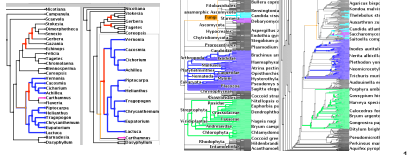


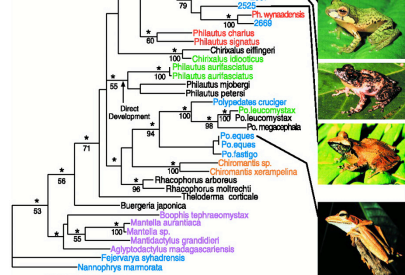
## TreeJuxtaposer

- side by side comparison of evolutionary trees



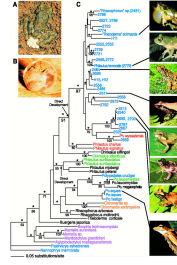
1

## Phylogenetic/Evolutionary Tree



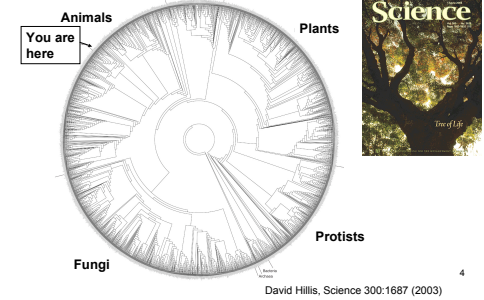
M Meegaskumbura et al., Science 298:379 (2002) 2

## Common Dataset Size Today



M Meegaskumbura et al., Science 298:379 (2002) 3

## Future Goal: 10M node Tree of Life



David Hillis, Science 300:1687 (2003) 4

## Paper Comparison: Multiple Trees

focus



context



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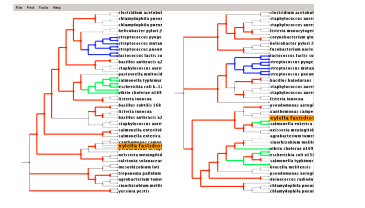
## Accordion Drawing

- rubber-sheet navigation
  - stretch out part of surface, the rest squishes
  - borders nailed down
  - Focus+Context technique
    - integrated overview, details
  - old idea
    - [Sarkar et al 93]
    - [Robertson et al 91]
- guaranteed visibility
  - marks always visible
  - important for scalability
  - new idea
    - [Munzner et al 03]



## Guaranteed Visibility

- marks are always visible
- easy with small datasets



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## Guaranteed Visibility Challenges

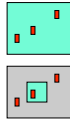
- hard with larger datasets
- reasons a mark could be invisible



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## Guaranteed Visibility Challenges

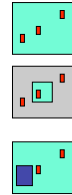
- hard with larger datasets
- reasons a mark could be invisible
  - outside the window
    - AD solution: constrained navigation



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## Guaranteed Visibility Challenges

- hard with larger datasets
- reasons a mark could be invisible
  - outside the window
    - AD solution: constrained navigation
  - underneath other marks
    - AD solution: avoid 3D



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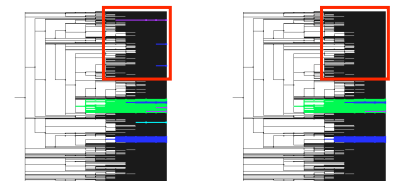
## Guaranteed Visibility Challenges

- hard with larger datasets
- reasons a mark could be invisible
  - outside the window
    - AD solution: constrained navigation
  - underneath other marks
    - AD solution: avoid 3D
  - smaller than a pixel
    - AD solution: smart culling



## Guaranteed Visibility: Small Items

- Naïve culling may not draw all marked items



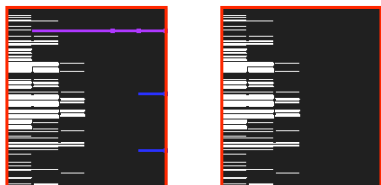
Guaranteed visibility of marks

No guaranteed visibility

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## Guaranteed Visibility: Small Items

- Naïve culling may not draw all marked items

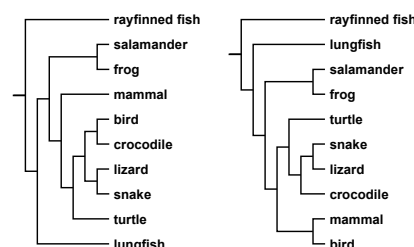


Guaranteed visibility of marks

No guaranteed visibility

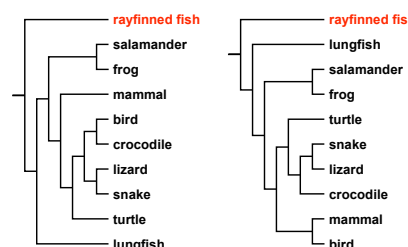
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## Structural Comparison



