CSE 566 Spring 2023

Research in Computational Biology

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Targeting Critical Problems

- Understanding biological systems at different levels
  - Molecules: DNA, RNAs, proteins; their sequences, 3D structures, and functions
  - Biological networks and pathways
  - Cell differentiation, cancer microenvironment
- Disease diagnosis and treatment
  - Drug discovery
  - Personalized medicine
  - AI-assistant diagnostics

New, and Evolving Fast

- Driven by new biotechnologies
  - Sequencing assays: DNA-seq, RNA-seq, ChIP-seq, ATAC-seq, Hi-C, Methyl-Seq, etc
  - Sequencing technologies: long-reads (ONT, PacBio), single-cell sequencing, spatial transcriptomics, etc
  - Gene editing (CRISPR-Cas9, etc) technologies
  - Imaging technologies (Cryo-EM, etc)
- Driven by unknowns and the urgent need of human wellness

Computational Techniques Used

- Data structures and algorithms
- Statistics
- Machine learning / AI

Broader Career Paths

- Academia
- Industrial positions:
  - “Traditional” IT companies
  - Biomedicine / Biotechnologies / Pharmaceutical companies
- Startups