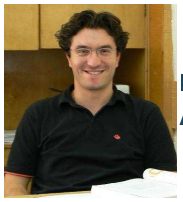
INTRODUCTION TO BIOINFORMATICS

General

INTRODUCTION TO BIOINFORMATICS



Instructor: Tolga CAN
Added: 18 November 2009

Introduction to Bioinformatics - Week 1 - Lecture 1

- Course Overview
- National Center for Biotechnology Information, USA.
- Protein Data Bank

Topic 1

Introduction to Bioinformatics

- Lecture Slides
- Week 1 - Lecture 1 [Video]

Topic 2

Introduction to biology, biological databases, and high-throughput data sources. Overview of bioinformatics problems.

Pairwise sequence alignment algorithms: Dynamic programming

- Lecture Slides
- Assignment 1
- Reading: Bioinformatics - An Introduction for Computer Scientists
- Reading: Cells and Genomes
- Reading: How Cells Read the Genome: From DNA to Protein
- Reading: The Nucleic Acid World
- Reading: Producing And Analzying Sequence Alignments
- Week 2 - Lecture 1 [Video]
- Week 2 - Lecture 2 [Video]
- Week 3 - Lecture 1 [Video]
- Week 3 - Lecture 2 [Video]
- Week 4 - Lecture 1 [Video]
- Week 4 - Lecture 2 [Video]

Topic 3

Statistical significance of alignments - Part I

Statistical significance of alignments - Part II

- Lecture Slides
- Reading: Pairwise Sequence Alignment
- Week 5 - Lecture 1 [Video]
- Week 5 - Lecture 2 [Video]
- Week 5 - Lecture 3 [Video]

Topic 4

Suffix Trees, Suffix Arrays

- Lecture Slides
- Week 6 - Lecture 1 [Video]
- Week 6 - Lecture 2 [Video]

Topic 5

Patterns, Profiles, and Multiple Alignments

Lecture Slides

Assignment 2

Week 6 - Lecture 3 [Video]

Topic 6

Hidden Markov Models

Week 5 Lecture Slides Continued

Week 7 - Lecture 1 [Video]

Week 7 - Lecture 2 [Video]

Week 7 - Lecture 3 [Video]

Topic 7

Multiple Sequence Alignment Algorithms

Week 5 Lecture Slides Continued

Week 8 - Lecture 1 [Video]

Week 8 - Lecture 2 [Video]

Week 8 - Lecture 3 [Video]

Topic 8

Midterm Review and Midterm Exam

Midterm Exam

Midterm Key

Phylogenetic trees

Lecture Slides

Topic 9

Introduction to protein structures

Structure Prediction

Lecture Slides

Assignment 3 for Computer Engineering Majors

- Assignment 3 for Biology or Genetics Majors
- Week 9 - Lecture 1 [Video]
- Week 9 - Lecture 2 [Video]
- Week 9 - Lecture 3 [Video]
- Week 9 - Lecture 4 [Video]

Topic 10

Protein Structure Prediction (continued)

- Week 10 - Lecture 1 [Video]
- Week 10 - Lecture 2 [Video]
- Week 10 - Lecture 3 [Video]

Topic 11

Protein Structure Prediction (continued)

- Week 11 - Lecture 1 [Video]
- Week 11 - Lecture 2 [Video]
- Week 11 - Lecture 3 [Video]

Topic 12

Structural Alignment of Proteins
(lecture notes continued)

- Week 12 - Lecture 1 [Video]
- Week 12 - Lecture 2 [Video]
- Week 12 - Lecture 3 [Video]

Topic 13

Microarray data normalization, analysis

Clustering techniques

- Lecture Slides
- K-means Demo
- Self Organizing Maps Demo
- Reading: Microarrays Intro Paper - 1

- Reading: Microarrays Intro Paper - 2
- Reading: Microarrays Intro Paper - 3
- Week 13 - Lecture 1 [Video]
- Week 13 - Lecture 2 [Video]

Topic 14

Introduction to Systems Biology

Gene regulatory networks

- Lecture Slides
- Assignment 4
- Dataset for Assignment 4
- Week 14 - Lecture 1 [Video]

Topic 15

Construction and Analysis of protein networks:
Monte Carlo Sampling, Random Walks on Graphs

- Lecture Slides
- Likelihood Computation Example
- Week 15 - Lecture 1 [Video]
- Week 15 - Lecture 2 [Video]

Final review