genomeName1, genomeName2, step):  
    kmers1, kmers2 = kmerSequence(fileName1, fileName2, genomeName1, genomeName2, step)  
    kmerCounts = {}  
    for kmer1 in kmers1:  
        if (kmer1 not in kmerCounts.keys()):  
            for kmer12 in kmers1:  
                if (kmer1 == kmer12):  
                    if (kmer1 in kmerCounts.keys()):  
                        kmerCounts[kmer1] += 1  
                    else:  
                        kmerCounts[kmer1] = 1  
            for kmer2 in kmers2:  
                if (kmer1 == kmer2):  
                    if (kmer1 in kmerCounts.keys()):  
                        kmerCounts[kmer1] += 1  
                    else:  
                        kmerCounts[kmer1] = 1  
    return kmerCounts
```



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Genome sense prediction

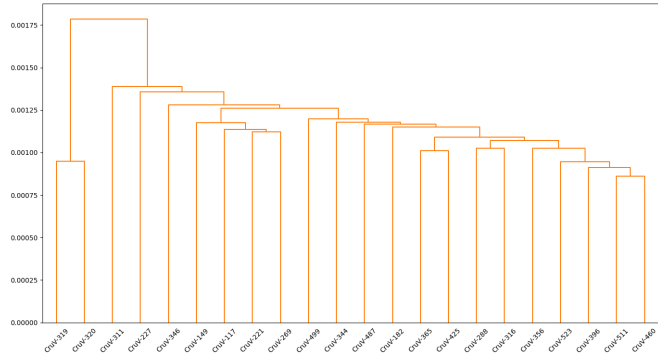
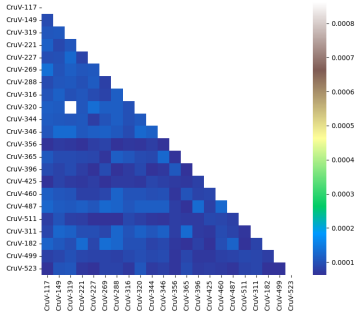
3 Results

Genome Name	CP Codon Bias	Rep Codon Bias	Genome Sense
Cruci_CruV_351	T	A	ambisense
Cruci_CruV_352	T	A	ambisense
Cruci_CruV_353	T	A	ambisense
Cruci_CruV_354	T	T	unisense
Cruci_CruV_355	A	A	unisense
Cruci_CruV_356	C	C	unisense
Cruci_CruV_357	T	T	unisense
Cruci_CruV_358	T	A	ambisense
Cruci_CruV_359	T	A	ambisense

Pairwise Comparison

3 Results

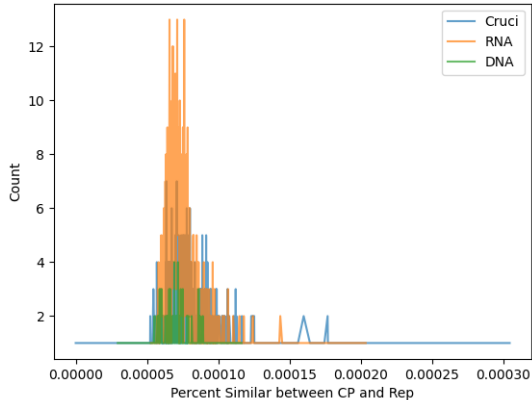
Pairwise comparison of CP gene



K-mer Similarity between CP and Rep Genes

3 Results

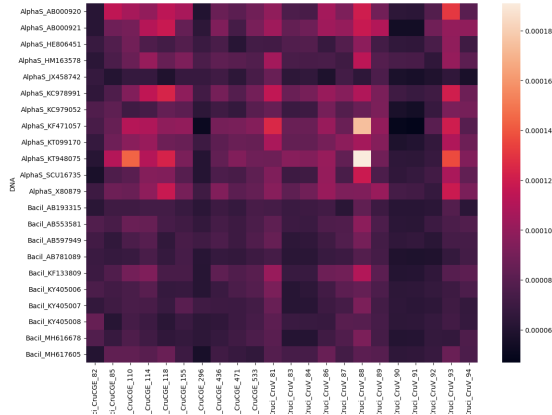
Distribution of K-mer Similarity between the CP and Rep genes of Crucivirus, RNA, and DNA Genomes



Comparison of K-mers between Genomes

3 Results

Percentage of Similar K-mer between Crucivirus and DNA pairs

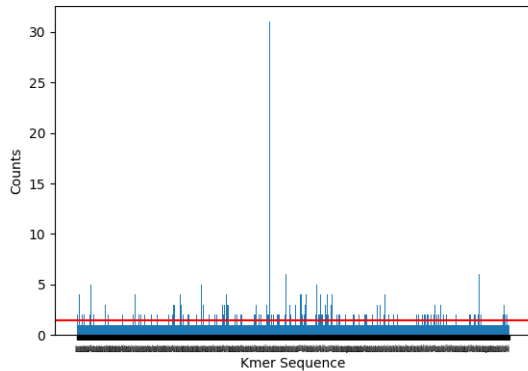
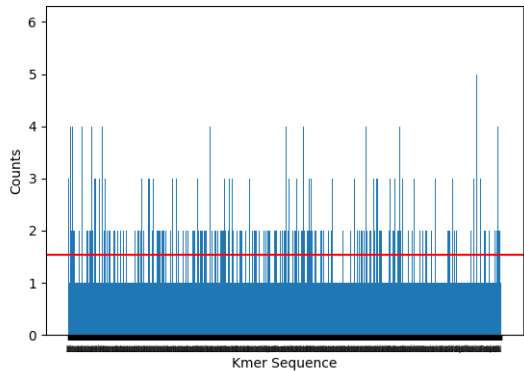


Comparison of K-mers between Specific Genomes

Examples

3 Results

Count of shared K-mers between Crucivirus-DNA pair





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Thank you for listening!
Any questions?