

# A Simple Protocol for the Inference of RNA Global Pairwise Alignments

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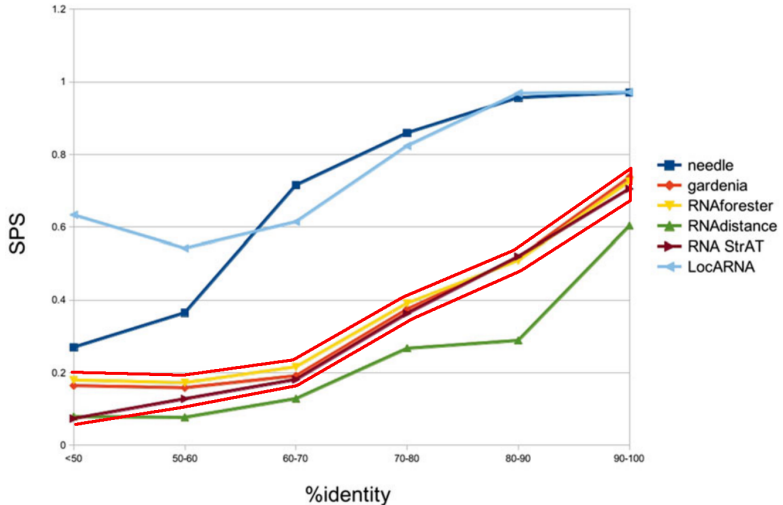


Tree-Based

Tree-Based

# Tree-based

Predicted Secondary Structures

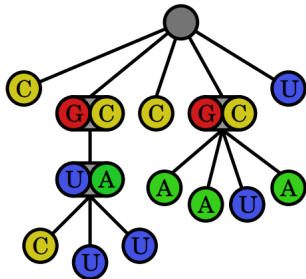


Using the secondary structure:

# Tree-based

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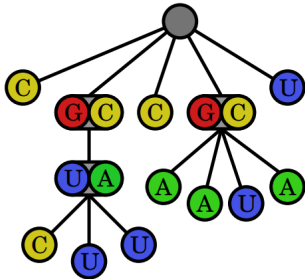
CGUCUUACCGAAUACU  
..((...)).(.....).



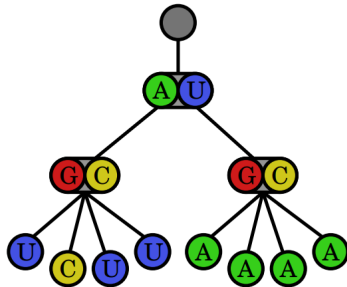
# Tree-based

Using the secondary structure:

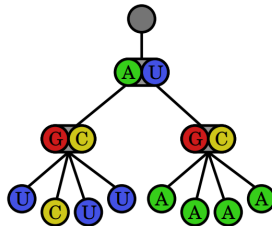
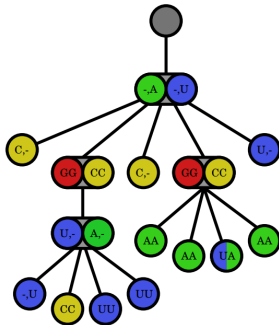
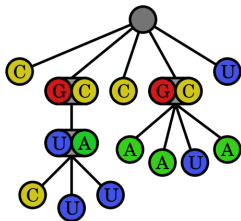
CGUCUUACCGAAUACU  
.(...)).(....).



AGUCUUCGAAAACU  
((...))(....)



# Tree-Alignment





# Tree-Alignment Problems

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- This is not always possible.

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Example:  $(. [. ) .]$

Edit operations on Trees ...

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... are edit operations on arc-annotated sequences!

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... are edit operations on arc-annotated  
sequences!  $(. ((. . (. .) . .)))$

# Tree-Editing Possibilities

1) ACGUUGACUGACAACAC

$$\dots \left( \left( \left( \dots \right) \right) \right) \dots$$

2) ACGAUCACGUACUAGCCUGAC

$$\dots (( (. ( (. . . ) ) . ) ) ) .$$


--- . --- . ( ( ( . . . ) ) ) . . . -- . .

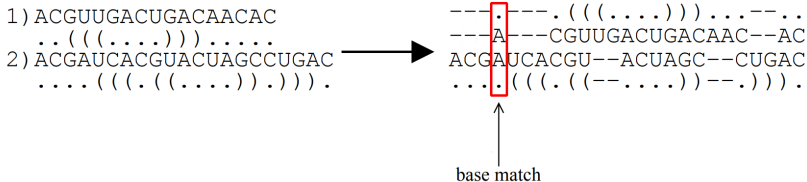
---A---CGUUGACUGACAAC--AC

ACGAUCACGU--ACUAGC--CUGAC

..... ( ( ( . ( ( -- . . . . ) ) -- . ) ) ) .

