Interactive Visualization of Evolutionary Trees and Gene Sequences

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UBC CS Discovery Forum

Computer Graphics
- create or manipulate images with computer
  - movies, games, photorealistic simulation
  - but wait, there’s more!

Visualization
- using interactive computer graphics to help people understand information better
  - biological data: evolutionary trees and gene sequences

Evolutionary Tree

Common Dataset Size Today

**Future Goal: 10M Node Tree of Life**

![Diagram of the Tree of Life with labels for Animals, Plants, Fungi, and Protists](image)

*David Hillis, Science 300:1687 (2003)*

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**Paper Comparison: Multiple Trees**

*focus*

*context*

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**TreeJuxtaposer**

- side by side comparison of evolutionary trees
- both focus and context with stretchable surface
- demo - downloadable from [http://olduvai.sf.net/tj](http://olduvai.sf.net/tj)

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**Reconstructing Trees from Genes**

- know leaves, infer interior nodes
  - similarity: parallel evolution or common ancestor?

- old: morphology
  - observable similarities

- new: molecular
  - DNA sequences - nucleotides
  - protein sequences - amino acids

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**SequenceJuxtaposer**

- comparison of aligned gene sequences
- focus and context with stretchable surface
- demo - downloadable from [http://olduvai.sf.net/sj](http://olduvai.sf.net/sj)
CS: Collaboration with Many Fields

- computational linguistics

- mathematics: topology and geometry

CS: Collaboration with Many Fields

- software for web site designers
  - now also useful for biologists!
  - downloadable from graphics.stanford.edu/~munzner/h3

More Information

- http://www.cs.ubc.ca/~tmm