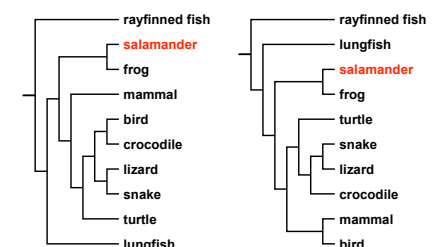
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## Matching Leaf Nodes



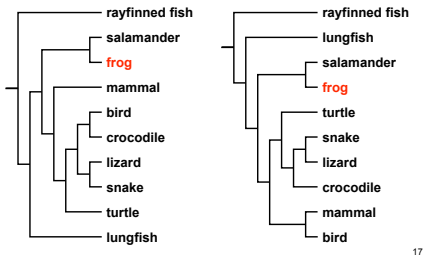
15

## Matching Leaf Nodes



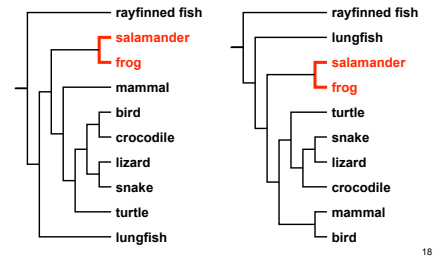
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### Matching Leaf Nodes



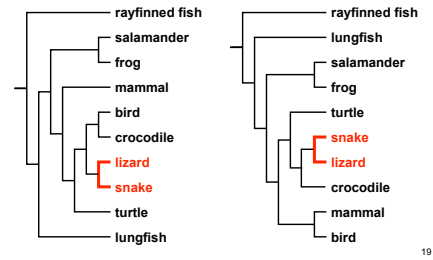
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### Matching Interior Nodes



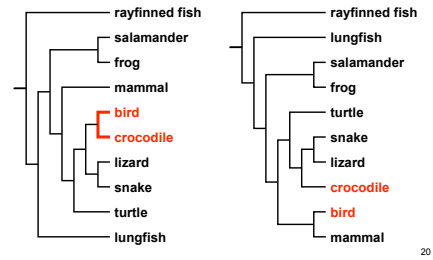
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### Matching Interior Nodes



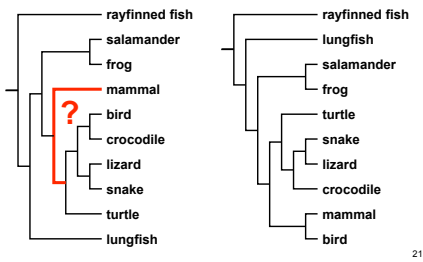
19

### Matching Interior Nodes



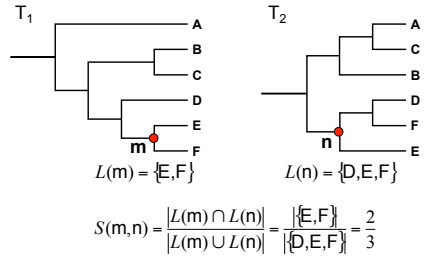
20

### Matching Interior Nodes



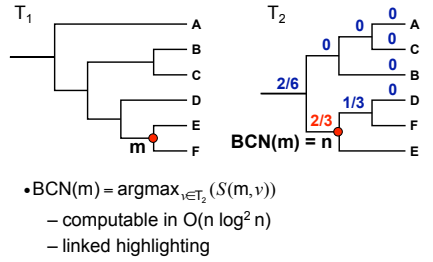
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### Similarity Score: $S(m, n)$



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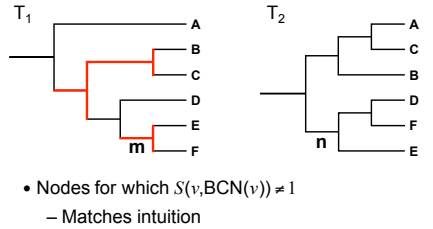
### Best Corresponding Node



- $BCN(m) = \text{argmax}_{v \in T_2} (S(m, v))$
- computable in  $O(n \log^2 n)$
- linked highlighting

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### Marking Structural Differences

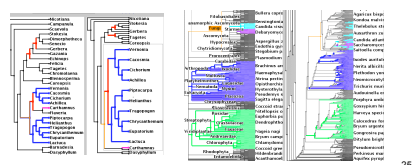


- Nodes for which  $S(v, BCN(v)) \neq 1$
- Matches intuition

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### TreeJuxtaposer

- video, software from [olduvai.sourceforge.net/tj](http://olduvai.sourceforge.net/tj)



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