Good Paths in FAs

Good Path

A ~~seqeience~~ of states

$q_0, q_1, \ldots, q_n$ is

a good path if it

corresponds to a path

in the state diagram

~~same~~ q_0 – start s.

& q_n – final state

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$q_0 \xrightarrow[\text{no repeated states}]{} q_n$

3

Let $\Gamma = q_0, \ldots q_i, \ldots q_j, \ldots, q_n$ be a good path.

If $\exists x \in \Delta^*$ $q_j \xrightarrow{x} q_i$ $p_1, p_2, \ldots, p_n$ for ~~me~~ some $i < j$

~~then~~ $\cancel{\xi}$ $p_1 = q_j, p_n = q_i$

then $p_1, \ldots, p_n$ is

a ~~from~~ (q_j, q_i)-return within Γ.

3.1

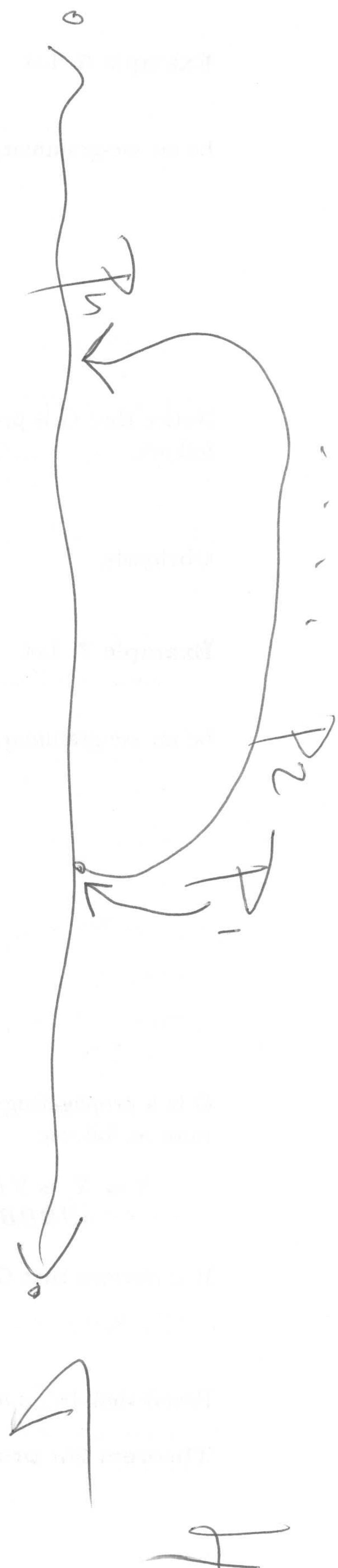
Let $L = \cancel{q_j}\, q_j p_1 \cdots p_k q_i \cdots q_j$

be a cycle,

$p_1, \ldots, p_k$ are not in ∇.

