Regular and first-order tree-to-tree functions

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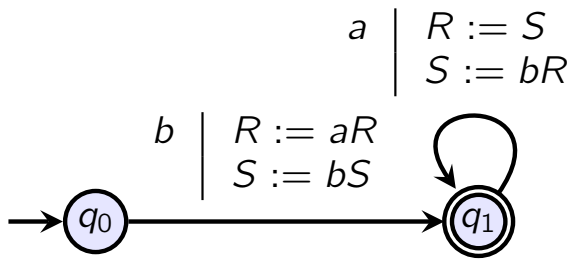
Amina Doumane & Mikołaj Bojańczyk
LIP-ENS Lyon

Regular and first-order word transductions

$$f : A^* \to B^*$$

Streaming string transducers (SST)		Monotone SST
MSO transductions	$x \geq y \mapsto y \geq x$	FO transductions
List functions	Basic functions (eg. $abaa \mapsto aaba$) + compositon	FO list functions

Regular and first-order tree-to-tree transductions

$$f : \mathcal{T}(A) \to \mathcal{T}(B)$$

Streaming tree transducers (STT)	Monotone STT
MSO transductions	FO transductions
?	?

Regular and first-order tree-to-tree transductions

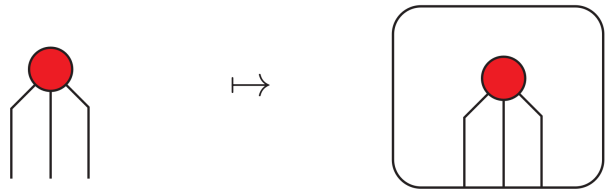
$$f : \mathcal{T}(A) \to \mathcal{T}(B)$$

Streaming tree transducers (STT)	Monotone STT
MSO transductions	FO transductions
Tree-to-tree functions	**FO tree-to-tree functions**

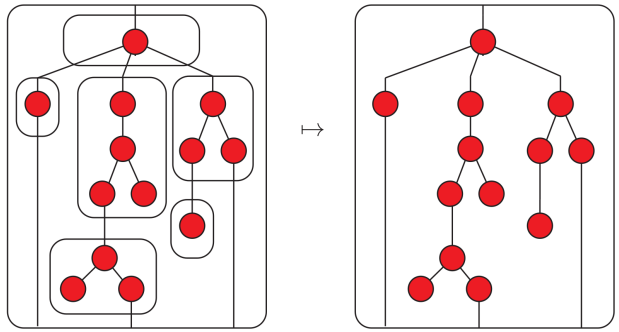
Regular and first-order tree-to-tree functions

$$f : \mathcal{T}(A) \to \mathcal{T}(B)$$

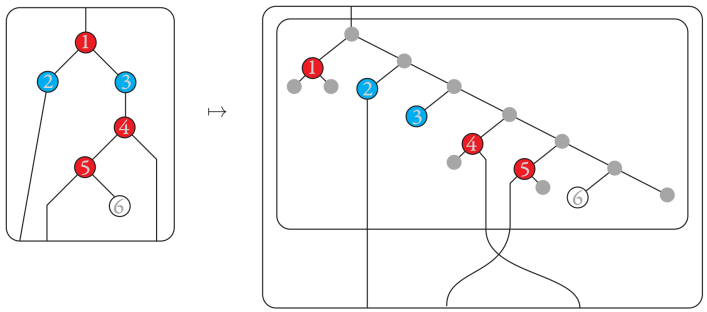
unit : $A \to \mathcal{T}(A)$



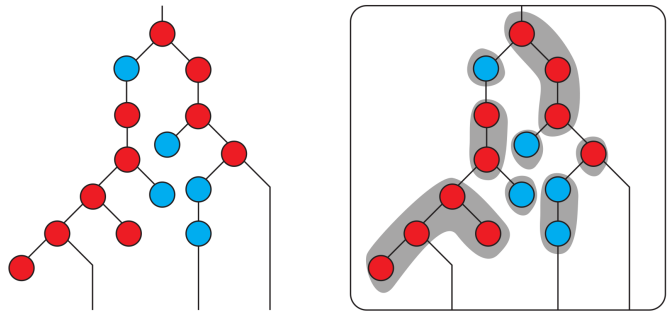
flat : $\mathcal{T}(\mathcal{T}(A)) \to \mathcal{T}(A)$



Depth-first-search : $\mathcal{T}(A) \to \mathcal{T}(A)$



block : $\mathcal{T}(A + B) \to \mathcal{T}(\mathcal{T}(A) + \mathcal{T}(B))$



Regular and first-order tree-to-tree functions

Theorem

Term functions = MSO transductions

Theorem

FO term functions = FO transductions

By product 2

Temporal logic for trees corresponding to FO.

By product 2

Evaluation of simply typed linear λ-terms is a FO transduction.

What's next?

- Implementations
- Graph-to-graph functions
- Poly-regular functions

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- Poly-regular functions

Thank you for your attention!