Simpler Method

Generalized Automaton

is a non-deterministic automaton with two properties.

1. $M_0$ has a single final state $F = \{ f \}$.

2. If $(q, u, p) \in \Delta_0$ then $q \neq f$, $p + s$.

3. No transition pointing in to initial state, or out of a final state.

We add to original $M$ a new initial state $s_0$, and new final state $f$. 

$u \in \Sigma^*$ or $u \in \mathbb{R}$.
and

$$\Delta_0 = \Delta \cup \{(e, s_0, s_0), (q, e, f) : q \in F_{\text{original}}, s_0 \text{ is original} \}$$

Example:

L(M) = {w : w has 3k+1 b's}
General MG

\[ L(M) = L(G_1) = L(M) \text{ eliminate all states} \]

\[ + \text{ we assume } \]

\[ M_0 = M_{\gamma} \]

\[ M_{\gamma} = M_{\gamma_1} \]

last has sub

Regula ESP

\[ LCM \]
GENERALIZED $M_G$

$M(G) = \{ q_1, ..., q_m \}$

We use construction on $M_G$

$L(M) = \bigcup \{ R(1, i, M) : \exists \gamma \in F \}$

NEW INITIAL NOW is $q_{n+1}$, $f = 2^n$

NEW NUMBER OF STATES $m = 5$
We have only one final state $f = 2n$ so

$L(M_6) = L(M) = R(n-1, n, n)$

$L(M) = R(m-1, n, n)$

For our example

$L(M) = R(1, 3, 3) -$

$L(M) = R(4, 5, 5)$

We can't use the formula

$R(i, j, k) = R(i, j, k-1) \cup R(i, k, k-1) R(k, k, k)$

$R(k, j, k-1)$
Diagram of M depicts correct values of

$R(i, j, 0)$

We compute $R(i, j, 0)$ by the following

of state 9

All strings that lead M to acceptance passing through 9 have been considered and taken into account in the $R(i, j, 0)$
General Method of States Eliminations

i.e. constructing \( M_0 \cong M \)

\( \lambda, \beta, \delta, \gamma \in \mathbb{R}^* \)

Regular

When there is no arrow \( \delta \)

\( \gamma > 0 \)

\( \gamma \in \mathbb{R} \)

\( \delta(x) = \{e\} \)

and

\( \delta(x) = \{e\} \)

Eliminate

Transform to
BACK TO OUR AUTOMATA

AFTER 2₁ ELIMINATION

2₂ ELIMINATION to obtain R₁₁₂

(aub₁a₂b₁b₃b)
elimination to obtain $R(4, 5, 3)$

Answer:

$L(M) = \Sigma (R)$

$R = R(4, 5, 5) = R(4, 5, 3)$

$R = a^*b (ba^*bba^*bba^*bba^*b* a)^*$

$L = \Sigma (R) = \{ w \in \Sigma^* : w \text{ has } 3k+1, 6's \text{ for some } k \in \mathbb{N} \}$
$a^* \cup a^+ \subseteq a^*$

\{e, a, aa, \ldots \} \cup \{a, aa, \ldots \} = a^*$