Then, L is a return to q_j (from q_i), written as

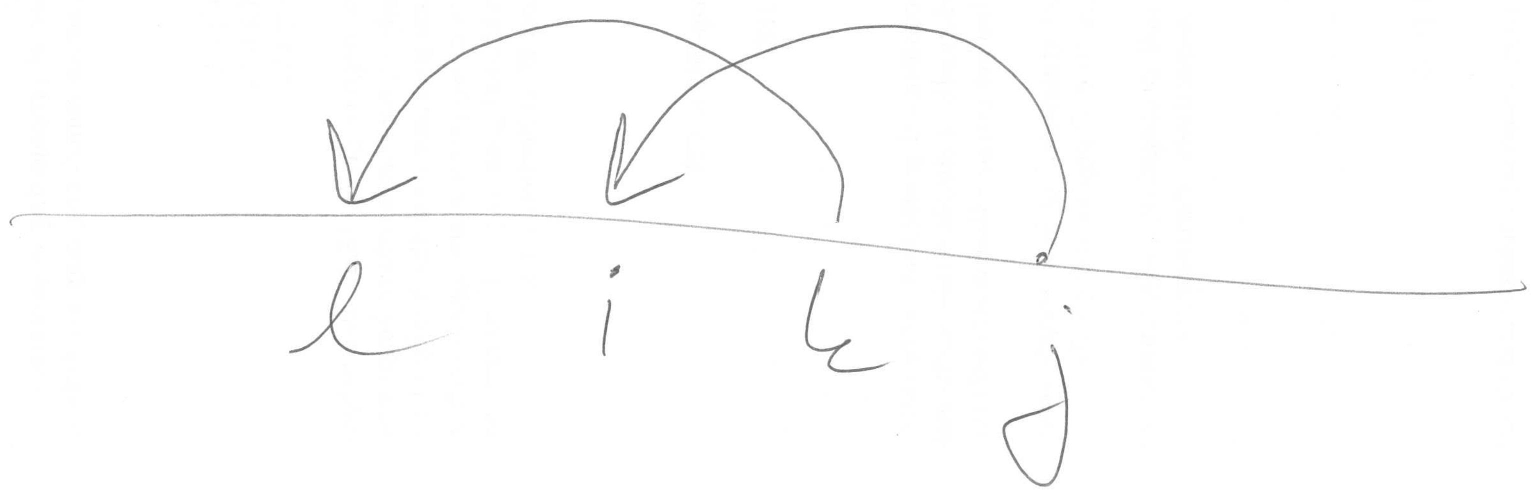
(q_i, q_j)-return



Overlapped returns σ

Let $\sigma = \ldots \mid (q_j, q_i)\text{-}r \mid (q_k, q_l)\text{-}r \mid$ & for some

$l < i < k < j$



5.1

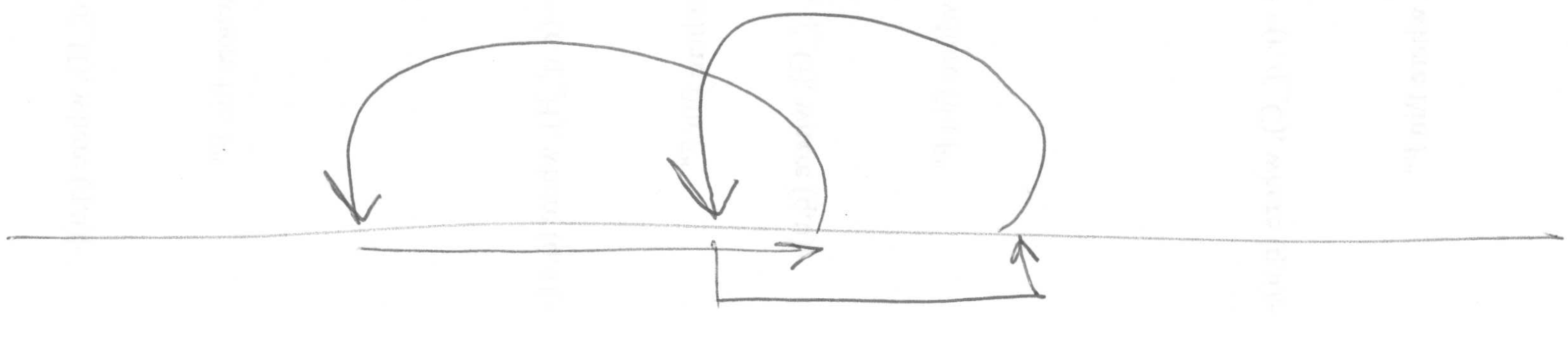
Let

$\sigma = q_1 \cdots q_i \cdots q_k \cdots q_j \cdots q_l \cdots q_n$

$x = (q_i, q_j)$ - return

$y = (q_k, q_l)$ - — " —

~~$k <$~~ $i < k < j < l$



Then, x ~~these two returns~~ and y 6.2

are overlapped returns.

5.3

M is a ~~one PA~~ one-good-path ~~PA~~ without over- r. if M contains one g. p. $\wedge$ no over-lapped returns.

