Unit-6: Model-checking ω-regular properties

B. Srivathsan

Chennai Mathematical Institute

NPTEL-course

July - November 2015

Module 1:

Overview

Does **Transition system** satisfy ω-regular property ?

Does **Transition system** satisfy ω-regular property ?

ω-regular expression ϕ

Does **Transition system** satisfy ω-regular property ?

ω-regular expression ϕ

NBA $\mathcal{A}_\phi$

Does **Transition system** satisfy ω-regular property ?

NBA $\mathcal{A}_{T.S}$

ω-regular expression ϕ

NBA $\mathcal{A}_{\phi}$

Does **Transition system** satisfy ω-regular property ?

ω-regular expression ϕ

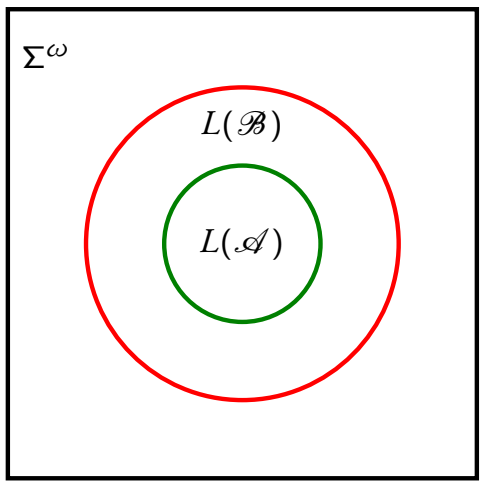
NBA $\mathcal{A}_{T.S}$

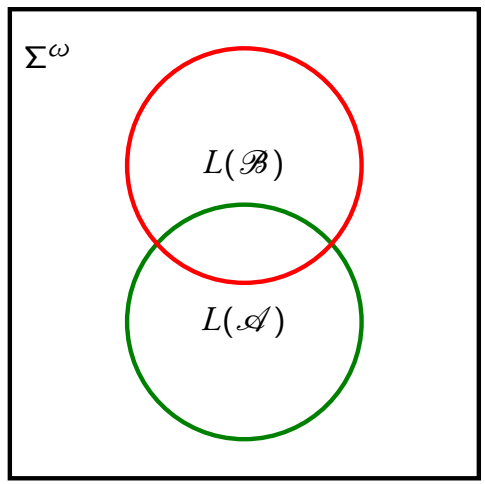
NBA $\mathcal{A}_{\phi}$

$$L(\mathcal{A}_{T.S.}) \subseteq L(\mathcal{A}_{\phi})\,?$$

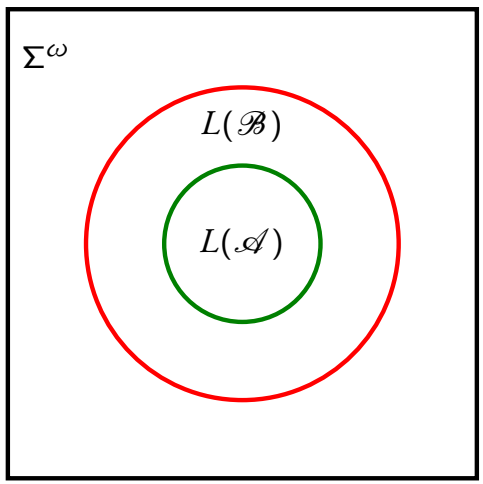
$$L(\mathscr{A}) \subseteq L(\mathscr{B})\,?$$

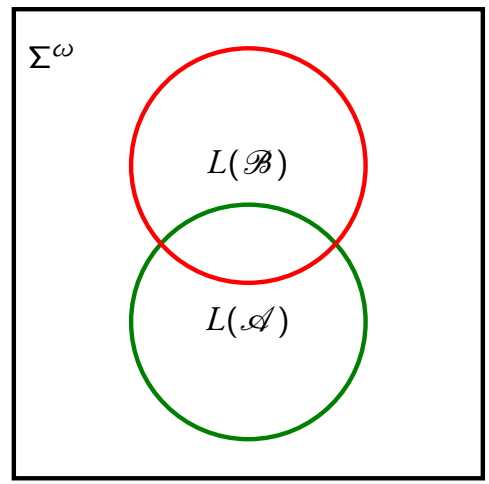
$$L(\mathscr{A}) \subseteq L(\mathscr{B})\,?$$





$$L(\mathscr{A}) \subseteq L(\mathscr{B})\,?$$





$$L(\mathscr{A}) \cap \overline{L(\mathscr{B})} \text{ is empty ?}$$

Does **Transition system** satisfy ω-regular property ?

NBA $\mathscr{A}_{T.S}$

ω-regular expression ϕ

NBA $\mathscr{A}_{\phi}$

$$L(\mathscr{A}_{T.S.}) \subseteq L(\mathscr{A}_{\phi}) \, ?$$

Does **Transition system** satisfy ω-regular property ?

ω-regular expression ϕ

NBA $\mathcal{A}_{T.S}$

NBA $\mathcal{A}_{\phi}$

$$L(\mathcal{A}_{T.S.}) \subseteq L(\mathcal{A}_{\phi})\,?$$

Is $L(\mathcal{A}_{T.S.}) \cap \overline{L(\mathcal{A}_{\phi})}$ empty ?

Does **Transition system** satisfy ω-regular property ?

ω-regular expression ϕ

NBA $\mathcal{A}_{T.S}$

NBA $\mathcal{A}_{\phi}$

$$L(\mathcal{A}_{T.S.}) \subseteq L(\mathcal{A}_{\phi})\,?$$

Is $L(\mathcal{A}_{T.S.}) \cap \overline{L(\mathcal{A}_{\phi})}$ empty ?

Is $L(\mathcal{A}_{T.S.}) \cap L(\overline{\mathcal{A}_{\phi}})$ empty ?

Does **Transition system** satisfy ω-regular property ?

ω-regular expression ϕ

NBA $\mathcal{A}_{T.S}$

NBA $\mathcal{A}_{\phi}$

$$L(\mathcal{A}_{T.S.}) \subseteq L(\mathcal{A}_{\phi})\,?$$

Is $L(\mathcal{A}_{T.S.}) \cap \overline{L(\mathcal{A}_{\phi})}$ empty ?

Is $L(\mathcal{A}_{T.S.}) \cap L(\overline{\mathcal{A}_{\phi}})$ empty ?

Is $L(\mathcal{A}_{T.S.} \times \overline{\mathcal{A}_{\phi}})$ empty ?

To be seen...

- **Converting** ω-regular expression to NBA (Module 2)

- Checking **language emptiness** of NBA (Module 3 and 4)