

Table of Contents

CERTIFICATE.....	III
APPROVAL SHEET.....	IV
ACKNOWLEDGEMENT.....	V
ABSTRACT.....	VII
TABLE OF CONTENTS.....	XVIII
LIST OF FIGURES.....	XXI
LIST OF TABLES.....	XXIII
LIST OF PROGRAMS.....	XXV
CHAPTER 1. INTRODUCTION.....	1
1.1. DISTRIBUTED COMPUTING (APPLIED TO BIOINFORMATICS).....	5
1.2. BIOINFORMATICS DATA AND ALGORITHMS (DATA ACQUIRED FROM NCBI)....	7
1.3. SIGNAL PROCESSING AND WAVELET TRANSFORMS	9
CHAPTER 2. DISTRIBUTED COMPUTING.....	11
2.1. INTRODUCTION	11
2.1.1. Characteristics of Distributed Computing	12
2.1.2. Features of Distributed System.....	12
2.1.3. Motivation for Implementing Distributed System.....	13
2.1.4. Models for Implementing Distributed System.....	13
2.1.5. Issues of Distributed System	14
2.2. MOTIVATION OF APPLYING DISTRIBUTED COMPUTING IN BIOINFORMATICS.	15
2.3. DESCRIPTION OF THE DISTRIBUTED APPLICATION	17
2.4. IMPLEMENTATION DETAILS OF THE DISTRIBUTED APPLICATION	20
2.4.1. Data Dictionary for DNA Sequencing Data	22
2.5. FEATURES/TECHNOLOGIES IMPLEMENTED IN DISTRIBUTED APPLICATION	25
2.6. FACILITIES PROVIDED THROUGH DISTRIBUTED APPLICATION	30
2.7. IMPLEMENTATION ISSUES	32
2.7.1. Practical issues dealt with while developing, executing and deploying Distributed Application	33
2.7.2. List of Java Programs	36
CHAPTER 3. BIOINFORMATICS DATA AND APPLICATIONS.....	44
3.1. INTRODUCTION	44
3.1.1. Several terminologies associated with BioInformatics, which are referred in this research study:.....	45
3.1.2. BioInformatics Data	49
3.1.3. Source of BioInformatics Data.....	52
3.1.4. Challenges in BioInformatics	54

3.1.5. BioInformatics Application	54
3.1.6. DNA Sequencing	55
3.1.7. Data and Application into consideration	58
CHAPTER 4. SIGNAL PROCESSING AND WAVELET TRANSFORMATIONS	63
4.1. INTRODUCTION	63
4.2. SIGNAL PROCESSING, TRANSFORMATION AND CONVOLUTION	68
4.2.1. Various types of Transformation of a signal:	73
4.3. COMPARISON BETWEEN WAVELET TRANSFORM AND FOURIER TRANSFORM / SHORT TIME FOURIER TRANSFORM	74
4.3.1. Similarities and Differences amongst Wavelet Transforms, Fourier Transforms and Short Time Fourier Transforms	75
4.4. WAVELET TRANSFORMATION	78
4.5. CHARACTERISTICS OF WAVELET TRANSFORMS	88
4.6. HAAR WAVELET TRANSFORM IN DECOMPOSITION PHASE	90
4.7. INVERSE WAVELET TRANSFORM	97
4.8. INVERSE HAAR WAVELET TRANSFORM IN SYNTHESIS PHASE	102
4.9. APPLICATIONS OF WAVELET TRANSFORMS	104
CHAPTER 5. ALGORITHMS AND RESULTS	105
5.1. ALGORITHM 1: DATA REDUCTION FOR DNA SEQUENCE ANALYSIS PROCESSING AND TRANSMISSION	105
5.1.1. Purpose	105
5.1.2. Methodology	110
5.1.3. Result And Discussion	115
5.2. ALGORITHM 2: RECOGNIZING IDENTICAL READS	128
5.2.1. Purpose	128
5.2.2. Methodology	129
5.2.3. Result and Discussion	132
5.3. ALGORITHM 3: RECOGNIZING SHORT TANDEM REPEAT REGIONS	145
5.3.1. Purpose	145
5.3.2. Methodology	149
5.3.3. Result and Discussion	153
5.3.4. List of Matlab Program developed for various algorithms: ..	164
CHAPTER 6. CONCLUSION AND SCOPE FOR FUTURE ENHANCEMENTS	165
6.1. CONCLUSION	165
6.2. SCOPE FOR FUTURE ENHANCEMENT	168
SUMMARY	169
APPENDIX A: SQL SCRIPT FOR TABLE CREATION	171
APPENDIX B: FORMAT OF THE FASTA FILE	178
APPENDIX C: ENCODING SCHEMES FOR DNA SEQUENCES	186
APPENDIX D: SAMPLE CODE-JAVA PROGRAMS	190

APPENDIX E: SAMPLE CODE – MATLAB PROGRAMS..... 246
LIST OF PUBLICATIONS..... 256
LIST OF CONFERENCE PRESENTATIONS 259
LIST OF TECHNICAL LECTURES/TALKS..... 262
BIBLIOGRAPHY 264
CONTENT OF INTERNATIONAL PUBLICATIONS:..... 275