Ψ – the set of all

$$\mathcal{L}(\Psi) = \{ L(M) \mid M \in \Psi \}$$

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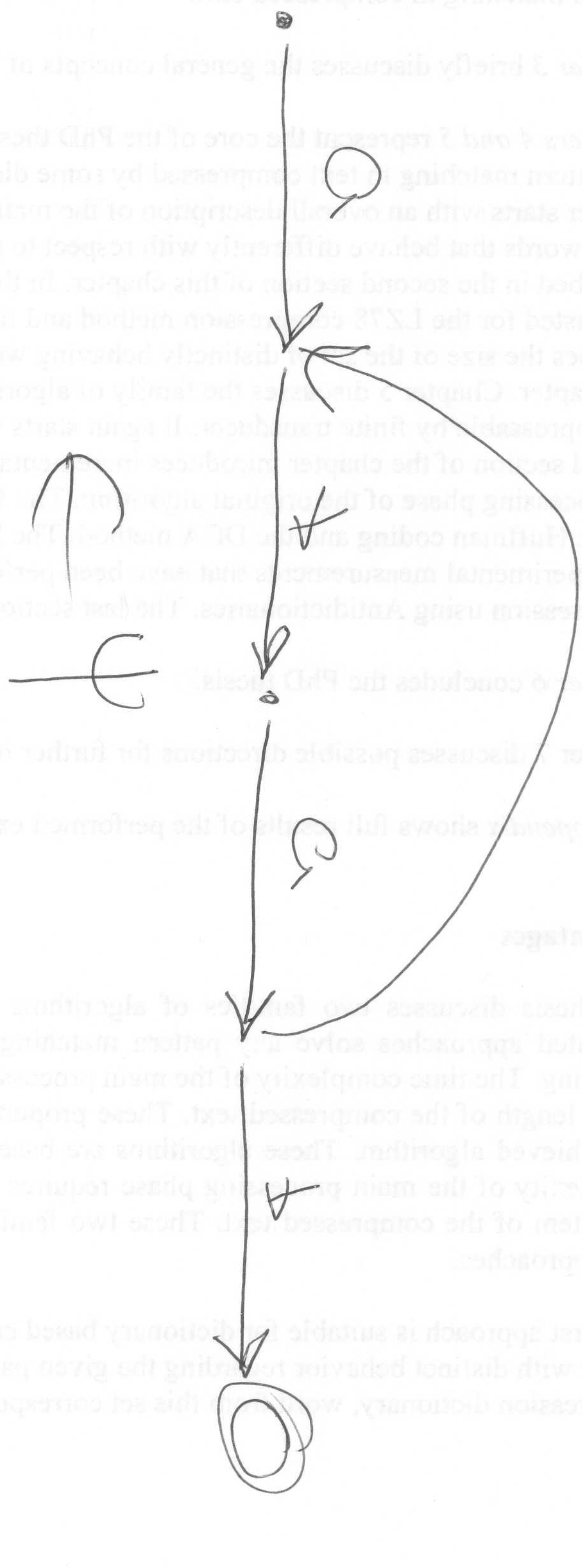
$*.E$ – only $*.$, not $|$

Conjecture. Let L be a f.l. L is a-ed by a OGPFA iff $L \in *.E$. $\boxed{\mathcal{L}(\Psi) = \mathcal{L}(*.E)}$

$(x\, y^{*} u)^{*}$



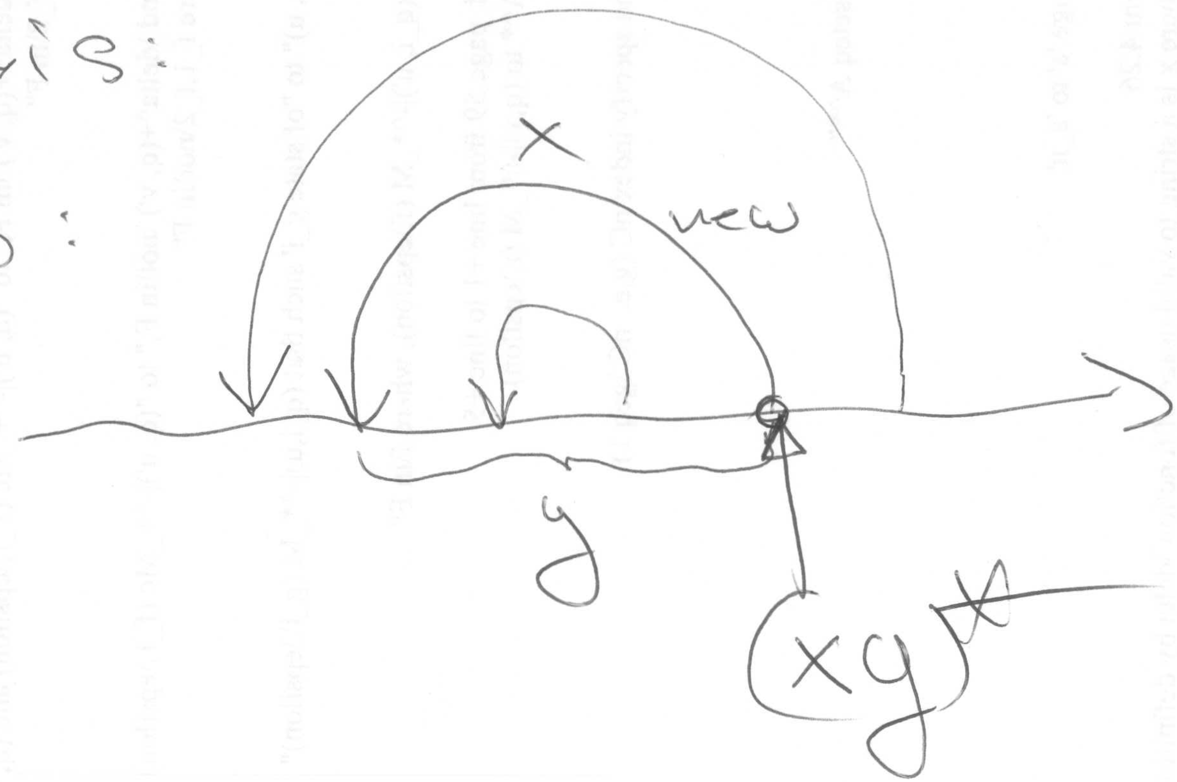
$\Rightarrow$: Let $M \in \Psi$. $\underline{\mathcal{L}(\Psi) \subseteq \mathcal{L}(x.F)^*}$