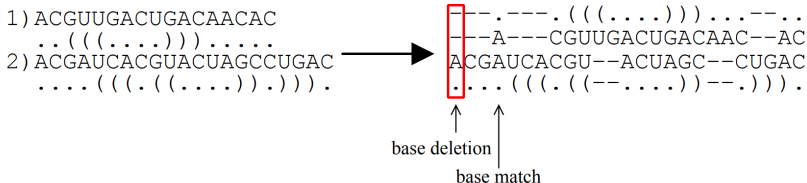


# Tree-Editing Possibilities



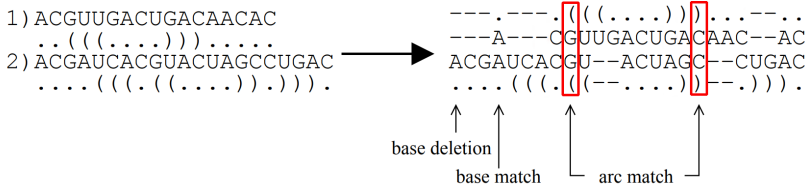
- base match

# Tree-Editing Possibilities



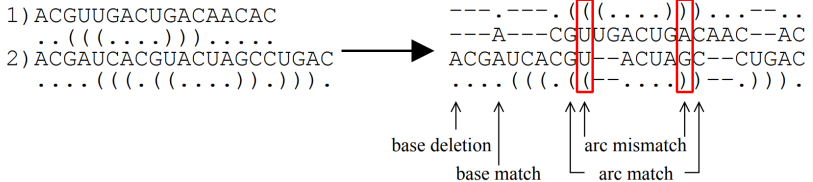
- base match
- base indel

# Tree-Editing Possibilities



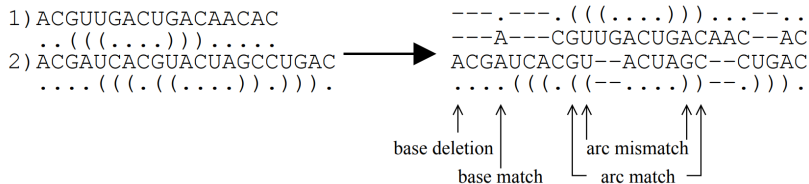
- base match
- base indel
- arc match

# Tree-Editing Possibilities



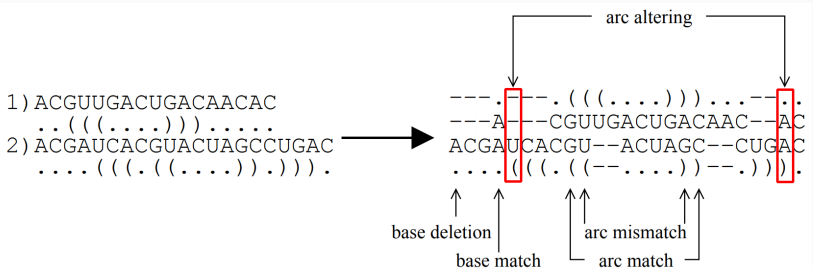
- base match
- base indel
- arc match
- arc mismatch

# Tree-Editing Possibilities



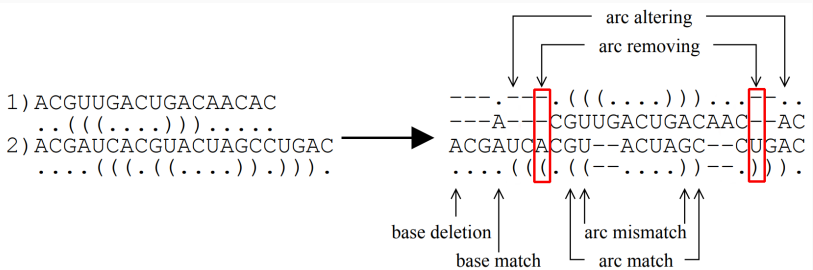
- base match
- base indel
- arc match
- arc mismatch
- arc breaking (missing)

# Tree-Editing Possibilities



- base match
- base indel
- arc match
- arc mismatch
- arc breaking (missing)
- arc altering

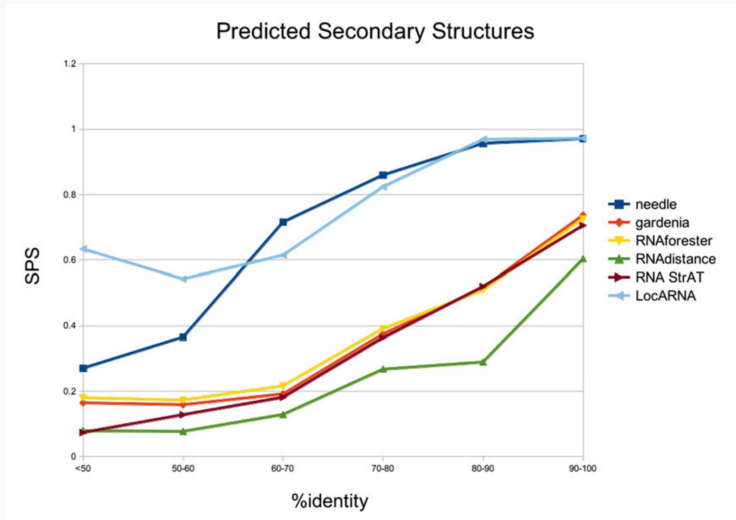
# Tree-Editing Possibilities



- base match
- base indel
- arc match
- arc mismatch

- arc breaking  
(missing)
- arc altering
- arc removing

# Performance comparison





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