

CSE 427

Computational Biology

Course Wrap Up

Please complete online course
evaluation by Sunday

<https://uw.iasystem.org/survey/161047>

What is DNA? RNA?

How many Amino Acids are there?

Did human beings, as we know them, develop from earlier species of animals?

What are stem cells?

What did Viterbi invent?

What is dynamic programming?

What is a likelihood ratio test?

What is the EM algorithm?

How would you find the maximum of $f(x) = ax^3 + bx^2 + cx + d$ in the interval $-10 < x < 25$?

CS Points of Contact

Scientific visualization

- Gene expression patterns

Databases

- Integration of disparate, overlapping data sources

- Distributed genome annotation in face of shifting underlying coordinates

AI/NLP/Text Mining

- Information extraction from journal texts with inconsistent nomenclature, indirect interactions, incomplete/inaccurate models,...

Machine learning

- System level synthesis of cell behavior from low-level heterogeneous data (DNA sequence, gene expression, protein interaction, mass spec, ...)

Algorithms

...

Frontiers & Opportunities

New data:

Proteomics, SNP, arrays, CGH, comparative sequence information, epigenomics, chromatin structure, ncRNA, interactome, single-cell everything

New methods:

graphical models, rigorous filtering

Data integration

many, complex, noisy sources

Systems Biology

Frontiers & Opportunities

Open Problems:

splicing, alternative splicing

multiple sequence alignment

(genome scale, 100s-1000s of species, w/ RNA etc.)

protein & RNA structure

interaction modeling

regulation, at all levels

network models

RNA trafficking

ncRNA discovery

...

Exciting Times

“Biology is to 21st Century
as Physics was to 20th”

Lots to do

Highly multidisciplinary

You'll be hearing a lot more about it

I hope I've given you a taste of it

Thanks!

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