by induction on ~~the~~ # of returns.

Basis:

IS:

M:



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$\mathcal{L}({}_*E) \subseteq \mathcal{L}(\Psi)$

$\Leftarrow$: Let $e \in {}_*E$

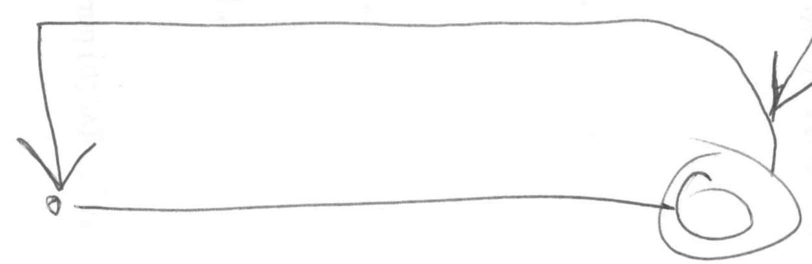
by induction on # of operators.

Basis: $\Sigma, \emptyset, a$

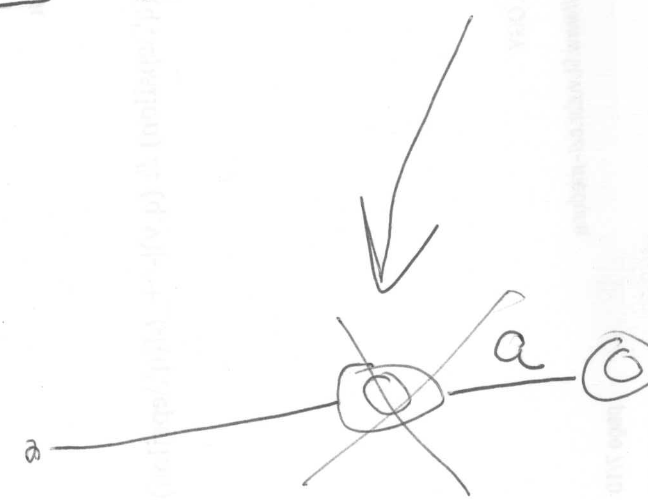
IS: I. $(e)^*$

n operators

n+1 operators



II. $e\ a$



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Ψ Ψ_1

${}_n\Psi$: ~~#~~ n or fewer good paths ~~in~~ ~~#~~ FAs with

$\mathcal{L}({}_n\Psi)$

$*.E|_n$ — $*.E$ plus n or fewer ~~B~~ 1s

$$\mathcal{L}({}_n\Psi) = \mathcal{L}(*.E|_n)$$

$\mathcal{L}({}^{\emptyset}E) = \{\emptyset$

${}^{\varepsilon}E = \varepsilon$

${}^{\Sigma}E = \Sigma$

${}^{\varepsilon\Sigma}E = \Sigma \cup \{\varepsilon\}$

${}^{*}E = \cancel{\Sigma\,\{\varepsilon\} \cup}\ \Sigma^{*}$

${}^{*\emptyset}E = \{\varepsilon\}$

${}^{*\varepsilon}E = \{\varepsilon\}$

$|E = $ FIN

$\cdot{*}E = $ this talk

$*|E = ((a|b)^{*} \mid c)^{*}$

$\cancel{|E}$

$\cancel{E = abcd}$

$\{a,b\} \notin \circ * E$